

X

## Nippon Telegraph and Telephone Corporation

1-6 Uchisaiwaicho 1-chome  
Chiyoda-ku, Tokyo 100, Japan  
Telephone: 011-81 (3) 509-3101  
Fax: 011-81 (3) 509-9104  
Dun's Number: 69-053-5000

*Date Founded: 1952*

### CORPORATE STRATEGIC DIRECTION

Nippon Telegraph and Telephone Public Corporation, incorporated in 1952 by the Nippon Telegraph and Telephone Public Corporation Law, was until 1985 the Japanese public telecommunications services company. The Public Corporation took over the telephone, telegraph, and related telecommunications services from the central government. Control of Nippon Telegraph and Telephone Public Corporation's business and financial activities was exercised by various governmental bodies, with principal supervision provided by the Ministry of Posts and Telecommunications (MPT).

Nippon Telegraph and Telephone Public Corporation remained a public company until 1985, at which point all assets and liabilities were transferred to Nippon Telegraph and Telephone Corporation (NTT). All shares of stock in the Public Corporation were transferred to the Japanese government upon dissolution of the Public Corporation. Since incorporation, the government of Japan has sold 5.4 million shares (32.5 percent of outstanding shares) of the Company's common stock to the general public. In *Business Week's* 1989 rankings of the world's top 1,000 companies, NTT's market value was estimated at US\$163.86 billion, making it the largest company in the world.

NTT is a telecommunications service company primarily involved in telephone, telegraph, leased circuit, data communications facility, digital data exchange, paging, and other services. The Company is also involved in various other related services, including sales of terminal equipment, telecommunications consulting, and operator information. The Company received 79.1 percent of its revenue from its primary telecommunications services in the fiscal year ending March 31, 1989, which is a decrease of 1.3 percent from the previous year.

Through its head office in Tokyo, NTT controls 11 Telecommunications Bureaus. These bureaus oversee field administrative division offices under five classifications: telecommunications, urban telecommunications, area telecommunications, carrier communications, and radio communications. Under these divisions, offices furnish telecommunications services directly to customers. NTT does not market its computer systems directly; revenue is generated through subscriptions and equipment leasing.

NTT operates in a highly regulated industry. The Japanese government began to deregulate the telecommunications services industry in 1986 when it opened the leased circuits services market. Subsequently, it opened the long distance telephone and paging services markets in 1987 and the mobile telephone services market in 1988. To operate in the industry, a new entrant must first seek approval from the MPT. Thirty-three Type I carriers (those who have their own telecommunications circuits and facilities) have been approved by the MPT.

Although NTT is a private company, the Japanese government maintains control of 67.5 percent of the outstanding stock. NTT must still apply to the MPT for approval of its business operation plan for the upcoming year. Furthermore, the government currently is considering a proposal to split NTT into separate operating companies. A five-year study has been undertaken to evaluate the effects of a divestiture and determine NTT's future structure.

Two main arguments support divesting NTT. The first is that NTT hinders fair and effective competition in the market through its established position. Currently, for an alternate long distance carrier to access a local loop, it must obtain services from NTT, which has a monopoly on the local telecommunications service market. The second argument is that NTT suffers

from inherent management inefficiencies due to its size.

To combat the possibility of a divestiture, NTT has implemented an unusual corporate strategy. NTT is offering technical advice to its competitors to increase the competitiveness within the industry. The desired outcome of this strategy is that in five years, the telecommunications industry will display sufficient competition so as not to warrant a divestiture. Currently, Daini Denden, Japan Telecom, and Teleway Japan, the three largest long distance carriers other than NTT, together control 6 percent of the \$20 billion domestic market.

To combat the second argument favoring divestiture, the Company has undertaken strategies to streamline the administrative structure, reduce rates, and divest Company interests. In April 1989, NTT reduced the number of administrative levels from four (headquarters, regional headquarters, district headquarters, and telephone offices) to three (headquarters, telecommunications service districts, and branches). Services were also integrated at the individual branches.

The Company also has been consistently reducing its service rates. In February, it reduced its long distance rates for the second year in a row and lowered charges for adjacent area telephone calls. Fees for pocket pagers and leased circuits were also reduced during 1989 by an average of 10 percent.

Lastly, by establishing affiliates, subsidiaries, and associated companies, NTT hopes to secure diversified sources of income. Since privatization, NTT has set up 131 companies. The most recent establishments have been through joint ventures with Battelle Memorial Institute, IBM Japan, Ltd., ITT-WD, and Moli Energy Ltd. of Canada. Through these joint ventures, NTT has expanded its interest in telecommunications-related businesses and has entered various other industries, such as lithium batteries and photonic research.

Additional corporate goals include the following:

- Digitize all telecommunications systems in order to implement Integrated Services Digital Network (ISDN) throughout Japan in the near future
- Introduce INS-Net 1500, the first commercial primary rate service in Japan

- Drastically increase the overall R&D expenditure over the next three years
- Further integrate the administrative structure, specifically the management, sales networks, and customer service operations in cellular phones and pocket pagers

Operating revenue in fiscal year ending March 31, 1989, continued to grow, but was overshadowed by efficiency-building expenses. Operating revenue increased 3.2 percent to ¥5,841.9 billion (US\$45,551 million) in fiscal 1989 from ¥5,662.0 billion (US\$41,020 million) in fiscal 1988. (Percentage changes refer only to ¥ amounts; US\$ percentage changes will differ because of fluctuations in Dataquest exchange rates.) The gain reflected favorable economic conditions and solid growth in the demand for leased circuit, digital data exchange (DDX), data communications facility, and telegraph services. Net income decreased 1.3 percent to ¥263.6 billion (US\$2,055 million) in fiscal 1989 from ¥267.2 billion (US\$1,936 million) in fiscal 1988.

NTT's operating revenue and profits for fiscal 1990 were released prior to NTT's fiscal 1990 Annual Report. Operating revenue increased 56.7 percent to ¥9,154.0 billion (US\$64,254 million), while operating profits increased 23 percent to ¥273.7 billion (US\$1,921 million). For 1990, Dataquest estimates that NTT acquired a 9 percent share of the worldwide telecommunications market and a 90 percent share of the Japanese telecommunications market, thereby ranking as the largest (by revenue) telecommunications company in the world.

R&D expenditure increased 22 percent to ¥221.7 billion (US\$1.7 billion) in fiscal 1989 from ¥181.7 billion (US\$1.3 billion) in fiscal 1988. As a percentage of revenue, R&D expenditure was 3.8 percent and 3.2 percent in fiscal 1989 and fiscal 1988, respectively. R&D efforts in 1989 focused on digital network technologies, intelligent processing technologies, nanoelectronics, and optoelectronics.

NTT's R&D system consists of 11 functionally grouped telecommunications laboratories, applied research sections in each of NTT's business divisions, and development centers for technology advances. The R&D system is coordinated by the Research and Development Headquarters. In all, there are approximately 6,000 scientists, engineers, and technicians.

More detailed information is available in Table 1, which appears after "Business Segment Strategic Direction" and presents corporate highlights. Information on revenue by region and distribution channel is not available. Tables 2 and 3, comprehensive financial statements, are at the end of this profile.

## BUSINESS SEGMENT STRATEGIC DIRECTION

### Telephone Services

Operating revenue for the telephone services increased 1.5 percent to ¥4,622.7 billion (US\$36.0 billion) in fiscal 1989 from ¥4,553.8 billion (US\$33.0 billion) in fiscal 1988. The telephone services revenue represented 79.1 percent of NTT's total operating revenue in fiscal 1989. The revenue increase came despite growing competition from new common carriers (NCCs) and an average 10 percent reduction on all telephone service rates implemented during fiscal 1989.

The Company offers a wide range of telephone services, including telephone subscriber, public telephone, automobile telephone, and other services. Outstanding revenue performances came from the cellular telephone services, which increased 57.6 percent in sales volume, as well as the new autodial prepaid magnetic telephone card service, and the toll-free dialing service.

### Telegraph Services

Operating revenue for the telegraph service increased 7 percent to ¥53.4 billion (US\$416 million) in fiscal 1989 from ¥49.8 billion (US\$361 million) in fiscal 1988. The telegraph service revenue represented 0.9 percent of NTT's total operating revenue.

Telegraph services consist of telegram and telex services. Telegraph transmissions gradually rose from 41 billion in the early 1980s to a peak of 44 billion in 1984. Since then, telegraph transmissions have hovered at around 41 billion. NTT has introduced value-added telegrams, such as musical and scented telegrams, to help boost the market and has computerized its telegram handling system in order to maximize efficiency.

### Leased Circuit Services

Operating revenue for the leased circuit services increased 13 percent to ¥334.3 billion (US\$2.6 billion) in fiscal 1989 from ¥295.4 billion (US\$2.1 billion) in fiscal 1988. Leased circuit services operating revenue accounted for 5.7 percent of NTT's total 1989 operating revenue.

Leased circuit services consist of standard circuit, high-speed digital circuit, video communications, television relay, satellite communications, and other services. All of NTT leased circuit services showed stable growth, although high-speed digital leased circuits showed the largest growth with a 39.5 percent increase.

### Data Communication Facility Services

Operating revenue for the data communication facility services increased 5.6 percent to ¥186.0 billion (US\$1.5 billion) in fiscal 1989 from ¥176.1 billion (US\$1.3 billion) in fiscal 1988. Data communication facility services operating revenue accounted for 3.2 percent of NTT's total 1989 operating revenue.

In May 1988, NTT established Data Communications Systems Corporation (NTT Data), a wholly owned subsidiary, to assume the responsibilities of NTT's Data Communications Sector. NTT Data designs, consults on, and contracts data communications systems for government organizations and private companies in various industries. NTT Data also provides ready-made services, such as Automatic Answer Network System for Electrical Request (ANSER) and Credit and Finance Information System (CAFIS). ANSER, used primarily by financial institutions, allows companies to supply customers automatically with account information requested via telephone, facsimile, personal computer, or videotex terminal. NTT Data also provides CAFIS, a nation-wide on-line network service that links credit card companies, banks, and retailers for credit-card and bank-card validations, billing status, and other account information.

### Digital Data Exchange Services

Operating revenue for DDX services increased 48.8 percent to ¥33.3 billion (US\$260 million) in fiscal 1989 from ¥22.4 billion (US\$162 million) in

fiscal 1988. DDX services accounted for 0.6 percent of NTT's total 1989 revenue.

NTT provides circuit-switching and packet-switching DDX services. In the near future, NTT expects to add packet-switching capabilities to INS-Net 64 (NTT's first commercial ISDN) and to INS-Net 1500 (NTT's upgraded ISDN with a transmission capacity approximately 12 times that of INS-Net 64).

#### Pocket Pager Services

Operating revenue for pocket pager services increased 1.3 percent to ¥94.5 billion (US\$737 million) in fiscal 1989 from ¥93.3 billion (US\$676 million) in fiscal 1988. Pocket pager services operating revenue accounted for approximately 1.6 percent of NTT's total 1989 operating revenue.

NTT has increased its competitiveness by reducing rates and introducing new products such as the card-type pocket pager, the pen-type display pager, and the large display pager. NTT also reorganized the sales network to enable customers to purchase a wider variety of products in one store.

#### Other Services

Operating revenue for NTT's other services remained fairly stable at ¥155.8 billion (US\$1.2 billion), which accounted for 2.7 percent of NTT's total 1989 operating revenue.

Other services are facsimile network services, videoconference services, and videotex services. The most significant growth came in from the F-Net facsimile network services, which experienced a 55.9 percent increase in revenue and a 48.2 percent increase in subscriptions to ¥5.3 billion (US\$41 million) and 297,800, respectively.

#### Related Businesses

NTT's related businesses brought in over ¥361 billion (US\$2.8 billion) in operating revenue, which accounted for 6.2 percent of NTT's total 1989 operating revenue. Related businesses' operating revenue increased 14 percent from the previous year.

Related businesses include terminal equipment sales, operator information services, and telecommunications consulting services. The main revenue generator in this sector is terminal equipment sales, which rose 4.1 percent to approximately ¥259 billion (US\$2.0 billion) in fiscal 1989 from approximately ¥249 billion (US\$1.8 billion) in fiscal 1988. Terminal sales accounted for approximately 72 percent and 4 percent of the related business operating revenue and NTT's total operating revenue, respectively.

#### New Developments

NTT is currently investing heavily in X-ray lithography systems. It has thus far achieved an accuracy level of 0.07 microns; however, a level of 0.04 microns is necessary to achieve the 0.2-micron design rule. Results are expected to be three to six years away.

NTT has developed a compact, economical synchronic orbital radiation (SOR) facility using only a 2.5-meter by 8.0-meter superconductive storage ring and a 1.7-meter linear accelerator. The SOR facility is capable of extremely fine structure processing. NTT's Large-Scale Integrated (LSI) Circuit Laboratories are developing SOR lithography as a source for advanced LSI manufacturing.

#### Further Information

For further information about the Company's business segments, please contact the appropriate Dataquest industry service.

**Table 1**  
**Corporate Highlights (Millions of US Dollars)**

	1986	1987	1988	1989
Four-Year Revenue	\$23,011	\$33,561	\$41,020	\$45,551
Percent Change	-	45.85	22.23	11.05
Capital Expenditure	\$7,144	\$10,108	\$13,013	\$13,758
Percent of Revenue	31.04	30.12	31.72	30.20
R&D Expenditure	\$616	\$936	\$1,317	\$1,729
Percent of Revenue	2.68	2.79	3.21	3.79
Number of Employees	304,000	298,000	294,369	283,294
Revenue (\$K)/Employee	\$76	\$113	\$139	\$161
Net Income	\$839	\$1,208	\$1,936	\$2,055
Percent Change	-	43.91	60.27	6.19
Exchange Rate (US\$1=¥)	¥221.26	¥159.52	¥138.03	¥128.25
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>
Quarterly Revenue	NA	NA	NA	NA
Quarterly Profit	NA	NA	NA	NA

NA = Not available

Source: Nippon Telegraph and Telephone Corporation  
 Annual Reports  
 Dataquest (1990)

---

## 1989 SALES OFFICE LOCATIONS

North America—2  
Europe—3  
Asia/Pacific—More than 133  
Japan—More than 130  
ROW—2

---

## MANUFACTURING LOCATIONS

### *North America*

Photonic Integration Research Inc., United States  
Optical waveguide products

### *Asia/Pacific*

Business Communication System Engineering Co.,  
Ltd., Japan  
Software  
Nippon Information and Communication Corp., Japan  
VAN and other telecommunications network  
services  
NTT Data Communications Systems Corp., Japan  
VAN and software  
NTT Leasing Co., Ltd., Japan  
Terminal equipment

---

## SUBSIDIARIES

### *North America*

Advanced Energy Technologies Inc. (Canada)  
NTT America, Inc. (United States)  
NTT Data USA (United States)  
Photonic Integration Research, Inc. (United States)

### *Europe*

NTT Europe Limited (United Kingdom)  
NTT Finance (Holland) BV (Netherlands)  
NTT Finance (U.K.) Limited (United Kingdom)  
NTT International Scandinavia (Finland)

### *Asia/Pacific*

Advanced Telecommunications Research Institute  
International (Japan)  
AIREC Engineering Corp. (Japan)  
Amenity Service Kansai Co., Ltd. (Japan)  
Business Communication System Engineering Co.,  
Ltd. (BCSE) (Japan)  
Captain Service Company Limited (Japan)  
Healthynet Hiroshima Co. (Japan)  
INS Engineering Corp. (Japan)  
International Information Inc. (Japan)  
Internetwork Inc. (Japan)  
Kokyo Securities Co., Ltd. (Japan)  
Nagoya Information Center Co. (Japan)  
Nippon Airport Radio Service Co., Ltd. (Japan)  
Nippon Computer Security Corp. (Japan)  
Nippon Directory Development Co., Ltd. (Japan)  
Nippon Information and Communication Corp. (NIC)  
(Japan)  
Nippon Senpaku Tsushin K.K. (Japan)  
Nippon Telematique, Inc. (Japan)  
NTT Auto Leasing Co., Ltd. (Japan)  
NTT Central Mobile Communications Corp. (Japan)  
NTT Central Network System (Japan)  
NTT Chugoku Mobile Communications Corp.  
(Japan)  
NTT Data Communications Systems Corp. (Japan)  
NTT Estate Co., Ltd. (Japan)  
NTT Information Development Co., Ltd. (Japan)  
NTT Intelligent Technology Co., Ltd. (Japan)  
NTT International Corp. (Japan)  
NTT Kansai Mobile Communications Corp. (Japan)  
NTT Kansai Real Estate Corp. (Japan)  
NTT Kansai Telecon Co. (Japan)  
NTT Kyushu Mobile Communications Corp. (Japan)  
NTT Kyushu Tele-control Corp. (Japan)  
NTT Learning Systems Co. (Japan)  
NTT Leasing Co., Ltd. (Japan)  
NTT Off-Talk Tushin Co., Ltd. (Japan)  
NTT PC Communications, Inc. (Japan)  
NTT Rental Engineering Co., Ltd. (Japan)  
NTT Software Corp. (Japan)  
NTT Telemarketing Co., Ltd. (Japan)  
NTT Tokai Mobile Communications Corp. (Japan)  
NTT Tokai Real Estate Corp. (Japan)  
NTT Tour-Media Company, Ltd. (Japan)  
NTT Urban Development Co., Ltd. (Japan)  
The Japan Utility Subway Company, Inc. (Japan)

### *ROW*

NTT do Brasil Ltda. (Brazil)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

1989

### International Telecommunications Union

NTT joined this union to promote the worldwide standardization of telecommunications technologies.

### IBM Japan

NTT and IBM Japan jointly formed Nippon Information and Communication Corporation.

### Matsushita and Nissan Motor

NTT Data, Matsushita, and Nissan jointly formed Star Communication Planning Corp.

### Nissan Motor

NTT Data and Nissan agreed to jointly develop IC credit cards.

### Toshiba

NTT and Toshiba agreed to jointly develop PBX software.

### Cincinnati Bell Information Systems

Cincinnati Bell agreed to supply its software network system.

### American Telephone and Telegraph

The companies made a product development and marketing agreement.

### ITT-WD

NTT and ITT-WD jointly formed Nippon Directory Development Co., Ltd., a telephone directory consulting company.

### Battelle Memorial Institute

NTT and Battelle jointly formed Photonic Integration Research, Inc.

### Moli Energy Ltd. of Canada

NTT and Moli jointly formed Advanced Energy Technologies Inc. to develop a rechargeable lithium battery.

### Illinois Bell Telephone

NTT and Illinois Bell linked their ISDN services so that users in the companies' respective countries can access services of the other.

### Schlumberger, Ltd.

NTT and Schlumberger formed a joint venture to construct an ASIC verification system based on an NTT tester design.

### LM Ericsson Telefon AB

NTT and Ericsson formed a joint venture to develop digital cellular telephone system for Japan.

### Northern Telecom

A joint development effort has been undertaken to build systems for the TRON Operating System.

### Fujitsu, Ltd.

A joint development effort has been undertaken to build systems for the TRON Operating System.

### Hitachi, Ltd.

A joint development effort has been undertaken to build systems for the TRON Operating System.

### Matsushita Electric Industrial Company

A joint development effort has been undertaken to build systems for the TRON Operating System.

### Mitsubishi Electric Corp.

A joint development effort has been undertaken to build systems for the TRON Operating System.

### Co Corp.

A joint development effort has been undertaken to build systems for the TRON Operating System.

### Oki Electric Co.

A joint development effort has been undertaken to build systems for the TRON Operating System.

### Toshiba Corp.

A joint development effort has been undertaken to build systems for the TRON Operating System.

---

## MERGERS AND ACQUISITIONS

Information is not available.

---

## KEY OFFICERS

Haru Yamaguchi  
Chairman

Masashi Kojima  
President

Shigeo Sawada  
Senior executive vice president

Katsumi Iida  
Senior executive vice president

Shozo Iwasaki  
Senior executive vice president



**Tomeo Kambayashi**  
Senior executive vice president

---

---

**FOUNDERS**

Information is not available.

---

**PRINCIPAL INVESTORS**

Ministry of Finance—77.5 percent  
Mitsubishi Trust & Banking—0.5 percent  
Sumitomo Trust—0.4 percent  
Toyo Trust—0.4 percent  
Yasuda Trust—0.4 percent  
Chuo Trust—0.3 percent  
Japan Securities Clearing—0.3 percent  
Nippon Life—0.3 percent  
Sumitomo Life—0.3 percent

**Table 2**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending March 31**  
**(Millions of US Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Total Current Assets</b>	\$4,019	\$6,255	\$7,828	\$9,707
Cash and Equivalents	1,798	2,822	3,198	3,542
Receivables	1,524	2,488	3,352	4,157
Inventory	178	232	290	377
Other Current Assets	519	712	988	1,631
<b>Net Property, Plants</b>	\$45,905	\$62,444	\$72,017	\$76,225
<b>Other Assets</b>	\$1,457	\$2,624	\$3,152	\$4,202
<b>Total Assets</b>	<b>\$51,381</b>	<b>\$71,324</b>	<b>\$82,996</b>	<b>\$90,134</b>
<b>Total Current Liabilities</b>	\$7,028	\$9,877	\$11,962	\$12,872
<b>Long-Term Debt</b>	\$18,824	\$25,130	\$27,427	\$28,607
<b>Other Liabilities</b>	\$9,658	\$13,828	\$16,245	\$17,761
<b>Total Liabilities</b>	<b>\$35,510</b>	<b>\$48,835</b>	<b>\$55,635</b>	<b>\$59,239</b>
<b>Total Shareholders' Equity</b>	\$15,872	\$22,489	\$27,361	\$30,895
Common Stock	15,032	20,851	24,097	25,934
Other Equity	-	73	141	213
Retained Earnings	839	1,565	3,123	4,747
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$51,381</b>	<b>\$71,324</b>	<b>\$82,996</b>	<b>\$90,134</b>
<b>Income Statement</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Revenue</b>	\$23,011	\$33,561	\$41,020	\$45,551
<b>Operating Expense</b>	\$11,067	\$15,610	\$19,476	\$22,199
<b>R&amp;D Expense</b>	\$616	\$936	\$1,317	\$1,729
<b>SG&amp;A Expense</b>	\$7,904	\$11,518	\$13,602	\$15,830
<b>Capital Expense</b>	\$7,144	\$10,108	\$13,013	\$13,758
<b>Pretax Income</b>	\$1,688	\$2,576	\$4,176	\$4,054
<b>Pretax Margin (%)</b>	7.33	7.68	10.18	8.90
<b>Effective Tax Rate (%)</b>	50.27	53.11	53.65	49.29
<b>Net Income</b>	\$839	\$1,208	\$1,936	\$2,055
<b>Shares Outstanding, Millions</b>	15.6	15.6	15.6	15.6
<b>Per Share Data</b>				
<b>Earnings</b>	\$53.80	\$77.42	\$124.08	\$131.76
<b>Dividend</b>	\$22.60	\$31.34	\$36.22	\$38.99
<b>Book Value</b>	\$1,017	\$1,442	\$1,754	\$1,980
<b>Exchange Rate (US\$1=¥)</b>	¥221.26	¥159.52	¥138.03	¥128.25

Source: Nippon Telegraph and Telephone Corporation  
Annual Reports  
Dataquest (1990)

**Table 3**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending March 31**  
**(Billions of Yen, except Per Share Data)**

<b>Balance Sheet</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Total Current Assets	¥889,249	¥997,796	¥1,080,466	¥1,244,968
Cash and Equivalents	397,918	450,240	441,388	454,322
Receivables	337,133	396,901	462,696	533,104
Inventory	39,323	37,044	40,036	48,318
Other Current Assets	114,875	113,611	136,346	209,224
Net Property, Plants	¥10,156,968	¥9,961,092	¥9,940,441	¥9,775,823
Other Assets	¥322,420	¥418,646	¥435,018	¥538,866
<b>Total Assets</b>	<b>¥11,368,637</b>	<b>¥11,377,534</b>	<b>¥11,455,925</b>	<b>¥11,559,657</b>
Total Current Liabilities	¥1,555,078	¥1,575,512	¥1,651,159	¥1,650,816
Long-Term Debt	¥4,164,976	¥4,008,735	¥3,785,812	¥3,668,824
Other Liabilities	¥2,136,819	¥2,205,860	¥2,242,340	¥2,277,791
<b>Total Liabilities</b>	<b>¥7,856,873</b>	<b>¥7,790,107</b>	<b>¥7,679,311</b>	<b>¥7,597,431</b>
Total Shareholders' Equity	¥3,511,764	¥3,587,427	¥3,776,614	¥3,962,226
Common Stock	3,326,076	3,326,076	3,326,076	3,326,076
Other Equity	-	11,700	19,500	27,300
Retained Earnings	185,688	249,651	431,038	608,850
<b>Total Liabilities and Shareholders' Equity</b>	<b>¥11,368,637</b>	<b>¥11,377,534</b>	<b>¥11,455,925</b>	<b>¥11,559,657</b>
<b>Income Statement</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Revenue	¥5,091,409	¥5,353,582	¥5,662,001	¥5,841,897
Operating Expense	¥2,448,649	¥2,490,048	¥2,688,250	¥2,847,004
R&D Expense	¥136,209	¥149,255	¥181,718	¥221,692
SG&A Expense	¥1,748,804	¥1,837,353	¥1,877,527	¥2,030,231
Capital Expense	¥1,580,600	¥1,612,351	¥1,796,159	¥1,764,400
Pretax Income	¥373,421	¥410,911	¥576,457	¥519,887
Pretax Margin (%)	7.33	7.68	10.18	8.90
Effective Tax Rate (%)	50.27	53.11	53.65	49.29
Net Income	¥185,688	¥192,663	¥267,187	¥263,612
Shares Outstanding, Millions	15.6	15.6	15.6	15.6
<b>Per Share Data</b>				
Earnings	¥11,903	¥12,350	¥17,127	¥16,898
Dividend	¥5,000	¥5,000	¥5,000	¥5,000
Book Value	¥225,113	¥229,963	¥242,091	¥253,989

**Table 3 (Continued)**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending March 31**  
**(Billions of Yen, except Per Share Data)**

<b>Key Financial Ratios</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<i>Liquidity</i>				
Current (Times)	0.57	0.63	0.65	0.75
Quick (Times)	0.55	0.61	0.63	0.72
Fixed Assets/Equity (%)	289.23	277.67	263.21	246.73
Current Liabilities/Equity (%)	44.28	43.92	43.72	41.66
Total Liabilities/Equity (%)	223.73	217.15	203.34	191.75
<i>Profitability (%)</i>				
Return on Assets	-	1.97	2.51	2.37
Return on Equity	-	6.30	7.77	7.06
Profit Margin	3.65	3.60	4.72	4.51
<i>Other Key Ratios</i>				
R&D Spending % of Revenue	2.68	2.79	3.21	3.79
Capital Spending % of Revenue	31.04	30.12	31.72	30.20
Employees	304,000	298,000	294,369	283,294
Revenue (¥K)/Employee	¥76	¥113	¥139	¥161
Capital Spending % of Assets	13.90	14.17	15.68	15.26
Exchange Rate (US\$1=¥)	¥221.26	¥159.52	¥138.03	¥128.25

Source: Nippon Telegraph and Telephone Corporation  
Annual Reports  
Dataquest (1990)

# Nippon Telegraph and Telephone Corporation

1-6 Uchisaiwaicho 1-chome  
Chiyoda-ku, Tokyo 100, Japan  
Telephone: (03) 509-5111  
Fax: (03) 509-4290

*Date Founded: 1952*

---

## CORPORATE STRATEGIC DIRECTION

Nippon Telegraph and Telephone Corporation (NTT) was, until April 1, 1985, the Japanese domestic public telecommunications corporation established in 1952 in an effort to streamline the Japanese telecommunications industry. The Company was modeled along the lines of AT&T prior to divestiture, though without manufacturing subsidiaries. NTT is under the jurisdiction of the Ministry of Posts and Telecommunications (MPT). Also under this ministry's jurisdiction was Kokusai Denshin Denwa (KDD), Japan's international telecommunications carrier. In 1985, NTT changed from a government-run enterprise to the largest private company in Japan.

In what might be compared to the AT&T divestiture, Japanese telecommunications were recently overhauled by the divestiture of NTT, which spun off the unprofitable local companies. The new NTT retains long distance service, but now extends into new telecommunications growth areas.

As part of the privatization, ownership of NTT by the Japanese government eventually will be reduced to 33 percent. There have been three public stock offerings since March 1986, and more occurred in 1989. Although now a private company, NTT is still subject to MPT approval in some areas.

As in the United States, it is now technologically possible in Japan for private companies to provide basic and enhanced telecommunications services previously provided exclusively by the NTT monopoly. MPT has approved 33 new competitors as Type I carriers (those who have their own telecommunications circuits and facilities). Three of these companies—Daini-Denden Inc., Japan Telecom Co., and Teleway Japan Corp.—have started supplying long distance services to the public.

The Company's primary business was and still is telephone service, which accounts for most of its revenue. Despite its commitment to telephone service, the Company has diversified, now offering mobile phone, pocket paging, and facsimile services as well. Mobile phone service is available not only in automobiles but also on trains, ships, and air transportation. The Company also offers videotex, telex, and telegram services, data transmission services, and both public and private networks.

NTT is ranked first among Japanese telecommunications companies and is considered to be the second largest telecommunications company worldwide.

In fiscal 1989, NTT received operating revenue from six main sources: telephone services (79 percent), telegraph services (1 percent), leased circuit services (6 percent), data communication facility services (3 percent), sales of terminal equipment (4 percent), and other (7 percent).

NTT's corporate goals include the following:

- Digitize all telecommunications systems in order to implement Integrated Services Digital Network (ISDN) throughout Japan in the near future
- Diversify through joint ventures and technology agreements
- Invest heavily in R&D within the next three years
- Introduce INS-Net 1500, the first commercial, primary rate service in Japan
- Integrate management, sales networks, and customer service operations in cellular phones and pocket pagers

NTT continued to enter new business areas aggressively. In fiscal 1989 (year ended March 31, 1989), the Company established 30 subsidiaries, affiliates, and associated companies, bringing the combined total for the past four years to 172.

In recent years, a primary focus of the Company has been the construction and future implementation of its ISDN Information Network System (INS). By digitizing the NTT transmission network and installing fiber cables and digital exchanges, NTT plans to construct a nationwide fiber-optic system throughout the next decade. June 27, 1989, marked the introduction of NTT's INS-Net 1500, a new optical fiber ISDN. Ten firms had already contracted for the service at the time of the introduction.

NTT reported revenue of \$44.3 billion\* in fiscal 1989, a decline of 2.3 percent over fiscal 1988 revenue of \$45.3 billion. Net income also declined to \$2.0 billion in fiscal 1989 from \$2.1 billion in fiscal 1988. NTT does not report revenue into foreign markets.

In 1989, procurement of foreign-manufactured products increased 33 percent over the previous year to \$336 million. Procurement from the United States accounted for 90 percent of the total. In 1989, NTT announced that it will be purchasing telephones made in Europe.

A top priority of NTT is to increase procurement of foreign products. The Company does its own R&D, but it does not manufacture any of the equipment it sells or leases. It purchases end equipment from competitive bidders. In the case of semiconductors, the Company has stringent quality and reliability standards and actually inspects its suppliers' semiconductor production lines.

Eleven telecommunications labs with 6,000 employees are under the direction of Research and Development Headquarters. NTT reports R&D spending as the expenditure of this headquarters. The Company also has four development centers that commercialize technology, and applied research labs. NTT concentrates its R&D efforts on digital network and intelligent processing technologies, nanoelectronics, and optoelectronics. NTT's R&D expenditures for fiscal 1989 totaled \$1.7 billion, or 3.8 percent of revenue.

NTT concentrates on the expansion and improvement of its telephone and nontelephone operations and reinforcing its emergency backup systems. NTT also

---

\*All dollar amounts are in U.S. dollars.

is investing heavily in digitizing its telecommunications network. The Company's fiscal 1989 capital expenditures totaled \$13.4 billion, or 30.2 percent of revenue.

NTT operates through its head office in Tokyo that controls 11 total Telecommunications Bureaus. These bureaus oversee field administrative offices that may be of five different classifications: Telecommunications Divisions, Urban Telecommunications Divisions, Area Telecommunications Divisions, Carrier Communications Divisions, and Radio Communications Divisions. Under these divisions, operating offices furnish telecommunications services directly to customers. NTT does not market its computer systems directly; revenue is generated through subscriptions and equipment leasing.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region and distribution channel. Table 4, a comprehensive financial statement, is at the end of this profile.

---

## BUSINESS SEGMENT STRATEGIC DIRECTION

### Telephone Services

The telephone services made up 79 percent of NTT's 1989 revenue. The Company offers a wide range of telephone services, including telephone subscriber services, public telephone services, automobile telephone services, shipboard telephone services, airport radiotelephone services, and portable cellular telephones.

NTT experienced moderate growth in this area despite reductions in long distance rates forced by increased competition from New Common Carriers (NCCs) in Japan.

### Telegraph Services

NTT's telegraph services represented 1 percent of 1989 revenue and consist of telegram and telex services. NTT has computerized its telegram handling

system in order to maximize efficiency. Telegraph transmissions gradually rose from 41 billion in the early '80s to a peak of 44 billion in 1984. Since then, telegraph transmissions have hovered at around 41 billion. NTT has introduced value-added telegrams such as musical and scented telegrams, which have fared well.

#### Leased Circuit Services

Leased circuit services provided by NTT include standard circuit services, a super digital high-speed digital leased circuit service, video communications, TV relay services, and satellite communications. This service represented 6 percent of NTT's 1989 revenue.

NTT has experienced an increase in demand for high-speed digital leased circuit services for comprehensive corporate communications systems. Additionally, competition from NCCs has increased as they enter the market. The total number of leased circuit lines at fiscal year end was 752,000, up 104,000 or 16.0 percent from a year earlier.

#### Data Communication Facility Services

The data communication facility services represented 3 percent of NTT's 1989 revenue. NTT offers two types of data communications facility services: public or custom. Other services include credit information systems such as Credit and Finance Information System (CAFIS) and a computer-generated response service, ANSER.

In July 1988, the data communications revenue was shifted from corporate to NTT Data Communications.

#### Digital Data Exchange Services (DDX)

NTT provides two kinds of DDX services: circuit-switching services and packet-switching services.

Circuit-switching subscriptions grew 21.5 percent in 1989, while packet-switching subscriptions grew 127.4 percent over the previous year.

#### Pocket Pager Service

NTT provides Pocket Bell pocket pager services in 64 districts throughout Japan. Although demand was up as a result of increased availability of service and reliance on paging systems, competition increased from NCCs.

#### Other Services

NTT's other services include facsimile network services, videoconference services, and videotex services. NTT experienced an increase of 48.1 percent in its facsimile network service that facsimile growth has stimulated. The videoconference services grew gradually from 46 subscriptions in 1988 to 49 in 1989. Videotex services and Character and Pattern Telephone Access Information (CAPTAIN) more than doubled their number of subscriptions.

#### Terminal Equipment

NTT accounts for its terminal equipment in its Related Business segment, which also includes operator information and telecommunications consulting services.

#### Further Information

For further information about the Company's business segments, please contact the appropriate industry service.

**Table 1**  
**Four-Year Corporate Highlights (Millions of U.S. Dollars)**

	1986	1987	1988	1989
Four-Year Revenue	\$28,286.0	\$36,668.0	\$45,296.0	\$44,257.0
Percent Change	-	29.63	23.53	(2.29)
Capital Expenditure	\$8,781.0	\$11,049.0	\$14,374.0	\$13,367.0
Percent of Revenue	31.04	30.13	31.73	30.20
R&D Expenditure	\$757.0	\$1,022.0	\$1,454.0	\$1,679.0
Percent of Revenue	2.68	2.79	3.21	3.79
Number of Employees	304,000	298,000	294,369	283,294
Revenue (\$K)/Employee	\$93.05	\$123.05	\$153.87	\$156.22
Net Income	\$1,032.0	\$1,320.0	\$2,137.0	\$1,997.0
Percent Change	-	27.91	61.89	(6.55)
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>
Quarterly Revenue	N/A	N/A	N/A	N/A
Quarterly Profit	N/A	N/A	N/A	N/A

N/A = Not Available

Source: NTT Corporation  
 Annual Reports  
 Dataquest  
 January 1990

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1986	1987	1988	1989
Japan	100.00	100.00	100.00	100.00

Source: NTT Corporation  
 Annual Reports

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1988	1989
Direct Sales	N/A	N/A
Indirect Sales	N/A	N/A

N/A = Not Available

Source: NTT Corporation  
 Annual Reports  
 Dataquest  
 January 1990



---

## 1988 SALES OFFICE LOCATIONS

Japan—More than 130  
 North America—2  
 Europe—3  
 Asia/Pacific—3  
 ROW—2

---

## MANUFACTURING LOCATIONS

### *Japan*

Business Communication System Engineering Co.,  
 Ltd.  
 Software  
 Nippon Information and Communication Corp.  
 VAN and other telecommunications network  
 services  
 NIT Data Communications Systems Corp.  
 VAN and software  
 NTT Leasing Co., Ltd.  
 Terminal equipment

### *North America*

Photonic Integration Research Inc. (United States)  
 Optical waveguide products

---

## SUBSIDIARIES

### *Japan*

Advanced Telecommunications Research Institute  
 International  
 AIREC Engineering Corp.  
 Amenity Service Kansai Co., Ltd.  
 Business Communication System Engineering Co.,  
 Ltd. (BCSE)  
 Captain Service Company Limited  
 Healthynet Hiroshima Co.  
 INS Engineering Corp.  
 International Information Inc.  
 Internetwork Inc.  
 Kokyo Securities Co., Ltd.  
 Nagoya Information Center Co.  
 Nippon Airport Radio Service Co., Ltd.  
 Nippon Computer Security Corp.  
 Nippon Directory Development Co., Ltd.

Nippon Information and Communication Corp. (NIC)  
 Nippon Senpaku Tsushin K.K.  
 Nippon Telematique, Inc.  
 NTT Auto Leasing Co., Ltd.  
 NTT Central Mobile Communications Corp.  
 NTT Central Network System  
 NTT Chugoku Mobile Communications Corp.  
 NTT Data Communications Systems Corp.  
 NTT Estate Co., Ltd.  
 NTT Information Development Co., Ltd.  
 NTT Intelligent Technology Co., Ltd.  
 NTT International Corp.  
 NTT Kansai Mobile Communications Corp.  
 NTT Kansai Real Estate Corp.  
 NTT Kansai Telecon Co.  
 NTT Kyushu Mobile Communications Corp.  
 NTT Kyushu Tele-control Corp.  
 NTT Learning Systems Co.  
 NTT Leasing Co., Ltd.  
 NTT Off-Talk Tushin Co., Ltd.  
 NTT PC Communications Inc.  
 NTT Rental Engineering Co., Ltd.  
 NTT Software Corp.  
 NTT Telemarketing Co., Ltd.  
 NTT Tokai Mobile Communications Corp.  
 NTT Tokai Real Estate Corp.  
 NTT Tour-Media Company, Ltd.  
 NTT Urban Development Co., Ltd.  
 The Japan Utility Subway Company, Inc.

### *North America*

NTT America, Inc. (United States)  
 Photonic Integration Research, Inc. (United States)

### *Europe*

NTT Europe Limited  
 NTT Finance (U.K.) Limited (United Kingdom)

### *ROW*

NTT do Brasil Ltda. (Brazil)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

### *1987*

Nippon Information and Communication (NIC)  
 and IBM Japan

NIC and IBM Japan entered a joint venture for nationwide digital networks.

**Business Communication System Engineering (BCSE) and Toshiba Corp.**

The two companies entered a joint venture for PBX-use software development.

**Tadasu Murakami**

Senior executive vice president

**Katsumi Iida**

Senior executive vice president

---

**KEY OFFICERS**

**Haruo Yamaguchi**

President

**Masashi Kojima**

Senior executive vice president

**Koichiro Kamo**

Senior executive vice president

---

**PRINCIPAL INVESTORS**

Ministry of Finance—77.5 percent

Mitsubishi Trust & Banking—0.5 percent

Sumitomo Trust—0.4 percent

Toyo Trust—0.4 percent

Yasuda Trust—0.4 percent

Sumitomo Life—0.3 percent

Nippon Life—0.3 percent

Japan Securities Clearing—0.3 percent

Chuo Trust—0.3 percent

**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending March 31**  
**(Millions of U.S. Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Total Current Assets</b>	<b>\$4,940.0</b>	<b>\$6,834.0</b>	<b>\$8,644.0</b>	<b>\$9,432.0</b>
Cash	638.0	852.0	3,531.0	3,442.0
Receivables	1,873.0	2,718.0	3,702.0	4,039.0
Marketable Securities	1,572.0	2,232.0	0	0
Inventory	218.0	254.0	320.0	366.0
Other Current Assets	639.0	778.0	1,091.0	1,585.0
<b>Net Property, Plants</b>	<b>\$56,428.0</b>	<b>\$68,227.0</b>	<b>\$79,523.0</b>	<b>\$74,059.0</b>
<b>Other Assets</b>	<b>\$1,791.0</b>	<b>\$2,867.0</b>	<b>\$3,480.0</b>	<b>\$4,082.0</b>
<b>Total Assets</b>	<b>\$63,159.0</b>	<b>\$77,928.0</b>	<b>\$91,647.0</b>	<b>\$87,573.0</b>
<b>Total Current Liabilities</b>	<b>\$8,639.0</b>	<b>\$10,791.0</b>	<b>\$13,209.0</b>	<b>\$12,506.0</b>
<b>Long-Term Debt</b>	<b>\$23,139.0</b>	<b>\$27,457.0</b>	<b>\$30,286.0</b>	<b>\$27,794.0</b>
<b>Other Liabilities</b>	<b>\$11,871.0</b>	<b>\$15,109.0</b>	<b>\$17,939.0</b>	<b>\$17,256.0</b>
<b>Total Liabilities</b>	<b>\$43,649.0</b>	<b>\$53,357.0</b>	<b>\$61,434.0</b>	<b>\$57,556.0</b>
<b>Total Shareholders' Equity</b>	<b>\$19,510.0</b>	<b>\$24,571.0</b>	<b>\$30,213.0</b>	<b>\$30,017.0</b>
Common Stock	4,333.0	5,342.0	6,240.0	5,909.0
Other Equity	14,145.0	17,519.0	20,525.0	19,495.0
Retained Earnings	1,032.0	1,710.0	3,448.0	4,613.0
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$63,159.0</b>	<b>\$77,928.0</b>	<b>\$91,647.0</b>	<b>\$87,573.0</b>
<b>Income Statement</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Revenue</b>	<b>\$28,286.0</b>	<b>\$36,668.0</b>	<b>\$45,296.0</b>	<b>\$44,257.0</b>
<b>Cost of Sales</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>R&amp;D Expense</b>	<b>\$757.0</b>	<b>\$1,022.0</b>	<b>\$1,454.0</b>	<b>\$1,679.0</b>
<b>SG&amp;A Expense</b>	<b>\$9,715.0</b>	<b>\$12,585.0</b>	<b>\$15,020.0</b>	<b>\$15,381.0</b>
<b>Capital Expense</b>	<b>\$8,781.0</b>	<b>\$11,049.0</b>	<b>\$14,374.0</b>	<b>\$13,367.0</b>
<b>Pretax Income</b>	<b>\$2,075.0</b>	<b>\$2,814.0</b>	<b>\$4,611.0</b>	<b>\$3,938.0</b>
<b>Pretax Margin (%)</b>	<b>7.34</b>	<b>7.67</b>	<b>10.18</b>	<b>8.90</b>
<b>Effective Tax Rate (%)</b>	<b>50.27</b>	<b>53.11</b>	<b>53.65</b>	<b>N/A</b>
<b>Net Income</b>	<b>\$1,032.0</b>	<b>\$1,320.0</b>	<b>\$2,137.0</b>	<b>\$1,997.0</b>
<b>Shares Outstanding, Millions</b>	<b>15.6</b>	<b>15.6</b>	<b>15.6</b>	<b>15.6</b>
<b>Per Share Data</b>				
<b>Earnings</b>	<b>\$66.13</b>	<b>\$85.00</b>	<b>\$137.00</b>	<b>\$128.00</b>
<b>Dividends</b>	<b>\$28.00</b>	<b>\$34.00</b>	<b>\$40.00</b>	<b>\$38.00</b>
<b>Book Value</b>	<b>\$1,250.64</b>	<b>\$1,575.06</b>	<b>\$1,936.73</b>	<b>\$1,924.17</b>

**Table 4 (Continued)**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending March 31**  
**(Millions of U.S. Dollars, except Per Share Data)**

<b>Key Financial Ratios</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<i>Liquidity</i>				
Current (Times)	0.57	0.63	0.65	0.75
Quick (Times)	0.55	0.61	0.63	0.72
Fixed Assets/Equity (%)	289.23	277.67	263.21	246.72
Current Liabilities/Equity (%)	44.28	43.92	43.72	41.66
Total Liabilities/Equity (%)	223.73	217.15	203.34	191.74
<i>Profitability (%)</i>				
Return on Assets	-	1.87	2.52	2.23
Return on Equity	-	5.99	7.80	6.63
Profit Margin	3.65	3.60	4.72	4.51
<i>Other Key Ratios</i>				
R&D Spending % of Revenue	2.68	2.79	3.21	3.79
Capital Spending % of Revenue	31.04	30.13	31.73	30.20
Employees	304,000	298,000	294,369	283,294
Revenue (\$K)/Employee	\$93.05	\$123.05	\$153.87	\$156.22
Capital Spending % of Assets	13.90	14.18	15.68	15.26

N/A = Not Available

Source: NTT Corporation  
Annual Reports  
Dataquest  
January 1990

# Nippon Electric Co., Ltd.

Nippon Electric Co., Ltd.  
33-1, Shiba Gochome  
Minato-ku  
Tokyo 108, Japan  
(Billions of Yen Except Per Share Data)

## Balance Sheet (March 31)

	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Working Capital	¥ 78.0	¥ 72.9	¥ 38.6	¥ 41.6	¥ 44.1
Long-Term Debt	¥ 197.8	¥ 203.2	¥ 174.0	¥ 189.0	¥ 246.1
Shareholders' Equity	¥ 89.7	¥ 98.9	¥ 130.3	¥ 174.4	¥ 208.6
After-Tax Return on Average Equity (%)	8.3	8.4	12.7	14.5	14.6

## Operating Performance (Fiscal Year Ending March 31)

	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Revenue	¥ 698.6	¥ 790.1	¥ 862.1	¥ 1,050.6	¥ 1,252.2
Japanese Revenue	¥ 503.7	¥ 584.3	¥ 606.1	¥ 733.4	¥ 845.3
Non-Japanese Revenue	¥ 194.9	¥ 205.8	¥ 256.0	¥ 317.2	¥ 406.9
Cost of Revenue	¥ 488.8	¥ 551.1	¥ 607.4	¥ 739.8	¥ 887.9
R&D Expense	¥ 22.6	¥ 32.0	¥ 44.1	¥ 50.8	¥ 57.5
SG&A Expense	¥ 122.0	¥ 136.6	¥ 157.4	¥ 182.6	¥ 219.2
Pretax Income	¥ 13.6	¥ 16.3	¥ 27.3	¥ 40.9	¥ 52.4
Pretax Margin (%)	1.9	2.1	3.2	3.9	4.2
Effective Tax Rate (%)	51.8	56.7	57.9	55.9	54.7
Net Income	¥ 7.3	¥ 7.9	¥ 14.6	¥ 22.1	¥ 27.9
Average Shares Outstanding (Millions)	816	838	913	950	970
Per Share					
Earnings	¥ 9.03	¥ 9.77	¥ 16.75	¥ 23.76	¥ 28.77
Dividends	¥ 5.00	¥ 5.00	¥ 6.00	¥ 6.50	¥ 6.50
Book Value	¥ 110	¥ 118	¥ 143	¥ 184	¥ 215
Price Range*	¥ 200- 300	¥ 220- 325	¥ 300- 440	¥ 395- 680	¥ 585- 930
Total Employees	59,744	60,481	60,755	64,147	69,061
Capital Expenditures	¥ 45.0	¥ 57.0	¥ 73.6	¥ 108.2	¥ 153.1
Exchange Rate (US\$ per ¥)	0.00395	0.00500	0.00431	0.00464	0.00389

\*Estimated from graph in the NEC Annual Report

Source: NEC Annual Reports  
DATAQUEST

# Nippon Electric Co., Ltd.

Table 1

Nippon Electric Company, Ltd.  
REVENUES BY PRODUCT AREA  
(Billions of Yen)

	Fiscal Years Ending March 31				
	1978	1979	1980	1981	1982
Communications	¥273.2	¥297.5	¥324.0	¥ 374.6	¥ 460.5
Computers and Industrial Electronic Systems	144.5	175.7	209.1	249.3	294.5
Electron Devices	120.9	136.8	185.0	242.5	302.5
Home Electronics	78.6	89.0	112.4	143.0	144.9
Other	81.4	91.1	31.6	41.2	49.8
Sales	¥698.6	¥790.1	¥862.1	¥1,050.6	¥1,252.2
Other Income	20.3	19.8	17.2	24.2	27.5
Total Revenue	¥718.9	¥809.9	¥879.3	¥1,074.8	¥1,279.7

Source: NEC Annual Reports  
DATAQUEST

Table 2

Nippon Electric Company, Ltd.  
REVENUES BY MAJOR CUSTOMER  
(Billions of Yen)

	Fiscal Years Ending March 31				
	1978	1979	1980	1981	1982
NTT and Government	¥156.5	¥173.4	¥182.2	¥ 211.5	¥ 228.4
Private Sector	347.2	410.9	423.9	521.9	616.9
Overseas	194.9	205.8	256.0	317.2	406.9
Total Revenue	¥698.6	¥790.1	¥862.1	¥1,050.6	¥1,252.2

Source: NEC Annual Reports  
DATAQUEST

# Nippon Electric Co., Ltd.

Table 3

Nippon Electric Company, Ltd.  
ESTIMATED SEMICONDUCTOR REVENUES  
(Millions of Dollars)

	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
<b>TOTAL SEMICONDUCTOR</b>	200	211	314	369	518	579	767	958	992
<b>Total Integrated Circuit</b>	104	107	153	187	299	364	533	646	722
Bipolar Digital	25	16	19	27	39	35	54	78	85
TTL									
DTL									
ECL									
Other									
Bipolar Digital (Recap)						35	54	78	85
Memory						13	18	18	15
Logic						22	36	60	70
MOS	42	54	74	98	183	231	348	403	484
NMOS						171	270	308	392
PMOS						25	28	30	22
CMOS						35	50	65	70
MOS (Recap)						231	348	403	484
Memory						110	180	150	220
Microprocessor						50	91	142	164
Logic						71	77	111	100
Linear	37	37	60	62	77	98	131	165	153
<b>Total Discrete</b>	93	101	157	176	209	201	213	291	246
Transistor		56	93	96	118	107	102	171	143
Small Signal									
Power									
Diode		29	45	53	68	65	80	84	79
Small Signal									
Power									
Zener									
Thyristor		2	4	7	10	15	17	21	13
Other		14	15	20	13	14	14	15	11
<b>Total Optoelectronic</b>	3	3	4	6	10	14	21	21	24
LED Lamps									
LED Displays									
Optical Couplers									
Other									

Source: DATAQUEST  
March 1983

## 10.08 Nippon Electric Company

**Table 10.08-1**  
**Nippon Electric Company**  
**ESTIMATED SEMICONDUCTOR REVENUES**  
**(Dollars in Millions)**

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
<i>TOTAL SEMICONDUCTOR</i>		115	198	200	211	314	369	565
<i>TOTAL I C</i>	38	49	93	104	107	153	187	333
<i>BIPOLAR DIGITAL</i>	20	14	25	25	16	19	27	39
<i>TTL</i>								
<i>DTL</i>								
<i>ECL</i>								
<i>OTHER</i>								
<i>MOS</i>	10	17	37	42	54	74	98	189
<i>PMOS</i>								
<i>NMOS</i>								
<i>CMOS</i>								
<i>LINEAR</i>		18	31	37	37	60	62	105
<i>INTERFACE</i>								
<i>CONTROL</i>								
<i>ENTERTAINMENT</i>								
<i>OTHER</i>								
<i>HYBRID</i>								
<i>TOTAL DISCRETE</i>		65	102	93	101	157	176	222
<i>TRANSISTOR</i>					56	93	96	114
<i>SMALL SIGNAL</i>								
<i>POWER</i>								
<i>DIODE</i>					29	45	53	74
<i>SMALL SIGNAL</i>								
<i>POWER</i>								
<i>ZENER</i>								
<i>THYRISTOR</i>					2	4	7	8
<i>OTHER</i>					14	15	20	26
<i>OPTOELECTRONIC</i>		1	3	3	3	4	6	10
<i>LED LAMPS</i>								
<i>LED DISPLAYS</i>								
<i>COUPLERS</i>								
<i>OTHER</i>								

Note: The following exchange rates were used to convert yen to dollars:  
 1971: 343 yen = \$1.00; 1972: 302 yen = \$1.00; 1973: 269 yen = \$1.00;  
 1974: 292 yen = \$1.00; 1975: 297 yen = \$1.00; 1976: 296 yen = \$1.00;  
 1977: 266 yen = \$1.00; 1978: 207 yen = \$1.00

Source: DATAQUEST, Inc.



## 10.08 Nippon Electric

Table 10.08.2-1  
Nippon Electric  
ESTIMATED SEMICONDUCTOR REVENUES  
(Dollars in Millions)

	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>
<b>TOTAL SEMICONDUCTOR</b>	115	171	194	199	343	314
<b>TOTAL I C</b>	49	80	101	105	174	156
<b>BIPOLAR DIGITAL</b>	14	22	24	17	23	14
TTL						
DTL						
ECL						
OTHER						
<b>MOS</b>	17	31	51	61	95	75
PMOS						
NMOS						
CMOS						
<b>LINEAR</b>	18	27	26	27	56	67
INTERFACE						
CONTROL						
ENTERTAINMENT						
OTHER						
<b>HYBRID</b>						
<b>TOTAL DISCRETE</b>	65	86	89	89	158	153
<b>TRANSISTOR</b>						93
SMALL SIGNAL						
POWER						
<b>DIODE</b>						45
SMALL SIGNAL						
POWER						
ZENER						
<b>THYRISTOR</b>						15
<b>OTHER</b>						0
<b>OPTOELECTRONIC</b>	1	5	4	5	11	5
LED LAMPS						
LED DISPLAYS						
COUPLERS						
OTHER						

Source: DATAQUEST, Inc.

# 10.08 Nippon Electric

**Table 10.08.2-1**  
**Nippon Electric**  
**ESTIMATED SEMICONDUCTOR REVENUES**  
**(Dollars in Millions)**

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>
<i>TOTAL SEMICONDUCTOR</i>		115	171	194	199	343
<i>TOTAL I C</i>	43	49	80	101	105	174
<i>BIPOLAR DIGITAL</i>	23	14	22	24	17	23
<i>TTL</i>						
<i>DTL</i>						
<i>ECL</i>						
<i>OTHER</i>						
<i>MOS</i>	11	17	31	51	61	95
<i>PMOS</i>						
<i>NMOS</i>						
<i>CMOS</i>						
<i>LINEAR</i>	9	18	27	26	27	36
<i>INTERFACE</i>						
<i>CONTROL</i>						
<i>ENTERTAINMENT</i>						
<i>OTHER</i>						
<i>TOTAL DISCRETE</i>		65	86	89	89	158
<i>TRANSISTOR</i>						
<i>SMALL SIGNAL</i>						
<i>POWER</i>						
<i>DIODE</i>						
<i>SMALL SIGNAL</i>						
<i>POWER</i>						
<i>ZENER</i>						
<i>THYRISTOR</i>						
<i>OTHER</i>						
<i>OPTOELECTRONIC</i>	9	1	3	4	5	11
<i>LED LAMPS</i>						
<i>LED DISPLAYS</i>						
<i>COUPLERS</i>						
<i>OTHER</i>						

Source: DATAQUEST, Inc.

## 10.08 Nippon Electric

Table 10.08.2-1

**Nippon Electric  
ESTIMATED SEMICONDUCTOR REVENUES  
(Dollars in Millions)**

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>
<i>TOTAL SEMICONDUCTOR</i>		115	171	194
<i>TOTAL I C</i>	43	49	80	101
<i>BIPOLAR DIGITAL</i>	23	14	22	24
<i>TTL</i>				
<i>DTL</i>				
<i>ECL</i>				
<i>OTHER</i>				
<i>MOS</i>	11	17	31	51
<i>PMOS</i>				
<i>NMOS</i>				
<i>CMOS</i>				
<i>LINEAR</i>	5	10	15	17
<i>INTERFACE</i>				
<i>CONTROL</i>				
<i>ENTERTAINMENT</i>				
<i>OTHER</i>				
<i>HYBRID</i>	4	8	12	9
<i>TOTAL DISCRETE</i>		65	86	89
<i>TRANSISTOR</i>				
<i>SMALL SIGNAL</i>				
<i>POWER</i>				
<i>DIODE</i>				
<i>SMALL SIGNAL</i>				
<i>POWER</i>				
<i>ZENER</i>				
<i>THYRISTOR</i>				
<i>OTHER</i>				
<i>OPTOELECTRONIC</i>	0	1	5	4

Source: DATAQUEST, Inc.

## 8.26 Electronic Arrays

Table 8.26.1-1  
Electronic Arrays  
ESTIMATED REVENUES  
(Dollars in Millions)

	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>
Total Semiconductor Revenues	\$16	\$18	\$15	\$17	\$14
Total Integrated Circuits	16	18	15	17	14
MOS	16	18	15	17	14
Total Company Revenues	\$15.8	\$18.1	\$14.9	\$17.2	\$13.6

Source: DATAQUEST, Inc.

978

## 8.26 Electronic Arrays

**Table 8.26.9-1**  
**Electronic Arrays**  
**FINANCIAL STATEMENT HISTORY 1973-78**  
**(Dollars in Millions)**

	Fiscal Year Ending March 31						TREN	CMPD GR
	1973	1974	1975	1976	1977	1978		
<b>BALANCE SHEET</b>								
1 CASH & LIQUID SECURITIES	0.31	3.62	2.87	3.39	1.05	0.80	(0.13)	3.68
3 RECEIVABLES	2.38	3.08	2.61	3.67	3.77	2.72	0.14	4.70
4 INVENTORY	1.85	3.43	2.45	2.18	2.55	1.97	(0.07)	(1.98)
5 OTHER CURRENT ASSETS	0.09	0.12	0.17	0.12	0.16	0.13	0.01	7.22
7 EXCESS FUNDS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8 TOTAL CURRENT ASSETS	4.62	10.25	8.09	9.36	7.54	5.61	(0.06)	0.54
9 GROSS P P E	5.76	7.62	8.88	9.83	11.33	11.85	1.22	15.04
10 ACCUMULATED DEPRECIATION	1.37	2.17	3.11	4.23	5.49	7.05	1.13	38.01
11 NET P P E	4.38	5.45	5.77	5.60	5.84	4.80	0.09	1.83
12 MISC ASSETS	0.28	0.34	0.30	0.34	0.37	0.81	0.08	17.66
13 INVEST. FOREIGN VENTURES	0.01	0.01	0.01	0.00	0.00	0.00	0.00	(98.49)
15 *TOTAL ASSETS*	9.30	16.05	14.18	15.29	13.75	11.22	0.11	1.58
16 NOTES PAYABLE	0.90	0.00	0.00	0.00	1.00	1.15	0.12	511.84
17 ACCOUNTS PAYABLE	1.58	2.11	0.54	1.35	2.56	1.48	0.05	3.49
18 ACCRUED TAXES	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19 ACCRUED LIABILITIES	0.48	0.76	0.65	0.76	0.73	0.45	0.00	(0.87)
20 CURR MAT LONG TERM DEBT	0.91	0.51	0.37	0.16	0.06	0.20	(0.15)	(34.39)
22 TOTAL CURR LIABILITIES	3.87	3.37	1.55	2.28	4.35	3.28	0.02	0.92
23 LONG TERM DEBT	1.77	1.32	0.94	0.85	0.81	1.40	(0.10)	(7.53)
24 DEFERRED TAXES	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25 MISC LIABILITIES	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26 MINORITY INT IN SUBS.	0.04	0.12	0.18	0.23	0.00	0.00	(0.01)	(98.30)
27 DEFICIT FUNDS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28 TOTAL LIABILITIES	5.67	4.81	2.66	3.36	5.16	4.67	(0.09)	(1.49)
29 PREFERRED STOCK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30 COMMON STOCK	1.30	1.70	1.73	1.73	1.76	1.78	0.07	4.89
31 CAPITAL SURPLUS	5.53	10.21	10.20	10.19	10.25	10.27	0.68	9.28
32 RETAINED EARNINGS	(3.95)	(0.58)	(0.33)	0.06	(3.36)	(5.44)	(0.44)	*****
33 ADJUSTMENT TO EQUITY	0.74	(0.09)	(0.08)	(0.04)	(0.06)	(0.06)	(0.11)	*****
34 TOTAL EQUITY	3.63	11.24	11.51	11.93	8.59	6.55	0.20	6.43
35 *TOTAL LIAB & EQUITY*	9.30	16.05	14.18	15.29	13.75	11.22	0.11	1.58
36 NET WORKING CAPITAL	0.76	6.88	6.54	7.07	3.19	2.33	(0.08)	10.20
<b>INCOME &amp; EXPENSE</b>								
38 SALES	9.76	17.85	15.96	16.67	16.01	13.59	0.41	4.01
40 COST OF GOODS	5.75	9.47	9.26	10.01	12.36	9.58	0.82	10.29
41 GROSS PROFIT	4.00	8.38	6.70	6.66	3.65	4.01	(0.41)	(6.87)
42 S G & A EXPENSE	1.46	2.49	2.72	2.84	3.28	2.97	0.29	13.44
43 R & D EXPENSE	1.07	1.86	2.15	2.02	1.88	1.11	0.00	0.45
45 OPERATING PROFIT	1.47	4.03	1.83	1.80	(1.51)	(0.07)	(0.70)	*****
46 DEPRECIATION	0.57	0.88	1.16	1.25	1.50	1.66	0.21	22.14
47 LEASE PAYMENTS	0.14	0.21	0.21	0.18	0.16	0.16	0.00	(0.76)
48 INTEREST EXPENSE	0.32	0.18	(0.02)	(0.17)	(0.02)	0.16	(0.04)	*****
49 MINORITY INT IN ENGS(LOS)	0.03	0.09	0.05	0.05	0.05	0.00	(0.01)	(91.66)
51 MISC INCOME	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
53 PRETAX PROFIT	0.42	2.69	0.42	0.49	(3.20)	(2.05)	(0.86)	*****
54 INCOME TAXES	0.23	1.50	0.21	0.23	0.21	0.04	(0.14)	(34.37)
55 EXTRAORDINARY ITEMS	(0.63)	(2.18)	(0.05)	(0.12)	0.00	0.00	0.28	*****
56 NET PROFIT	0.82	3.37	0.25	0.38	(3.41)	(2.09)	(0.99)	*****
57 EPS AFTER PRD DIVIDENDS	0.71	2.19	0.15	0.21	(1.95)	(1.18)	(0.62)	*****
58 COMMON DIV PER SHARE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Source: DATAQUEST, Inc.  
 Electronic Arrays Annual Report

## 8.26 Electronic Arrays

Table 8.26.9-2  
Electronic Arrays  
FINANCIAL STATEMENT HISTORY 1973-78  
(Percent)

	Fiscal Year Ending March 31						TREND	CMPD GR
	1973	1974	1975	1976	1977	1978		
<b>BALANCE SHEET</b>								
1 CASH & LIQUID SECURITIES	3.29	22.57	20.25	22.13	7.66	7.13	(0.68)	2.06
3 RECEIVABLES	25.58	19.22	18.41	23.99	27.43	24.21	0.67	3.06
4 INVENTORY	19.91	21.35	17.27	14.28	18.56	17.52	(0.67)	(3.51)
5 OTHER CURRENT ASSETS	0.95	0.73	1.17	0.79	1.16	1.19	0.05	5.55
7 EXCESS FUNDS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8 TOTAL CURRENT ASSETS	49.72	63.87	57.10	61.18	54.81	49.99	(0.62)	(1.03)
9 GROSS P P E	61.88	47.47	62.61	64.30	82.39	105.61	9.29	13.25
10 ACCUMULATED DEPRECIATION	14.75	13.52	21.93	27.68	39.90	62.81	9.29	35.86
11 NET P P E	47.13	33.95	40.68	36.62	42.48	42.80	0.00	0.25
12 MISC ASSETS	3.01	2.11	2.14	2.20	2.71	7.21	0.65	15.83
13 INVEST. FOREIGN VENTURES	0.14	0.07	0.08	0.00	0.00	0.00	(0.03)	(99.13)
15 *TOTAL ASSETS*	100.00	100.00	100.00	100.00	100.00	100.00	0.00	0.00
16 NOTES PAYABLE	9.68	0.00	0.00	0.00	7.27	10.25	0.71	606.09
17 ACCOUNTS PAYABLE	16.95	13.14	3.79	8.85	18.64	13.22	0.08	1.88
18 ACCRUED TAXES	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19 ACCRUED LIABILITIES	5.15	4.73	4.56	5.00	5.29	3.98	(0.11)	(2.42)
20 CURR MAT LONG TERM DEBT	9.82	3.16	2.60	1.08	0.45	1.76	(1.43)	(35.41)
22 TOTAL CURR LIABILITIES	41.59	21.03	10.95	14.93	31.65	29.22	(0.74)	(0.65)
23 LONG TERM DEBT	19.01	8.21	6.62	5.57	5.88	12.45	(1.17)	(8.97)
24 DEFERRED TAXES	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25 MISC LIABILITIES	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26 MINORITY INT IN SUBS.	0.39	0.75	1.23	1.48	0.00	0.00	(0.11)	(98.97)
27 DEFICIT FUNDS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28 TOTAL LIABILITIES	60.99	29.99	18.80	21.98	37.52	41.67	(2.02)	(3.03)
29 PREFERRED STOCK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30 COMMON STOCK	14.00	10.61	12.18	11.33	12.81	15.87	0.43	3.26
31 CAPITAL SURPLUS	59.43	63.61	71.91	66.59	74.50	91.52	5.37	7.58
32 RETAINED EARNINGS	(42.42)	(3.62)	(2.31)	0.37	(24.41)	(48.52)	(2.58)	*****
33 ADJUSTMENT TO EQUITY	8.01	(0.59)	(0.59)	(0.27)	(0.44)	(0.53)	(1.20)	*****
34 TOTAL EQUITY	39.01	70.01	81.20	78.02	62.48	58.33	2.02	4.77
35 *TOTAL LIAB & EQUITY*	100.00	100.00	100.00	100.00	100.00	100.00	0.00	0.00
36 NET WORKING CAPITAL	8.13	42.85	46.15	46.25	23.16	20.78	0.12	8.48
<b>INCOME &amp; EXPENSE</b>								
38 SALES	100.00	100.00	100.00	100.00	100.00	100.00	0.00	0.00
40 COST OF GOODS	58.99	53.06	58.01	60.03	77.20	70.52	3.77	6.04
41 GROSS PROFIT	41.01	46.94	41.99	39.97	22.80	29.48	(3.77)	(10.46)
42 S G & A EXPENSE	14.98	13.93	17.04	17.06	20.47	21.82	1.54	9.07
43 R & D EXPENSE	10.96	10.42	13.49	12.12	11.75	8.16	(0.32)	(3.42)
45 OPERATING PROFIT	15.08	22.60	11.46	10.79	(9.42)	(0.50)	(4.99)	*****
46 DEPRECIATION	5.89	4.90	7.29	7.48	9.37	12.25	1.30	17.44
47 LEASE PAYMENTS	1.41	1.15	1.33	1.07	1.00	1.16	(0.06)	(4.56)
48 INTEREST EXPENSE	3.24	1.02	(0.13)	(1.00)	(0.09)	1.19	(0.41)	*****
49 MINORITY INT IN ERGS(LOS)	0.27	0.48	0.34	0.31	0.32	0.00	(0.05)	(93.97)
51 MISC INCOME	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
53 PRETAX PROFIT	4.26	15.05	2.64	2.93	(20.02)	(15.08)	(5.76)	*****
54 INCOME TAXES	2.35	8.42	1.34	1.36	1.29	0.29	(0.90)	(36.90)
55 EXTRAORDINARY ITEMS	(6.49)	(12.24)	(0.29)	(0.73)	0.00	0.00	1.96	*****
56 NET PROFIT	8.41	18.86	1.59	2.30	(21.31)	(15.37)	(6.82)	*****
57 EPS AFTER PFD DIVIDENDS	100.00	100.00	100.00	100.00	100.00	100.00	0.00	0.00
58 COMMON DIV PER SHARE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Source: DATAQUEST, Inc.  
Electronic Arrays Annual Report

## 8.26 Electronic Arrays

Table 8.26.9-3  
Electronic Arrays  
FUNDS FLOW HISTORY 1974-78  
(Dollars in Millions)

	<u>Fiscal Year Ending March 31</u>					<u>TREND</u>	<u>CHG</u>
	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>		
<i>SOURCES</i>							
56 NET PROFIT	3.37	0.25	0.38	(3.41)	(2.09)	(1.45)	*****
46 DEPRECIATION	0.88	1.16	1.25	1.50	1.66	0.19	16.65
61 NEW LONG TERM DEBT	0.06	0.00	0.08	0.02	0.79	0.15	801.75
62 NEW EQUITY	5.08	0.01	0.00	0.09	0.04	(1.00)	*****
53 INCR OTHER LIABILITIES	0.08	0.05	0.05	(0.23)	0.00	(0.04)	*****
56 TOTAL SOURCES	9.46	1.48	1.76	(2.03)	0.40	(2.16)	*****
<i>USES</i>							
67 P P E EXPENDITURES	1.94	1.48	1.08	1.74	0.62	(0.24)	(18.99)
68 REPAYMENT LONG TERM DEBT	0.91	0.52	0.37	0.16	0.05	(0.21)	(47.92)
69 PREFERRED DIVIDENDS	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70 COMMON DIVIDENDS	0.00	0.00	0.00	0.00	0.00	0.00	0.00
72 INCR WORKING CAPITAL	5.71	(0.47)	0.33	(3.99)	(0.72)	(1.64)	*****
71 INCR OTHER ASSETS	0.06	(0.03)	0.02	0.04	0.44	0.08	*****
74 TOTAL USES	8.62	1.49	1.80	(2.05)	0.41	(2.00)	*****
75 EXCESS/DEFICIT	0.00	0.00	0.00	0.00	0.00	0.00	0.00
76 CUMULATIVE SUR/DEF	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Source: DATAQUEST, Inc.  
Electronic Arrays Annual Report

## 8.26 Electronic Arrays

Table 8.26.9-4  
Electronic Arrays  
FINANCIAL RATIO HISTORY 1973-78

	Fiscal Year Ending March 31						ST AV	WTD AVG	
	1973	1974	1975	1976	1977	1978			
<b>LIQUIDITY</b>									
1	CURRENT RATIO	1.195	3.038	5.216	4.099	1.732	1.711	2.832	2.773
2	QUICK RATIO	0.694	1.988	3.532	3.090	1.109	1.073	1.914	1.886
3	CASH RATIO	0.079	1.074	1.850	1.483	0.242	0.244	0.829	0.780
4	WORKING CAPITAL/SALES	0.077	0.385	0.410	0.424	0.199	0.172	0.278	0.276
6	DAYS RECEIVABLES	89.005	63.086	59.697	80.321	85.984	72.957	75.175	75.391
7	DAYS INVENTORY	117.460	132.048	96.524	79.644	75.356	74.889	95.987	86.468
<b>LEVERAGE</b>									
8	LONG TERM DEBT/CAPITALIZ	0.328	0.105	0.075	0.067	0.086	0.176	0.139	0.120
11	LONG TERM DEBT/EQUITY	0.487	0.117	0.081	0.071	0.094	0.213	0.177	0.143
12	TOTAL DEBT/EQUITY	0.987	0.162	0.113	0.085	0.218	0.419	0.331	0.267
<b>COVERAGE</b>									
13	EBIT/INTEREST	2.316	15.758	(19.048)	(1.940)	214.667	(11.806)	33.325	46.258
14	FIXED CHARGE COVERAGE	1.916	7.941	3.204	38.538	(21.103)	(5.464)	4.172	2.060
16	REPAY LTD+FIX CHARGE COV	*****	2.364	0.877	1.315	(9.871)	(4.570)	(1.977)	(3.618)
<b>OPER PERFORMANCE</b>									
17	GROSS PROFIT/SALES	0.410	0.469	0.420	0.400	0.228	0.295	0.370	0.339
18	OPER PROFIT/SALES	0.151	0.226	0.115	0.108	(0.094)	(0.005)	0.093	0.042
21	PRETAX PROFIT/SALES	0.043	0.150	0.026	0.029	(0.200)	(0.151)	(0.017)	(0.065)
22	NET PROFIT/SALES	0.084	0.189	0.016	0.023	(0.213)	(0.154)	(0.009)	(0.066)
23	NET PROFIT/AVG EQUITY	*****	0.453	0.022	0.093	(0.332)	(0.276)	(0.020)	(0.141)
24	NET PROFIT/AVG CAPITALIZ	*****	0.375	0.020	0.030	(0.308)	(0.241)	(0.025)	(0.129)
26	NET PROFIT/AVG TOT ASSETS	*****	0.266	0.017	0.026	(0.235)	(0.167)	(0.019)	(0.093)
27	E P S GROWTH RATE	*****	2.079	(0.932)	0.441	*****	(0.394)	*****	*****
28	SALES GROWTH RATE	*****	0.830	(0.106)	0.045	(0.040)	(0.151)	0.115	(0.011)
<b>TURNOVER</b>									
31	SALES/AVG EQUITY	*****	2.402	1.403	1.422	1.560	1.795	1.717	1.646
32	SALES/AVG CAPITALIZ	*****	1.989	1.277	1.321	1.444	1.567	1.520	1.474
33	SALES/AVG TOT DEBT + EQTY	*****	1.761	1.233	1.294	1.368	1.376	1.407	1.364
34	SALES/AVG TOTAL ASSETS	*****	1.408	1.056	1.131	1.103	1.088	1.157	1.118
35	SALES/AVG OPER ASSETS	*****	1.445	1.080	1.157	1.130	1.142	1.191	1.154
36	SALES/AVG GROSS P P E	*****	2.659	1.935	1.782	1.513	1.172	1.814	1.587
<b>BALANCE SHEET</b>									
37	CASH/SALES	0.031	0.203	0.180	0.203	0.066	0.059	0.124	0.118
38	RECEIVABLES/SALES	0.244	0.173	0.164	0.220	0.236	0.206	0.206	0.207
41	INVENTORY/SALES	0.190	0.192	0.153	0.131	0.159	0.145	0.162	0.153
42	OTH CURR ASSETS/SALES	0.009	0.007	0.010	0.007	0.010	0.009	0.009	0.009
44	GROSS P P E/SALES	0.590	0.427	0.556	0.590	0.708	0.872	0.624	0.678
45	LINE 13/SALES	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000
46	MISC ASSETS/SALES	0.029	0.019	0.019	0.020	0.023	0.060	0.028	0.032
47	ACCOUNTS PAYABLE/SALES	0.162	0.118	0.034	0.081	0.160	0.109	0.111	0.109
48	ACCRUED TAXES/SALES	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
51	ACCRUED LIABILITY/SALES	0.049	0.043	0.040	0.046	0.045	0.033	0.043	0.041
53	DEFERRED TAXES/SALES	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
54	MISC LIABILITIES/SALES	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
56	LINE 26/SALES	0.004	0.007	0.011	0.014	0.000	0.000	0.006	0.005
<b>MISCELLANEOUS</b>									
57	EQUITY PER COMMON SHARE	3.145	7.300	6.705	6.641	4.909	3.706	5.401	5.295
58	RETIRE/PRV GROSS P P E	*****	(0.014)	(0.029)	(0.014)	(0.025)	(0.009)	(0.018)	(0.017)
61	DEPREC/PRV GROSS P P E	*****	0.152	0.153	0.140	0.153	0.147	0.149	0.148
62	COM DIVS/PRV-PPD DIVS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
63	TAX RATE	0.550	0.560	0.508	0.465	(0.065)	(0.019)	0.333	0.220
64	COST OF GOODS/SALES	0.590	0.531	0.580	0.600	0.772	0.705	0.530	0.561
65	S G & A/SALES	0.150	0.139	0.170	0.171	0.205	0.218	0.176	0.188

Source: DATAQUEST, Inc.  
Electronic Arrays Annual Report



**Nixdorf Computer AG**  
Furstenallee 7  
D-4790 Paderborn  
Federal Republic of Germany  
Telephone: INT-5251-150  
Fax: (05251) 15-1105  
Dun's Number: 31-569-7243  
*Date Founded: 1952*

---

### **CORPORATE STRATEGIC DIRECTION**

Nixdorf Computer AG and Siemens AG officially announced in January 1990 that Siemens would acquire 51 percent of Nixdorf's capital. The transaction was approved by the West German Cartel Office and the European Commission in May 1990. The new company, called Siemens-Nixdorf Information Systems AG, will merge the computer and telecommunications systems business of both Nixdorf and Siemens, effective October 1, 1990. If combined, 1989 sales for the two companies would be DM 12.0 billion (US\$7.15 billion), in contrast to Nixdorf's current worldwide sales of DM 5.3 billion (\$2.8 billion).

The current product lines of both partners will be retained. Subsequent fusing of these product lines will include safeguards to customer investments for future product decisions. Siemens-Nixdorf also will continue the program set up by Nixdorf prior to the merger to reduce costs and improve profitability. More recently, Siemens-Nixdorf reports that Nixdorf operations have been restructured into 15 business units designed to give greater flexibility and faster response to changes in the global marketplace.

According to Nixdorf, a comprehensive package of measures has been adopted to define the priorities for reinstating the Company to a profitable footing. The Company will halt unprofitable activities, adapt production capacity to demand, reduce vertical integration in development and production, raise efficiency in the applications software area, and tighten administration. The plans include transferring the manufacturing operation from the Bray plant in Ireland to Paderborn, Germany. Altogether, approximately 3,500 personnel will be trimmed from the work force during 1990.

Nixdorf currently manufactures and markets computer systems; point-of-sale (POS) terminals; self-service equipment such as ATMs and ticketing terminals; telecommunications systems, including PABX and facsimile machines; and system supplies and peripherals.

For the fiscal year ending December 31, 1989, Nixdorf's revenue was DM 5.3 billion (US\$2.8 billion), a 2 percent decrease from revenue of DM 5.4 billion (US\$3.0 billion) in 1988. (Percentage changes refer only to DM amounts; US\$ percentage changes will differ because of fluctuations in Dataquest exchange rates.) Nixdorf had a net loss for 1989 of DM 1.1 billion (US\$585 million), compared with income of DM 26 million (US\$13.8 million) for 1988. Nixdorf attributes the loss in 1989 to increased competition in a shrinking market, noting that its slow response to changes in the computer markets resulted in lower sales revenue and increased operating costs.

Although the Company's revenue dropped 7 percent in the German market in 1989, sales increased 4 percent in international markets. International business accounted for 48 percent of overall revenue, of which 41 percent came from other European countries. Nixdorf was represented by subsidiaries and agencies in 45 countries worldwide.

Nixdorf's marketing strategy during 1989 was to expand sales of its UNIX-based systems and position the Company as a systems integrator to its traditional customer base. The Company's target markets include large commercial accounts, with emphasis on local government, retailers, banks, insurance companies, and airlines. Nixdorf also offers customized solutions for small to medium-size retailers as well as hotels and restaurants.

The Company's marketing organization consists of the following marketing divisions: industry, wholesaling, and services; financial institutions and private insurance companies; small business, retailing, restaurants, and hotels; government, social security, and telecommunication; and personal computers and microcomputers.

During 1989, Nixdorf's North American subsidiary Nixdorf Computer Corp. underwent reorganization in its field sales and support organization. Nixdorf has an estimated 1,500 US employees in various sales and service offices and four research centers.

As part of its cost-cutting strategies, Nixdorf's expenditure for R&D remained level at DM 527 million (US\$280 million) for 1989. R&D activity for the year focused on development of open systems products. Other activity included improved software offerings for system integration, new product development for the self-service and retail industries, and continued adaptation of proprietary product lines using new hardware technologies. R&D in the telecommunications sector concentrated on development of ISDN functions for user communication.

Nixdorf's capital expenditure decreased 23 percent during the year, from DM 749 million (US\$421 million) in 1988, to DM 578 million (US\$307 million) in 1989. Personnel expenses increased slightly to DM 2,132 million (US\$1,134 million) during the year, despite staff reductions of 2,500 that left the total employment at 31,037 by the end of 1989.

Nixdorf will close its 1990 fiscal year prematurely on September 30. Because the Company's cost-saving measures will not have been in effect long enough to attain their full impact, the Company anticipates substantial losses to be reported for the (shortened) 1990 fiscal year.

More detailed information is available in Tables 1 and 2, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region. Information on revenue by distribution channel is not available. Tables 3 and 4, comprehensive financial statements, are at the end of this profile.

---

## BUSINESS SEGMENT STRATEGIC DIRECTION

### Computer Systems

Nixdorf offers a broad spectrum of computer products ranging from personal computers to multiprocessor, multiuser business computers. Dataquest estimates that Nixdorf holds tenth place in the worldwide midrange computer market, based on 1989 factory revenue of \$428 million.

Nixdorf's strategy in its computer business is focused on the development of UNIX-based open systems products and systems integration. Three major aspects of the open systems strategy are conversion of Nixdorf-proprietary solutions to standard technology; implementation of DXAE (Nixdorf distributed open application environment) software architecture; and provision of end-to-end, binary-compatible UNIX system family, from personal computers to high-end servers based on reduced-instruction-set computer (RISC) architecture.

As part of its commitment to this open systems strategy, Nixdorf has formed alliances with technological partners such as MIPS, Pyramid, and Tandem. Nixdorf currently is selling Pyramid computers under its Targon product line. The agreements with MIPS and Tandem include joint development and marketing of fault-tolerant systems based on MIPS' RISC technology and the UNIX operating system standard.

A large share of Nixdorf's 1989 computer revenue came from sales of its UNIX-based Targon product line. This product line ranges from the single processor Targon 31, based on Motorola 68030 microprocessors, to the Targon/35 system with four processors operating at up to 48 million instructions per minute (mips), based on the Pyramid MIServer. Though rumors have circulated that the Targon line will be dropped in favor of the Siemens product offering, Siemens and Nixdorf both claim the two separate UNIX-based product lines will be carried after the merger is completed.

Nixdorf also has enhanced its proprietary Quattro and 886x systems product lines. During 1989, Nixdorf added a SCSI interface and a new VLSI-CPU to double the compute power of the 886x systems. For the Quattro systems, a 32-bit processor was introduced and memory capacity expanded to 32MB. The 886x family contains a distributed data processing system (8860) as well as industry-specific solutions for the retail markets (8862) and the banking terminal market (8864), including the ATM and customer self-service terminal markets. The Quattro is positioned to meet demands for vertical market solutions and has sold well in small-business environments.

Dataquest estimates that Nixdorf sold over 60,000 units in the personal computer market in 1989. The majority of Nixdorf's PC sales came from its 80286-based PCs, which Dataquest estimates to be 42,000 units for the year.

During 1989, Nixdorf introduced the Targon 386 file server to the US marketplace. The Targon 386 is based on the Intel 80386 microprocessor and allows the user to run UNIX and MS-DOS applications. The system comes in four versions offering 40 to 180MB of disk storage, expandable to 360MB. The system can support up to 10 workstations or PCs in a networked environment. The Targon 386 is a part of Nixdorf's strategy for developing PC sales using the client-server concept. Nixdorf is offering OS/2, UNIX, 886x, and Quattro systems as servers to be used in local area networks (LANs) linking PCs and workstations to a company's central resources.

## Telecommunications

Nixdorf developed the MegaLine system, a broadband network available for corporate communication at the workstation level. MegaLine consists of the MegaSwitch broadband PABX, MegaTel workstations for video telephone calls, and MegaDesk, which integrates voice and moving-image communication, as well as data and telecom applications. These systems are expected to open up a new business growth area for Nixdorf.

In the telecommunications sector, Nixdorf markets digital switching equipment and facsimile machines. The Company also is developing ISDN systems, and has begun tests on a broadband communication network developed jointly by Nixdorf and ANT for moving-image communications. The pilot system, being used by several hospitals, is a direct-dial installation and can be used to transmit both video signals and mass data volumes.

Shipments of Nixdorf's 8818 PABX systems reached over 10,000 during 1989. This system has been certified by the German Posts, Telegraph & Telephone Authority (PTT) for use in the public ISDN network. The 8818 PABX is also certified by the Italian PTT, and is in operation in 18 countries worldwide.

## Further Information

For further information about the Company's business segments, please contact the appropriate industry service.

**Table 1**  
**Five-Year Corporate Highlights (Millions of US Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$1,335.4	\$2,075.1	\$2,817.2	\$3,003.9	\$2,798.4
Percent Change	-	55.40	35.76	6.63	(6.84)
Capital Expenditure	\$186.7	\$297.7	\$402.8	\$420.8	\$307.5
Percent of Revenue	13.98	14.35	14.30	14.01	10.99
R&D Expenditure	\$131.0	\$196.8	\$265.0	\$296.1	\$280.3
Percent of Revenue	9.81	9.48	9.41	9.86	10.02
Number of Employees	23,290	23,290	25,576	29,440	31,037
Revenue (\$K)/Employee	\$57.34	\$89.10	\$110.15	\$102.04	\$90.16
Net Income	\$58.5	\$102.3	\$146.7	\$14.6	(\$568.6)
Percent Change	-	74.87	43.36	(90.04)	(3992.86)
Exchange Rate (US\$1=DM)	DM 2.94	DM 2.17	DM 1.80	DM 1.78	DM 1.88
1989 Calendar Year	Q1	Q2	Q3	Q4	
Quarterly Revenue	NA	NA	NA	NA	
Quarterly Profit	NA	NA	NA	NA	

NA = Not available

Source: Nixdorf Computer AG  
Annual Reports  
Dataquest (1990)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1985	1986	1987	1988	1989
German	49.34	49.00	52.00	54.00	52.00
International	50.66	51.00	48.00	46.00	48.00
Europe	40.00	41.00	40.00	40.00	41.00
All Others	11.00	10.00	8.00	6.00	7.00

Source: Nixdorf Computer AG  
Annual Reports

---

## 1989 SALES AND SERVICE LOCATIONS

North America—45  
 Europe—59  
 Asia/Pacific—6  
   Japan—1  
 ROW—16

---

## MANUFACTURING LOCATIONS

### *North America*

North Reading, Massachusetts  
 Computers for North America

### *Europe*

Berlin, Germany  
 Computers, disk drives, video displays  
 Cologne, Germany  
 Printers, subassemblies  
 Paderborn, Germany  
 Main European site for computer assembly,  
 subassembly  
 Toledo, Spain  
 Computers, subassemblies

### *ROW*

Singapore  
 Video displays, keyboards, printer subassemblies

---

## SUBSIDIARIES

### *North America*

Nixdorf Computer Canada Ltd., Toronto (Canada)  
 Nixdorf Computer Corp., Massachusetts  
 (United States)  
 Nixdorf Computer Engineering Corp., Massachusetts  
 (United States)

### *Europe*

BOG-Nixdorf Computer GmbH, Munster (Germany)  
 Nixdorf Computer AB, Stockholm (Sweden)  
 Nixdorf Computer AE, Athens (Greece)  
 Nixdorf Computer AG, Zurich (Switzerland)  
 Nixdorf Computer A/S, Copenhagen (Denmark)

Nixdorf Computer A/S, Oslo (Norway)  
 Nixdorf Computer B.V. (Netherlands)  
 Nixdorf Computer Datenverarbeitungssysteme  
 GmbH, Berlin (Germany)  
 Nixdorf Computer Distribution SA (France)  
 Nixdorf Computer Financial Services Ltd., Dublin  
 (Ireland)  
 Nixdorf Computer France SA, Paris (France)  
 Nixdorf Computer GesmbH, Vienna (Austria)  
 Nixdorf Computer GmbH & Co. Verwaltung, Berlin  
 (Germany)  
 Nixdorf Computer International Ltd., Bray/Dublin  
 (Ireland)  
 Nixdorf Computer Leasing GmbH, Salzkotten  
 (Germany)  
 Nixdorf Computer Ltd., Dublin (Ireland)  
 Nixdorf Computer Ltd., London (United Kingdom)  
 Nixdorf Computer Lyon SA, Lyon (France)  
 Nixdorf Computer Miete GmbH, Berlin (Germany)  
 Nixdorf Computer SA, Brussels (Belgium)  
 Nixdorf Computer SA, Madrid (Spain)  
 Nixdorf Computer SA, Paris (France)  
 Nixdorf Computer SA, Strassen (France)  
 Nixdorf Computer S.p.A., Milan (Italy)  
 Nixdorf Entwicklungsgesellschaft fur  
 Kommunikationstechnik mbH, Berlin (Germany)  
 Nixdorf International Finance B.V., Amstelveen  
 (Netherlands)  
 Nixdorf Microprocessor Engineering GmbH, Berlin  
 (Germany)  
 Nixdorf Software Engineering GmbH, Berlin  
 (Germany)  
 OY Nixdorf Computer AB, Helsinki (Finland)

### *Asia/Pacific*

Nixdorf Computer China Ltd. (Hong Kong)  
 Nixdorf Computer International Singapore Pte. Ltd.  
 (Singapore)  
 Nixdorf Computer Japan K.K., Tokyo (Japan)  
 Nixdorf Computer Ltd., Auckland (New Zealand)  
 Nixdorf Computer Ltd. (Hong Kong)  
 Nixdorf Computer Pte. Ltd. (Singapore)  
 Nixdorf Computer Pty. Ltd., Sydney (Australia)  
 Nixdorf Regional Headquarters Pte. Ltd. (Singapore)

### *ROW*

Nixdorf Computer C.A., Caracas (Venezuela)  
 Nixdorf Computer (Pty) Ltd., Johannesburg (South  
 Africa)  
 Nixdorf Computer SA, Casablanca (Morocco)  
 Nixdorf Computer Ticaret A.S., Istanbul (Turkey)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

1989

### M4 Data

M4 Data announced the signing of a three-year OEM agreement with Nixdorf. M4 Data will provide nine-track magnetic tape drives for Nixdorf's Targon and Quattro computer systems.

### MIPS Computer Systems

Nixdorf agreed to develop computers based on RISC designs from MIPS and will become an OEM for MIPS RISC-based computer systems.

### Tandem Computers

Nixdorf will sell a UNIX-based computer to be unveiled by Tandem in 1990.

### Pyramid Technology

Pyramid announced that it signed an amendment to its agreement with Nixdorf extending its long-running OEM relationship to include Pyramid's new products, the MIServer line of high-performance open commercial servers.

### Tandem Computers

The two companies are joining forces on fault-tolerant systems based on MIPS RISC technology and the UNIX operating system standard.

1988

### Apollo Computer

Nixdorf and Apollo Computer entered into a licensing agreement. Under the agreement, Apollo will market Nixdorf's graphics workstations in Europe.

### Uniplex Integration Systems, Inc.

Nixdorf and Uniplex Integration Systems, Inc., entered into a marketing agreement. Under the agreement, Nixdorf will market Uniplex Business Software with the UNIX-based Targon computer systems.

---

## MERGERS AND ACQUISITIONS

Information is not available.

---

## KEY OFFICERS

Arno Bohn  
Vice chairman

Dr. Hartmut Fetzer  
Executive director

Albert Holler  
Executive director

Sven Kado  
Executive director

Dr. Horst Nasko  
Executive director

Karlheinz Voll  
Executive director

---

## PRINCIPAL INVESTORS

Information is not available.

---

## FOUNDER

Heinz Nixdorf

**Table 3**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December 31**  
**(Millions of US Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Total Current Assets	\$863.9	\$1,224.9	\$1,736.1	\$1,662.0	\$1,259.4
Cash	0	0	408.9	116.5	134.6
Receivables	331.0	471.4	713.0	844.6	653.6
Inventory	368.0	539.2	573.9	700.9	471.3
Other Current Assets	165.0	214.3	40.2	0	0
Net Property, Plants	\$388.1	\$632.7	\$918.4	\$1,048.2	\$971.1
Other Assets	\$171.8	\$171.9	\$17.7	\$6.5	\$7.0
<b>Total Assets</b>	<b>\$1,423.8</b>	<b>\$2,029.5</b>	<b>\$2,672.2</b>	<b>\$2,716.7</b>	<b>\$2,237.0</b>
Total Current Liabilities	\$141.5	\$224.0	\$276.7	\$374.3	\$525.1
Long-Term Debt	\$81.3	\$53.5	\$735.2	\$740.1	\$807.9
Other Liabilities	\$429.6	\$350.2	\$3.4	\$5.7	\$8.1
<b>Total Liabilities</b>	<b>\$652.4</b>	<b>\$627.6</b>	<b>\$1,015.3</b>	<b>\$1,120.2</b>	<b>\$1,341.1</b>
Total Shareholders' Equity	\$771.4	\$1,401.8	\$1,656.9	\$1,596.5	\$896.3
Capital Stock	163.3	258.1	311.2	314.7	297.9
Other Equity	579.6	1,097.2	1,283.6	1,269.2	598.4
Retained Earnings	28.6	46.5	62.2	12.6	0
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$1,423.8</b>	<b>\$2,029.5</b>	<b>\$2,672.2</b>	<b>\$2,716.7</b>	<b>\$2,237.4</b>
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1988</b>
Revenue	\$1,335.4	\$2,075.1	\$2,817.2	\$3,003.9	\$2,798.4
German Revenue	658.8	1,084.8	1,521.7	1,574.7	NA
Non-German Revenue	676.5	990.3	1,295.6	1,429.2	NA
Cost of Sales	\$503.7	\$712.0	\$950.9	\$1,258.3	\$1,223.1
R&D Expense	\$131.0	\$196.8	\$265.0	\$296.1	\$280.3
SG&A Expense	\$493.5	\$733.2	\$1,004.4	\$1,175.8	\$1,134.0
Capital Expense	\$186.7	\$297.7	\$402.8	\$420.8	\$307.5
Pretax Income	NA	NA	NA	NA	NA
Pretax Margin (%)	NA	NA	NA	NA	NA
Effective Tax Rate (%)	NA	NA	NA	NA	NA
Net Income	\$58.5	\$102.3	\$146.7	\$14.6	(\$568.6)
Shares Outstanding, Thousands	NA	338.0	NA	NA	NA
<b>Per Share Data</b>					
Earnings	NA	NA	NA	NA	NA
Dividend	\$3.40	NA	\$1.39	\$5.62	\$2.13
Book Value	NA	\$4.15	NA	NA	NA

**Table 3 (Continued)**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December 31**  
**(Millions of US Dollars, except Per Share Data)**

<b>Key Financial Ratios</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<i>Liquidity</i>					
Current (Times)	6.11	5.47	6.27	4.44	2.40
Quick (Times)	3.50	3.06	4.20	2.57	1.50
Fixed Assets/Equity (%)	50.31	45.13	55.43	65.66	108.33
Current Liabilities/Equity (%)	18.34	15.98	16.70	23.45	58.59
Total Liabilities/Equity (%)	84.57	44.77	61.27	70.16	149.63
<i>Profitability (%)</i>					
Return on Assets	8.22	5.93	6.24	0.54	(22.96)
Return on Equity	15.17	9.41	9.59	0.90	(45.62)
Profit Margin	4.38	4.93	5.21	0.49	(20.32)
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	9.81	9.48	9.41	9.86	10.02
Capital Spending % of Revenue	13.98	14.35	14.30	14.01	10.99
Employees	23,290	23,290	25,576	29,440	31,037
Revenue (\$K)/Employee	\$57.34	\$89.10	\$110.15	\$102.04	\$90.16
Capital Spending % of Assets	13.12	14.67	15.07	15.49	13.74
Exchange Rate (US\$1=DM)	DM 2.94	DM 2.17	DM 1.80	DM 1.78	DM 1.88

NA = Not available

Source: Nixdorf Computer AG  
Annual Reports  
Dataquest (1990)



**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December 31**  
**(Millions of Deutsche Marks, except Per Share Data)**

<b>Balance Sheet</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Total Current Assets</b>	DM 2,540.0	DM 2,658.0	DM 3,124.8	DM 2,958.3	DM 2,367.8
Cash	0	0	736.0	207.4	253.1
Receivables	973.0	1,023.0	1,283.4	1,503.3	1,228.7
Inventory	1,082.0	1,170.0	1,033.1	1,247.6	886.0
Other Current Assets	485.0	465.0	72.3	0	0
<b>Net Property, Plants</b>	DM 1,141.0	DM 1,373.0	DM 1,653.2	DM 1,865.8	DM 1,825.6
<b>Other Assets</b>	DM 505.0	DM 373.0	DM 31.9	DM 11.6	DM 12.9
<b>Total Assets</b>	<b>DM 4,186.0</b>	<b>DM 4,404.0</b>	<b>DM 4,809.9</b>	<b>DM 4,835.7</b>	<b>DM 4,206.3</b>
<b>Total Current Liabilities</b>	DM 416.0	DM 486.0	DM 498.0	DM 666.3	DM 987.2
<b>Long-Term Debt</b>	DM 239.0	DM 116.0	DM 1,323.4	DM 1,317.4	DM 1,518.9
<b>Other Liabilities</b>	DM 1,263.0	DM 760.0	DM 6.1	DM 10.2	DM 15.2
<b>Total Liabilities</b>	<b>DM 1,918.0</b>	<b>DM 1,362.0</b>	<b>DM 1,827.5</b>	<b>DM 1,993.9</b>	<b>DM 2,521.3</b>
<b>Total Shareholders' Equity</b>	DM 2,268.0	DM 3,042.0	DM 2,982.5	DM 2,841.8	DM 1,685.0
Capital Stock	480.0	560.0	560.1	560.1	560.1
Other Equity	1,704.0	2,381.0	2,310.4	2,259.2	1,124.9
Retained Earnings	84.0	101.0	112.0	22.5	0
<b>Total Liabilities and Shareholders' Equity</b>	<b>DM 4,186.0</b>	<b>DM 4,404.0</b>	<b>DM 4,810.0</b>	<b>DM 4,835.7</b>	<b>DM 4,206.3</b>
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Revenue</b>	DM 3,926.0	DM 4,503.0	DM 5,071.0	DM 5,347.0	DM 5,261.4
German Revenue	1,937.0	2,354.0	2,739.0	2,803.0	NA
Non-German Revenue	1,989.0	2,149.0	2,332.0	2,544.0	NA
<b>Cost of Sales</b>	DM 1,481.0	DM 1,545.0	DM 1,711.6	DM 2,239.7	DM 2,299.4
<b>R&amp;D Expense</b>	DM 385.0	DM 427.0	DM 477.0	DM 527.0	DM 527.0
<b>SG&amp;A Expense</b>	DM 1,451.0	DM 1,591.0	DM 1,808.0	DM 2,093.0	DM 2,132.3
<b>Capital Expense</b>	DM 549.0	DM 646.0	DM 725.0	DM 749.0	DM 578.0
<b>Pretax Income</b>	NA	NA	NA	NA	NA
<b>Pretax Margin (%)</b>	NA	NA	NA	NA	NA
<b>Effective Tax Rate (%)</b>	NA	NA	NA	NA	NA
<b>Net Income</b>	DM 172.0	DM 222.0	DM 264.0	DM 26.0	(DM 1,069.0)
<b>Shares Outstanding, Thousands</b>	NA	NA	NA	NA	NA
<b>Per Share Data</b>					
Earnings	NA	NA	NA	NA	NA
Dividend	DM 10.00	NA	DM 2.50	DM 10.00	DM 4.00
Book Value	NA	NA	NA	NA	NA

**Table 4 (Continued)**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December 31**  
**(Millions of Deutsche Marks, except Per Share Data)**

Key Financial Ratios	1985	1986	1987	1988	1989
<i>Liquidity</i>					
Current (Times)	6.11	5.47	6.27	4.44	2.40
Quick (Times)	3.50	3.06	4.20	2.57	1.50
Fixed Assets/Equity (%)	50.31	45.13	55.43	65.66	108.34
Current Liabilities/Equity (%)	18.34	15.98	16.70	23.45	58.59
Total Liabilities/Equity (%)	84.57	44.77	61.27	70.16	149.63
<i>Profitability (%)</i>					
Return on Assets	8.22	5.17	5.73	0.54	(23.65)
Return on Equity	15.17	8.36	8.76	0.89	(47.23)
Profit Margin	4.38	4.93	5.21	0.49	(20.32)
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	9.81	9.48	9.41	9.86	10.02
Capital Spending % of Revenue	13.98	14.35	14.30	14.01	10.99
Employees	23,290	23,290	25,576	29,440	31,037
Revenue (DM K)/Employee	DM 168.57	DM 193.34	DM 198.27	DM 181.62	DM 169.52
Capital Spending % of Assets	13.12	14.67	15.07	15.49	13.74
Exchange Rate (US\$1=DM)	DM 2.94	DM 2.17	DM 1.80	DM 1.78	DM 1.88

NA = Not available

Source: Nixdorf Computer AG  
Annual Reports  
Dataquest (1990)

# Nixdorf Computer AG

Furstenallee 7  
D-4790 Paderborn  
Federal Republic of Germany  
Telephone: INT-5251-150  
Fax: (05251) 15-1105  
Dun's Number: 31-569-7243

*Date Founded: 1952*

---

Nixdorf Computer AG and Siemens AG officially announced on Wednesday, January 10, that Siemens intends to acquire 51 percent of Nixdorf's capital, pending the West German Cartel Office's approval. (The Cartel Office's final decision is expected within four months.) The financial value of the transaction has not been disclosed. Common shares were acquired from the Nixdorf family, which previously controlled all the voting shares. Nixdorf said that nonvoting preferred shares listed in German exchanges will not be affected by the merger.

The new company, a majority-owned subsidiary of Siemens called Siemens-Nixdorf Information Systems AG, would combine the Siemens data and information systems activities with those of Nixdorf. Annual sales of the company would be DM 12.0 billion (US\$7.15 billion), which contrasts with Nixdorf's current worldwide sales of DM 5.6 billion (US \$3.34 billion).

Nixdorf stated that "given the relatively few overlapping lines of business, a merger opens up good business opportunities and favorable synergistic aspects."

---

## CORPORATE STRATEGIC DIRECTION

Heinz Nixdorf founded Labor Fur Impulstechnik in 1952. This company was subsequently renamed Nixdorf Computer AG (Nixdorf) in 1968. Heinz Nixdorf led the Company through a period of phenomenal growth and success until his death in 1986.

Nixdorf offers systems for every application in data and information processing in a business environment. The product range is enhanced by word

processing systems, integration of telex and videotex, and telecommunication offerings such as digital PABXs and digital telephones, in addition to a wide spectrum of services.

In 1988, direct sales accounted for 58 percent of Nixdorf's revenue; services and rental accounted for the remaining 42 percent.

Nixdorf is represented in 43 countries in a worldwide marketing and service network regionally divided into Europe, North America, and other overseas countries. Within this network, European countries (excluding Germany) form a key market area accounting for 41 percent of Nixdorf's total revenue in 1988. Nixdorf employs more than 31,000 people worldwide.

The Company's marketing organization consists of the following marketing divisions: industry, wholesaling, and services; financial institutions and private insurance companies; small business, retailing, restaurants, and hotels; government, social security, and telecommunications; and personal computers and microcomputers.

Nixdorf strives to be a complete supplier of information technology solutions integrating computers, communications, and application software. The Company is number three behind IBM and Siemens in the German market, where it obtains 52 percent of its revenue. Since 1986, Nixdorf has been making a major push to develop U.S. sales. It has more than 1,500 U.S. employees in various sales and service locations and four research centers.

Nixdorf's past success resulted from targeting the vertical markets of small businesses, government, banking, and retailing with an impressive array of application software. The Company intends to grow with innovative products based on the convergence of data, text, image, and voice communications. The U.S. sales strategy primarily targets large commercial accounts, with emphasis on local government, retailers, banks, and hotels as well.

Anticipating its five-year 16 percent annual growth to continue in 1988, Nixdorf invested heavily in additional staff and facilities. Instead, 1988 saw a slower market, sharper competition, adverse foreign currency movements, and higher production costs. Revenue rose 6.6 percent to \$3.0 billion\* in 1988 compared with \$2.8 billion in 1987. However, net income saw a sharp decline of more than 90 percent—from \$146.7 million in 1987 to \$14.6 million in 1988.

During 1989, Nixdorf's North American subsidiary Nixdorf Computer Corp. underwent reorganization in its field sales and support organization. Additionally, approximately 3 percent of Nixdorf's worldwide work force was cut, including R&D, engineering, and manufacturing employees.

Concentrating on end-user requirements, open standards, and integration of computer and communications technology, Nixdorf spent \$296.1 million on research and development, or 9.9 percent of its 1988 revenue. Capital expenditures in 1988 were sustained at the 14.0 percent of revenue of the previous three years, at \$420.8 million in 1988.

Nixdorf also pursues complete solution capability through technological cooperation with other companies, universities, and scientific institutions.

Nixdorf joined with Amdahl Corporation in 1987 to form the Communications Software Group to broaden the range of communications software for the UNIX operating system.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region and distribution channel. Table 4, a comprehensive financial statement, is at the end of this profile.

\*All dollar amounts are in U.S. dollars.

## BUSINESS SEGMENT STRATEGIC DIRECTION

### Telecommunications

Nixdorf manufactures systems for every application in data and information processing in a business environment. Its product line is enhanced by word processing systems, integration of teletex and videotex, and telecommunications offerings such as digital PABXs and digital telephones. These products blend computer, office communications, and telecommunications technologies.

Nixdorf began pilot tests of its Integrated Services Digital Network (ISDN) and started a public service ISDN network in 1988. By year-end, shipments of Nixdorf ISDN 8818 PABX rose to 7,700 systems. The ISDN 8818 is present in 17 countries following recent system certification in Malaysia and Indonesia.

Nixdorf developed the MegaLine system, a broadband network available for corporate communications at the workstation level. MegaLine consists of the MegaSwitch broadband PABX, MegaTel workstations for video telephone calls, and MegaDesk, which integrates voice and moving-image communications, as well as data and telecom applications. These systems are expected to open up a new business growth area for Nixdorf.

### Data Processing Activities

Nixdorf offers a broad spectrum of products ranging from personal computers to multiterminal business computers. The Company held less than 1 percent of the European personal computer market and 4 percent of the European computer market in 1988.

A major 1985 launch was the introduction of the Targon system family aimed at new markets such as manufacturing, engineering, and scientific applications; it also was intended to broaden Nixdorf's base in established market areas. The Targon models are good examples of Nixdorf's strategy to develop new products by enriching its own expertise through effective cooperation with technological partners. Through this approach, the Company was able to market a new product family based on a worldwide UNIX operating system.

This product family incorporated reduced-instruction-set computing (RISC) architecture, which equips computers with much faster processing speeds than those of their predecessors.

Nixdorf introduced the Targon 386 to the U.S. marketplace. The Targon 386 comes in four versions: Versions 1 and 2 are 40MB hard disk models; Versions 3 and 4 have 180MB hard disks. Versions 1 and 2 expand to a maximum of 220 MB, whereas Versions 3 and 4 expand to 360MB.

Nixdorf also introduced a menu-driven software package with integrated SQL-compliant database functionality for use in retail stores with the Company's Targon multiuser UNIX systems or its 386-based 8810 microcomputer line.

#### **Further Information**

For further information about the Company's business segments, please contact the appropriate industry service.

**Table 1**  
**Five-Year Corporate Highlights (Millions of U.S. Dollars)**

	1984	1985	1986	1987	1988
Five-Year Revenue	\$1,148.4	\$1,335.4	\$2,075.1	\$2,817.2	\$3,003.9
Percent Change	-	16.28	55.40	35.76	6.63
Capital Expenditure	\$176.8	\$186.7	\$297.7	\$402.8	\$420.8
Percent of Revenue	15.40	13.98	14.35	14.30	14.01
R&D Expenditure	\$113.3	\$131.0	\$196.8	\$265.0	\$296.1
Percent of Revenue	9.87	9.81	9.48	9.41	9.86
Number of Employees	20,193	23,290	25,576	29,440	31,037
Revenue (\$K)/Employee	\$56.87	\$57.34	\$81.14	\$95.69	\$96.79
Net Income	\$42.5	\$58.5	\$102.3	\$146.7	\$14.6
Percent Change	-	37.80	74.87	43.36	(90.04)
1989 Calendar Year	Q1	Q2	Q3	Q4	
Quarterly Revenue	N/A	N/A	N/A	N/A	
Quarterly Profit	N/A	N/A	N/A	N/A	

N/A = Not Available

Source: Nixdorf Computer  
 Annual Reports  
 Dataquest  
 January 1990

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1984	1985	1986	1987	1988
German	49.00	49.00	52.00	54.00	52.00
International	51.00	51.00	48.00	46.00	48.00
Europe	40.00	41.00	40.00	40.00	41.00
All Others	11.00	10.00	8.00	6.00	7.00

Source: Nixdorf Computer  
 Annual Reports

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1988
Direct Sales	58.00
Indirect Sales	42.00

Source: Nixdorf Computer  
 Annual Reports

---

## 1988 SALES AND SERVICE LOCATIONS

North America—45  
 Japan—1  
 Europe—59  
 Asia/Pacific—6  
 ROW—16

---

## MANUFACTURING LOCATIONS

### *North America*

North Reading, Massachusetts  
 Computers for North America

### *Europe*

Berlin, Germany  
 Computers, disk drives, video displays  
 Bray, Ireland  
 Subassemblies  
 Cologne, Germany  
 Printers, subassemblies  
 Paderborn, Germany  
 Main European site for computer assembly  
 Toledo, Spain  
 Computers, subassemblies

### *ROW*

Singapore  
 Video displays, keyboards, printer subassemblies

---

## SUBSIDIARIES

### *North America*

Nixdorf Computer Canada Ltd. (Toronto)  
 Nixdorf Computer Corp. (Massachusetts)  
 Nixdorf Computer Engineering Corp. (Massachusetts)

### *Japan*

Nixdorf Computer Japan K.K. (Tokyo)

### *Europe*

BOG-Nixdorf Computer GmbH (Munster)  
 Nixdorf Computer AB (Stockholm)  
 Nixdorf Computer AE (Athens)  
 Nixdorf Computer AG (Zurich)  
 Nixdorf Computer A/S (Copenhagen)  
 Nixdorf Computer A/S (Oslo)  
 Nixdorf Computer B.V. (Vianen)  
 Nixdorf Computer Datenverarbeitungssysteme GmbH  
 (Berlin)  
 Nixdorf Computer Distribution SA (Le Vesinet)  
 Nixdorf Computer Financial Services Ltd. (Dublin)  
 Nixdorf Computer France SA (Paris)  
 Nixdorf Computer Ges m.b.H. (Vienna)  
 Nixdorf Computer GmbH & Co. Verwaltung (Berlin)  
 Nixdorf Computer International Ltd. (Bray/Dublin)  
 Nixdorf Computer Leasing GmbH (Salzkotten)  
 Nixdorf Computer Ltd. (Dublin)  
 Nixdorf Computer Ltd. (London)  
 Nixdorf Computer Lyon SA (Lyon)  
 Nixdorf Computer Miete GmbH (Berlin)  
 Nixdorf Computer SA (Brussels)  
 Nixdorf Computer SA (Madrid)  
 Nixdorf Computer SA (Paris)  
 Nixdorf Computer SA (Strassen)  
 Nixdorf Computer S.p.A. (Milan)  
 Nixdorf Entwicklungsgesellschaft für  
 Kommunikationstechnik mbH (Berlin)  
 Nixdorf Infratec GmbH (Paderborn)  
 Nixdorf International Finance B.V. (Amstelveen)  
 Nixdorf Microprocessor Engineering GmbH (Berlin)  
 Nixdorf Software Engineering GmbH (Berlin)  
 OY Nixdorf Computer AB (Helsinki)

### *Asia/Pacific*

Nixdorf Computer China Ltd. (Hong Kong)  
 Nixdorf Computer International Singapore Pte. Ltd.  
 (Singapore)  
 Nixdorf Computer Ltd. (Auckland)  
 Nixdorf Computer Ltd. (Hong Kong)  
 Nixdorf Computer Pte. Ltd. (Singapore)  
 Nixdorf Computer Pty. Ltd. (Sydney)  
 Nixdorf Regional Headquarters Pte. Ltd. (Singapore)

### *ROW*

Nixdorf Computer C.A. (Caracas)  
 Nixdorf Computer (Pty) Ltd. (Johannesburg)  
 Nixdorf Computer S.A. (Buenos Aires)  
 Nixdorf Computer SA (Casablanca)  
 Nixdorf Computer Ticaret A.S. (Istanbul)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

1989

### M4 Data

M4 Data announced the signing of a three-year OEM agreement with Nixdorf. M4 Data will provide 9-track magnetic tape drives for Nixdorf's Targon and Quattro computer systems.

### MIPS Computer Systems

Nixdorf agreed to develop computers based on RISC designs from MIPS and will become an OEM for MIPS RISC-based computer systems.

### Tandem Computers

Nixdorf will sell a UNIX-based computer to be unveiled by Tandem in 1990.

### Pyramid Technology

Pyramid announced that it signed an amendment to its agreement with Nixdorf extending its long-running OEM relationship to include Pyramid's new products, the MIServer line of high-performance open commercial servers.

### Tandem Computers

The two companies are joining forces on a fault-tolerant systems based on MIPS RISC technology and the UNIX operating system standard.

1988

### Apollo Computer

Nixdorf and Apollo Computer entered into a licensing agreement. Under the agreement, Apollo will market Nixdorf's graphics workstations in Europe.

### Uniplex Integration Systems, Inc.

Nixdorf and Uniplex Integration Systems, Inc., entered into a marketing agreement. Under the agreement, Nixdorf will market Uniplex Business Software with the UNIX-based Targon computer systems.

---

## KEY OFFICERS

### Arno Bohn

Vice chairman

### Dr. Hartmut Fetzler

Executive director

### Albert Holler

Executive director

### Sven Kado

Executive director

### Dr. Horst Nasko

Executive director

### Karlheinz Voll

Executive director

---

## FOUNDER

Heinz Nixdorf



**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December 31**  
(Millions of U.S. Dollars, except Per Share Data)

<b>Balance Sheet</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
<b>Total Current Assets</b>	\$681.4	\$863.9	\$1,224.9	\$1,736.1	\$1,662.0
Cash	0	0	0	408.9	116.5
Receivables	287.4	331.0	471.4	713.0	844.6
Inventory	338.9	368.0	539.2	573.9	700.9
Other Current Assets	55.1	165.0	214.3	40.2	0
Net Property, Plants	\$334.4	\$388.1	\$632.7	\$918.4	\$1,048.2
Other Assets	\$129.5	\$171.8	\$171.9	\$17.7	\$6.5
<b>Total Assets</b>	<b>\$1,145.3</b>	<b>\$1,423.8</b>	<b>\$2,029.5</b>	<b>\$2,672.2</b>	<b>\$2,716.7</b>
<b>Total Current Liabilities</b>	\$126.0	\$141.5	\$224.0	\$276.7	\$374.3
Long-Term Debt	\$136.5	\$81.3	\$53.5	\$735.2	\$740.1
Other Liabilities	\$370.5	\$429.6	\$350.2	\$3.4	\$5.7
<b>Total Liabilities</b>	<b>\$633.0</b>	<b>\$652.4</b>	<b>\$627.6</b>	<b>\$1,015.3</b>	<b>\$1,120.2</b>
<b>Total Shareholders' Equity</b>	\$512.3	\$771.4	\$1,401.8	\$1,656.9	\$1,596.5
Capital Stock	126.3	163.3	258.1	311.2	314.7
Other Equity	363.2	579.6	1,097.2	1,283.6	1,269.2
Retained Earnings	22.8	28.6	46.5	62.2	12.6
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$1,145.3</b>	<b>\$1,423.8</b>	<b>\$2,029.5</b>	<b>\$2,672.2</b>	<b>\$2,716.7</b>
<b>Income Statement</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
<b>Revenue</b>	\$1,148.4	\$1,335.4	\$2,075.1	\$2,817.2	\$3,003.9
German Revenue	562.7	658.8	1,084.8	1,521.7	1,574.7
Non-German Revenue	585.7	676.5	990.3	1,295.6	1,429.2
Cost of Sales	\$400.7	\$503.7	\$712.0	\$950.9	\$1,258.3
R&D Expense	\$113.3	\$131.0	\$196.8	\$265.0	\$296.1
SG&A Expense	\$430.5	\$493.5	\$733.2	\$1,004.4	\$1,175.8
Capital Expense	\$176.8	\$186.7	\$297.7	\$402.8	\$420.8
Pretax Income	N/A	N/A	N/A	N/A	N/A
Pretax Margin (%)	N/A	N/A	N/A	N/A	N/A
Effective Tax Rate (%)	N/A	N/A	N/A	N/A	N/A
Net Income	\$42.5	\$58.5	\$102.3	\$146.7	\$14.6
Shares Outstanding, Thousands	N/A	N/A	338.0	N/A	N/A
<b>Per Share Data</b>					
Earnings	N/A	N/A	N/A	N/A	N/A
Dividends	\$3.16	\$3.40	N/A	\$1.39	\$5.62
Book Value	N/A	N/A	\$4.15	N/A	N/A

**Table 4 (Continued)**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December 31**  
**(Millions of U.S. Dollars, except Per Share Data)**

Key Financial Ratios	1984	1985	1986	1987	1988
<i>Liquidity</i>					
Current (Times)	5.41	6.11	5.47	6.27	4.44
Quick (Times)	2.72	3.50	3.06	4.20	2.57
Fixed Assets/Equity (%)	65.27	50.31	45.13	55.43	65.66
Current Liabilities/Equity (%)	24.59	18.34	15.98	16.70	23.45
Total Liabilities/Equity (%)	123.56	84.57	44.77	61.27	70.16
<i>Profitability (%)</i>					
Return on Assets	-	4.55	5.93	6.24	0.54
Return on Equity	-	9.11	9.41	9.59	0.90
Profit Margin	3.70	4.38	4.93	5.21	0.49
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	9.87	9.81	9.48	9.41	9.86
Capital Spending % of Revenue	15.40	13.98	14.35	14.30	14.01
Employees	20,193	23,290	25,576	29,440	31,037
Revenue (\$K)/Employee	\$56.87	\$57.34	\$81.14	\$95.69	\$96.79
Capital Spending % of Assets	15.44	13.12	14.67	15.07	15.49
Exchange Rate: US\$1=DM	2.85	2.94	2.17	1.80	1.78

N/A = Not Available

Source: Nixdorf Computer  
Annual Reports  
Dataquest  
January 1990

# NMB Semiconductor Corporation

Table 1

**Estimated Worldwide Semiconductor Revenue by Calendar Year  
(Billions of Yen)**

	<u>1987</u>	<u>1988</u>
Total Semiconductor	14.9	25.9
Total Integrated Circuit	14.9	25.9
Bipolar Digital (Function)		
Bipolar Digital Memory		
Bipolar Digital Logic		
MOS (Function)	14.9	25.9
MOS Memory	14.9	25.9
MOS Microdevices		
MOS Logic		
Analog		
Total Discrete		
Total Optoelectronic		

Table 2

**Estimated Worldwide Semiconductor Revenue by Calendar Year  
(Millions of Dollars)**

	<u>1987</u>	<u>1988</u>
Total Semiconductor	104	199
Total Integrated Circuit	104	199
Bipolar Digital (Function)		
Bipolar Digital Memory		
Bipolar Digital Logic		
MOS (Function)	104	199
MOS Memory	104	199
MOS Microdevices		
MOS Logic		
Analog		
Total Discrete		
Total Optoelectronic		

Source: Dataquest  
December 1989

# NMB Semiconductor Corporation

**Table 3**

**NMB Semiconductor Corporation  
1988 Worldwide Ranking by Semiconductor Markets  
(Revenue in Millions of Dollars)**

	<u>1988 Rank</u>	<u>1987 Rank</u>	<u>1988 Revenue</u>	<u>Sales % Change 1987-1988</u>	<u>Industry % Change 1987-1988</u>
Total Semiconductor	35	48	\$199	91.3%	33.0%
Total Integrated Circuit	31	40	\$199	91.3%	37.4%
MOS (Function)	26	31	\$199	91.3%	54.5%
MOS Memory	15	13	199	91.3%	93.1%

**Table 4**

**NMB Semiconductor Corporation  
Estimated 1988 Semiconductor Revenue by Geographic Region  
(Millions of Dollars)**

	<u>U.S.</u>	<u>Japan</u>	<u>Europe</u>	<u>ROW</u>
Total Semiconductor	\$85	\$27	\$30	\$57
Total Integrated Circuit	\$85	\$27	\$30	\$57
Bipolar Digital (Function)				
Bipolar Digital Memory				
Bipolar Digital Logic				
MOS (Function)	\$85	\$27	\$30	\$57
MOS Memory	85	27	30	57
MOS Microdevices				
MOS Logic				
Analog				
Total Discrete				
Total Optoelectronic				

Source: Dataquest  
December 1989

## Nokia Corporation

Mikonkatu 15 A

Helsinki, Finland

Telephone: +35 (80) 18071

Fax: 35 (80) 656388m 608027

Dun's Number: 31-000-4494

*Date Founded: 1865*

---

### CORPORATE STRATEGIC DIRECTION

Nokia Corporation, the largest Scandinavian information technology company, was founded in 1865. A company with diverse operations, Nokia is Europe's third largest color TV manufacturer, one of the largest soft tissue producers in Europe, and the world's leading manufacturer of mobile phones, cable machinery, and modems.

Nokia's products include cellular mobile telephones, digital telecommunications systems, machinery for producing fiber-optic cables, and complete information system solutions and related services. Nokia also makes satellite receivers and numerous other electronic products for professional and consumer markets.

The Company is divided into six business groups for financial and strategic simplification: Nokia Consumer Electronics, Nokia Data, Nokia Mobile Phones, Nokia Telecommunications, Cables and Machinery, and Basic Industries.

Over the past few years, Nokia has undergone structural changes and has become increasingly international. With increased emphasis on consumer electronics and information technology, the Company continues to diversify its activities beyond its traditional industries of cables, rubber, and paper.

In January 1988, Nokia acquired 80 percent of the Data Systems Division of Ericsson, a Swedish telecommunications company. The ensuing Nokia Data is now the largest information technology company in the Nordic region.

The purchase of Ericsson Data Systems arose from Nokia's need for a major acquisition in order to develop its activities outside of Finland. During 1989, Nokia purchased the remainder of the Data Systems shares from Ericsson.

Nokia's net sales for fiscal 1989 were Fmk 22.8 billion (US\$5.3 billion), an increase of 9 percent over 1988 sales.\* (Percentage changes refer only to Fmk amounts; US\$ percentage changes will differ because of fluctuations in Dataquest exchange rates.) The electronics and electrochemical industries together accounted for 81 percent of net sales. Nokia's operating profit for fiscal 1989 was Fmk 859 million (US\$200 million), a decrease of nearly 13 percent from the previous year. The decline from the previous year's figure was partly due to the fact that the 1988 figure had included substantial nonrecurring profit items.

Expenditure for R&D totaled Fmk 1.2 billion (US\$268 million), an increase of 7 percent over the previous year's total and approximately 5 percent of 1989 revenue. This expenditure was concentrated on the electronics sector. Capital expenditure in 1989 was Fmk 1.9 billion (US\$438 million), down 44 percent from the 1988 total of Fmk 3.4 billion (US\$788 million). Capital expenditure amounted to 8 percent of revenue in 1989, versus 15.5 percent in 1988.

The Company's employment figure continued to decline in the first four months of 1990. At the end of April 1990, the Company employed 36,800 people, a reduction of 17.5 percent since December 1988. Approximately 50 percent of the Company's employees work outside of Finland.

Nokia has more than 160 subsidiaries in Finland and abroad, operates in 33 countries, and has manufacturing facilities in 15 countries. Approximately 30 percent of Nokia's net sales are generated in Finland.

More detailed information is available in Tables 1 and 2, which appear after "Business Segment Strategic

\*Figures are according to the Finnish Accounting Standards (FAS).

Direction" and present corporate highlights and revenue by region. Information on revenue by distribution channel is not available. Tables 3 and 4, comprehensive financial statements, are at the end of this backgrounder. Due to the Company's accounting practices, a financial ratio analysis is not available.

---

## BUSINESS SEGMENT STRATEGIC DIRECTION

### Consumer Electronics

Nokia's Consumer Electronics business group manufactures and markets electronics equipment for consumer and industrial use. Its most important products are television sets, video recorders, and satellite receivers. This group has manufacturing facilities in 5 European countries and sales companies in 13.

With the acquisition of the German company Standard Elektrik Lorenz's (SEL's) entire consumer electronics operation and part of its components operation, Nokia's Consumer Electronics division is now Europe-wide and is the third largest color TV producer after Philips and Thomson.

In 1989, the Consumer Electronics group recorded net sales of Fmk 6.0 billion (US\$1.4 billion), or 25 percent of total sales. This figure was slightly lower than the sales figure for 1988 and represented a net loss. Nokia attributes some of its difficulty in this area to the integration of major acquisitions into the group, divestment of some operations, and a revaluation of the Finnish market.

Nokia joined the Eureka 95 high-definition television (HDTV) project directorate in October 1989. Nokia's main concentration in its HDTV-related research is on the development of reception equipment, with the particular emphasis on display technology and digital signal processing.

### Nokia Data

Nokia Data is Nokia's information systems business group. Its key products are workstations, network products, work group and departmental systems, and integrated information systems, especially for banks, insurance companies, retailers, industry, and public administration. Nokia Data is increasingly moving away from being solely a supplier of products toward

becoming a supplier of complete systems and their associated services.

As mentioned earlier, Nokia Data was formed by the merging of Ericsson's Data Systems division and Nokia Information Systems. Nokia also expanded this division by acquiring the Finnish company Oy Dava Ab and the computer operations of EB-Ericsson in Norway. These acquisitions brought Nokia Data strong marketing and distribution networks in Germany, France, Britain, the Benelux countries, Spain, and Switzerland.

In spring 1989, Nokia Data brought a new Alfaskop PC family onto the market. The family has five members, ranging from compact 80286 workstations to workstations and servers based on the 80386 or 80386SX processor. All are characterized by attractive design, first-class ergonomics, and their capability for expansion and communication. This new PC family will replace all the previous Nokia and Ericsson PC products in the long run. Nokia Data has capitalized on the Alfaskop name, which comes from the highly successful Ericsson Alfaskop terminals and represents some of the first common products resulting from the acquisition.

Net sales for this group increased 5 percent and totaled Fmk 5.0 billion (US\$1.2 billion) in 1989, representing 21 percent of Nokia's total revenue (the same percentage of total sales as in 1988). Sales in Finland and Sweden accounted for 66 percent of net sales, with the remaining 34 percent generated elsewhere in Europe. Nokia Data is now divided into three product groups: PCs, terminals, and systems, in addition to sales companies in various countries. To date, Nokia has supplied nearly 1 million workstations, primarily to large and medium-size companies in Europe.

Several new products were introduced in March 1990. They included a compact, silent Alfaskop Net Station, which operates within a local area network (LAN) without a mass storage of its own, and several enhanced microcomputer models. Nokia also introduced its Alfaskop Office System, featuring sophisticated electronic mail and archiving functions. The first four months of 1990 maintained a recent trend of exports continuing to account for an increasingly large percentage of the units' total sales.

Nokia Data also markets older Nokia and Ericsson models such as the Nokia PC (based on the 80168 chip), the AWS and PC286 workstations and the ASC and WS286 servers (based on the 286 chip), the

educational PC sold only in Finland, and the Alfaskop WS386 and 3TT/386 (based on the 386 chip).

Nokia's products are designed with the idea of connectability to other existing systems, and the Company positions itself more as a supplier of advanced workstations and intelligent terminals than as a mass PC vendor. Emphasis is placed on the flexibility of Nokia Data workstations to fit into almost any existing system. This relates to the Company's overall strategy of addressing the large accounts market, where the presence of an existing installed base creates this need for compatibility and linkage rather than for an entirely new system.

### Mobile Phones

Nokia Mobile Phones manufactures and markets mobile telephones and wide area paging equipment, as well as cordless telephones and terminals for mobile data transmission. Net sales for this unit increased 19 percent over 1988 figures, and totaled Fmk 1.7 billion (US\$395 million) in 1989. This represented 8 percent of Nokia's total revenue for fiscal 1989, versus 5 percent of total revenue in 1988.

Nokia's range of mobile phones was broadened during the year, with seven new models being introduced in the main market areas. A new generation of Nokia Talkman models suiting the AMPS, TACS, and NMT 450 and 900 systems went into production.

Nokia has taken steps to consolidate its operations in the Mobile Phones division, as the Mobitex operation was sold in February, and Nokia's American paging service company, Cue Paging Corporation, were both sold in early 1990. Nokia will continue to manufacture pagers for Cue Paging.

### Telecommunications

Nokia Telecommunications develops, manufactures, and markets telecommunications equipment and systems for use in public telecommunications networks, mobile telephone networks, and dedicated networks for use by companies and the public sector. The division is divided into three business units: Public Networks, Dedicated Networks, and Cellular Systems (NCS). Public Networks makes up 72 percent of this division's sales, Cellular Systems 16 percent, and the Dedicated Networks 12 percent.

The Telecommunications group achieved sales of Fmk 2.2 billion (US\$512 million) in fiscal 1989, a 44 percent increase over 1988 revenue total. This group accounted for 9 percent of Nokia's total revenue in 1989, versus 7 percent in 1988.

The Public Networks unit supplies transmission and switching equipment as well as telecommunications systems. This unit experienced a 40 percent increase in invoicing, attributable primarily to growth in exports. Sales increased considerably when deliveries commenced under agreements concluded earlier with organizations including British Telecom and the Dutch and Portuguese PTT authorities.

The Dedicated Networks unit supplies telecommunications networks to oil, gas, and energy companies, railway systems, various authorities, and other large organizations needing independent communications systems. Key products in this unit include digital transmission systems and the Actionet radiotelephone system.

The Cellular Systems unit develops equipment and services for public cellular mobile telephone networks. Its main products include digital exchanges, base stations, and cellular networks.

NCS achieved important new market penetrations in 1989 when it obtained orders from Algeria and Thailand. The Algerian PTT ordered an NMT 900 mobile phone system, which will be the largest in Africa. The Telephone Organization of Thailand will be supplied with equipment for a substantial expansion of its NMT 450 mobile phone network.

Nokia Telecommunications is active in the European Cellular Radio 900 (ECR 900) consortium, formed by Nokia, AEG, and Alcatel. This consortium develops, manufactures, and markets digital cellular networks for the European Groupe Special Mobile (GSM) standard.

In 1989, the ECR 900 received new orders for mobile phone systems from Austrian, Dutch, British, and Finnish telecommunications companies in addition to those already obtained in Germany and France.

### Cables and Machinery

The Cables and Machinery business group comprises Nokia Cable Industry, Other Electrical Industry, Nokia Machinery, and Electrical Wholesale. The Cables and Machinery business group had sales of

Fmk 4.4 billion (US\$1.0 billion) in fiscal 1989, an increase of 8.5 percent over 1988 revenue. This group accounted for 19 percent of Nokia's total revenue in 1989, the same percentage as in 1988.

The Cable Industry division develops, manufactures, and markets worldwide cables, cable accessories, and electrification and telecommunications projects.

The Other Electrical Industry division manufactures aluminum products, capacitors, cable harnesses, heating equipment, and lighting devices.

Nokia Machinery develops, manufactures, and globally markets machines and production systems for the cable industry.

Nokia's Electrical Wholesale division is Finland's largest electrical goods wholesaler, a leading marketer of domestic appliances and an important supplier of equipment and systems to power utilities, industry, and the telecommunications sector.

### Basic Industries

The Basic Industries business group includes Nokia's tires, power, and chemicals businesses. In 1989, the group achieved sales of Fmk 4.3 billion (US\$1.0 billion), an increase of 7 percent over 1988 revenue.

Basic Industries' sales accounted for 19 percent of the Company's total revenue in 1989, down from 22 percent in 1988.

The 1989 figures include Nokia Paper, which now is part of the largest soft-tissue alliance in Europe, formed by Nokia, James River Corporation, and Ferruzzi group member Montedison of Italy.

Nokia Chemicals division manufactures and markets bleaching agents for the wood-processing industry. Products include chlorine, sodium hydroxide, sodium chlorate, sodium borohydride, and water-treatment chemicals.

Nokia Tyres is one of Scandinavia's leading suppliers in the tire industry. Its strongest area of expertise is tires for severe winter conditions and forestry use.

Nokia Power is a significant producer of electrical energy. It sells energy to utilities, industry, other power companies, and other units belonging to the Nokia Group.

### Further Information

For further information about Nokia's business segments, please contact the appropriate Dataquest industry service.



**Table 1**  
**Five-Year Corporate Highlights\* (Millions of US Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$1,777.4	\$2,365.7	\$3,181.4	\$5,219.9	\$5,301.2
Percent Change	-	33.10	34.48	64.08	1.56
Capital Expenditure	\$144.8	\$178.3	\$453.9	\$811.5	\$437.9
Percent of Revenue	8.15	7.54	14.27	15.55	8.26
R&D Expenditure	\$77.3	\$106.3	\$132.0	\$250.0	\$267.9
Percent of Revenue	4.35	4.49	4.15	4.79	5.05
Number of Employees	27,619	28,509	29,276	44,588	41,326
Revenue (\$K)/Employee	\$64.35	\$82.98	\$108.67	\$117.07	\$128.28
Net Income	\$59.1	\$34.7	\$59.6	\$85.2	(\$63.5)
Percent Change	-	(41.29)	71.76	42.95	(174.53)
Exchange Rate (US\$1=Fmk)	Fmk 6.20	Fmk 5.07	Fmk 4.40	Fmk 4.18	Fmk 4.30
1989 Calendar Year		Q1	Q2	Q3	Q4
Quarterly Revenue		NA	NA	NA	NA
Quarterly Profit		NA	NA	NA	NA

NA = Not available

\*Nokia changed its reporting standards in 1986; 1985 figures are taken from the 1986 annual report.

Source: Nokia Corporation  
 Annual Reports  
 Dataquest (1990)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1985	1986	1987	1988	1989
Scandinavia	NA	NA	43.00	47.00	48.00
Western Europe	NA	NA	47.00	40.00	39.00
Other Countries	NA	NA	10.00	13.00	13.00

Source: Nokia Corporation  
 Annual Reports

---

## 1990 SALES OFFICE LOCATIONS

North America—4  
Europe—56  
Asia/Pacific—8  
ROW—5

---

## MANUFACTURING LOCATIONS

### *North America*

Hayward, California  
Machinery  
South Hadley, Massachusetts  
Cable machinery

### *Europe*

Aanekoski, Finland  
Telecommunications, mobile phones  
Aetsa, Finland  
Chemicals  
Altena, Germany  
Components  
Berlin, Germany  
Cable  
Bochum, Germany  
Mobile phones  
Bochum, Germany  
Televisions  
Bor (2), Sweden  
Technical rubber products  
Brakne-Hoby, Sweden  
Workstations  
Budapest, Hungary  
Televisions  
Cascais, Portugal  
Televisions  
Chartres, France  
Televisions, consumer electronics  
Delft, Netherlands  
Cable  
Ecublens, Switzerland  
Cable machinery  
Espoo, Finland  
Data telecommunications  
Esslingen, Germany  
Picture tubes  
Geroldsgrun, Germany  
Components  
Harsum, Germany

Materials handling  
Haukipudas, Finland  
Telecommunications  
Helsinki, Finland  
Cable  
Horda, Sweden  
Technical rubber products  
Hos, Sweden  
Technical rubber products  
Huntingdon, United Kingdom  
Telecommunications  
Iskenderum, Turkey  
Steel pipes  
Ismif, Turkey  
Cable  
Joutseno, Finland  
Chemicals  
Kemijarvi, Finland  
Consumer electronics  
Kempele, Finland  
Cable, harnesses  
Kerava, Finland  
Rubber  
Kirkkonummi, Finland  
Aluminium  
Lohja, Finland  
Data communications  
Marburg/Lahn, Germany  
Cable  
Moscow, Soviet Union  
Cable  
Moscow, Soviet Union  
Mobile telephone services  
Motala, Sweden  
Televisions, consumer electronics  
Nokia, Finland  
Tires  
Oulu, Finland  
Data communications, telecommunications, cable  
Ronneby, Sweden  
Workstations  
Salisbury, United Kingdom  
Capacitors  
Salo, Finland  
Mobile phones, consumer electronics  
Straubing, Germany  
Loudspeakers  
Trappes, France  
Mobile telephones  
Tampere, Finland  
Capacitors  
Tikkakoski, Finland  
Machinery  
Uusikaupunki, Finland  
Consumer electronics  
Vallingby, Sweden

Vallingby, Sweden  
Cable machinery  
Vantaa, Finland  
Cable, machinery  
Waddinxveen, Netherlands  
Cable  
Ziemetshausen, Germany  
Components

*Asia/Pacific*

Masan, South Korea  
Mobile telephones  
Penang, Malaysia  
Audio products

*ROW*

Riyadh, Saudi Arabia  
Air distribution products

LK Products Oy (Finland)  
Luxor AB (Sweden)  
Luxor Forsaljning AB (Sweden)  
Luxor Hushallselektronik AB (Sweden)  
Luxor Norge A/S (Norway)  
Luxor Oy (Finland)  
Luxor (UK) Ltd. (United Kingdom)  
Makitorpan Autoradio Oy (Finland)  
Matra Nokia Radiomobiles S.A. (France)  
Micronas Oy (Finland)  
Monette Kabel-und Elektrowerk GmbH (Germany)  
Nivo Heat Oy (Finland)  
NKF Holding N.V. (Netherlands)  
NKF Kabel B.V. (Netherlands)  
Nokia (UK) Ltd. (United Kingdom)  
Nokia A/S (Norway)  
Nokia Aluminium, Nokia Capacitors (Sweden)  
Nokia Audio Electronics GmbH (Germany)  
Nokia Cable Machinery Oy (Finland)  
Nokia Capacitors Ltd. (United Kingdom)  
Nokia Cellular Systems Oy (Finland)  
Nokia Consumer Electronics AB (Sweden)  
Nokia Consumer Electronics A/S (Denmark)  
Nokia Consumer Electronics A/S (Norway)  
Nokia Consumer Electronics Belgium B.V. (Belgium)  
Nokia Consumer Electronics (Espana) S.A. (Spain)  
Nokia Consumer Electronics France S.A. (France)  
Nokia Consumer Electronics International S.A.  
(Switzerland)  
Nokia Consumer Electronics Italia S.r.l. (Italy)  
Nokia Consumer Electronics (Schweiz) AG  
(Switzerland)  
Nokia Consumer Electronics (UK) Ltd. (United  
Kingdom)  
Nokia Data AB (Sweden)  
Nokia Data AG (Switzerland)  
Nokia Data A/S (Denmark)  
Nokia Data A/S (Norway)  
Nokia Data B.V. (Netherlands)  
Nokia Data GmbH (Germany)  
Nokia Data Ltd. (United Kingdom)  
Nokia Data S.A. (France)  
Nokia Data S.A. (Spain)  
Nokia Data Systems AB (Sweden)  
Nokia Data Systems Oy (Finland)  
Nokia Dekk A/S (Norway)  
Nokia Display Technics GmbH (Germany)  
Nokia Electronica de Consumo S.A. (Portugal)  
Nokia Electronics Bochum GmbH (Germany)  
Nokia Finance International B.V. (Switzerland)  
Nokia Graez Holzwerke GmbH (Germany)  
Nokia Gruppen, Danmark A/S (Denmark)  
Nokia International AG (Switzerland)  
Nokia Kunststofftechnik GmbH (Germany)  
Nokia-Maillefer (France)  
Nokia-Maillefer (Germany)

**SUBSIDIARIES***North America*

Nokia Data Communications Corp.  
Nokia Inc.  
Nokia-Maillefer  
Nokia-Maillefer Inc.  
Nokia-Mobira Inc.  
Nokia Products Ltd.  
Pacific Roller Die Co., Inc.  
Transnorm System Inc.

*Europe*

Atlas Lace Paper Co. Ltd. (United Kingdom)  
Baltic Pacific (Finland) Oy (Finland)  
BT (Finance) Limited (United Kingdom)  
D&N Morgan (Hire) Ltd. (United Kingdom)  
Edacom Oy Ab (Finland)  
Elec-Tuote Oy (Finland)  
Elektro-Import Finland Ltd. (Finland)  
Gloystarne and Co. Ltd. (United Kingdom)  
Graetz Strahlungsmesstechnik GmbH (Germany)  
Horda AB (Sweden)  
Horda Compound AB (Sweden)  
Horda Form AB (Sweden)  
Horda Profil AB (Sweden)  
Hygie France S.A.R.L. (France)  
Ibervisao S.A. (Portugal)  
Insele Oy (Finland)  
Kolsi Oy (Finland)  
Larsen and Lund A/S (Norway)

Nokia-Maillefer (United Kingdom)  
Nokia-Maillefer AB (Sweden)  
Nokia-Maillefer Holding S.A. (Switzerland)  
Nokia-Maillefer S.A. (Switzerland)  
Nokia Matkapuhelinet Oy (Finland)  
Nokia Mechatronics GmbH (Germany)  
Nokia Mobile Phones (Germany)  
Nokia Mobile Phones Italia S.r.l. (Italy)  
Nokia Mobile Phones UK Ltd. (United Kingdom)  
Nokia-Mobira AB (Norway)  
Nokia-Mobira AB (Sweden)  
Nokia-Mobira A/S (Denmark)  
Nokia Radiocommunication (France)  
Nokia Reifen AG (Switzerland)  
Nokia Reifen GmbH (Germany)  
Nokia Renkaat Oy (Finland)  
Nokia Representative Office (Soviet Union)  
Nokia Sko AB (Sweden)  
Nokia Svenska AB (Sweden)  
Nokia Telecommunications (Denmark)  
Nokia Telecommunications (Germany)  
Nokia Telecommunications (Netherlands)  
Nokia Telecommunications (Spain)  
Nokia Telecommunications (Sweden)  
Nokia Telecommunications Ltd. (United Kingdom)  
Nokia Unterhaltungselektronik GmbH (Germany)  
Nokian Paperi Oy (Finland)  
NOKO (Soviet Union)  
Oy Nordic Trading Ab (Finland)  
Pucast Oy (Finland)  
Renucci S.A.R.L. (France)  
Sahkoliikkeiden Oy (Finland)  
Sako Oy (Finland)  
Salora AB (Sweden)  
Salora Oy (Finland)  
Sanka Oy (Finland)  
SLO-Idman Svenska AB (Sweden)  
Sofrapel S.A. (France)  
Softis Ltd. (United Kingdom)  
Sotralose, S.A. (France)  
Telenokia Oy (Finland)  
Teval Oy (Finland)  
Transnorm System GmbH (Germany)  
Transnorm System Ltd. (United Kingdom)  
Tuottajain Kone Oy (Finland)  
Turkkablo A.O. (Turkey)  
Wullum Dekk A/S (Norway)

#### *Asia/Pacific*

Nokia Japan Co., Ltd. (Japan)  
Nokia-Maillefer (Far East) Ltd. (Hong Kong)  
Nokia (Malaysia) Sdn. Bhd., Sanyo Electric (joint venture) (Malaysia)  
Nokia Representative Office (Australia)

Nokia Representative Office (Bangladesh)  
Nokia Representative Office (China)  
Nokia Representative Office (Indonesia)  
Nokia (S.E.A.) Pte. Ltd., Nokia Regional Office (Singapore)  
Nokia Telecommunications (Thailand)

#### *ROW*

Nokia Representative Office (Egypt)  
Nokia Representative Office (Middle East)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

### *1990*

#### **Storebrand**

Nokia and Storebrand, Norway's largest insurance company, founded a company called Torinno, which will develop and market data systems for Scandinavian insurance businesses.

#### **Datacraft**

Nokia and Datacraft of Australia formed a joint venture, Nokia-Datacraft Technologies Pty. Ltd., which manufactures and markets telephone exchanges in Australia.

#### **Network Computing Devices (NCD)**

Nokia signed an agreement with NCD of Mountain View, California, to become the exclusive distributor of NCD's family of network display terminals in Sweden, Finland, Norway, and Denmark.

### *1989*

#### **Moscow Telephone Network**

Nokia and the Moscow Telephone Network founded a joint venture to build a mobile phone network covering Moscow and to provide mobile phone services for international companies and diplomats.

#### **James River Corporation and Ferruzzi Group member Montedison of Italy**

Nokia signed an agreement creating a pan-European soft tissue and related products group led by two Dutch companies: JA/Mont-Nokia N.V. and JA/Mont N.V. Nokia's stake in the former company is 50 percent and in the latter one 20 percent.

**Finnish Broadcasting Co. and PTT**

Nokia began a joint venture with the Finnish Broadcasting Co. and PTT (Finland's national tele-  
communication authority) to coordinate research on HDTV.  
The joint venture is called Radio and Television  
Technology Research Ltd.

**AT&T**

Nokia Mobile Phones and AT&T signed an agree-  
ment to codevelop microcircuits for mobile phones  
for the 1990s.

**Du Pont**

Nokia and Du Pont signed an agreement to do  
extensive R&D for new materials and components  
for the electronics industry.

**Paavo Rantanen**

Senior vice president

**Hannu Bergholm**

Senior vice president

**Olli-Pekka Kallasvuo**

Senior vice president

**Matti Paasila**

Senior vice president

**Matti Saarinen**

Senior vice president

**Taavi Heinila**

General counsel

---

**MERGERS AND ACQUISITIONS**

1989

**NKF Holdings N.V.**

Nokia Cables strengthened its position in Europe  
by acquiring a majority stake in NKF Holding  
N.V. of the Netherlands.

---

**PRINCIPAL INVESTORS**

Information is not available.

---

**KEY OFFICERS**

**Kalle Isokallio**

President and chief operating officer

**Simo Vuorilehto**

Chairman and chief executive officer

---

**FOUNDERS**

Information is not available.

**Table 3**  
**Comprehensive Financial Statement\***  
**Fiscal Year Ending December 31**  
**(Millions of US Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Total Current Assets	\$1,149.8	\$1,603.3	\$2,276.4	\$3,457.4	\$3,230.0
Cash	205.7	396.5	673.8	169.4	153.3
Receivables	575.5	725.4	985.5	1,642.3	1,457.7
Inventory	368.6	481.3	617.1	1,109.6	1,032.1
Fixed Assets	\$650.9	\$889.2	\$1,172.9	\$1,959.1	\$1,976.0
Net Property, Plants	\$457.9	\$616.0	\$846.0	\$1,295.2	\$1,249.1
Long-Term Receivables	\$35.2	\$36.6	\$29.2	\$32.1	\$36.7
Other Noncurrent Assets	\$59.5	\$86.9	\$170.8	\$120.6	\$161.4
Total Current Liabilities	(\$624.7)	(\$765.3)	(\$1,138.1)	(\$2,313.6)	(\$2,108.1)
Net Current Assets	\$525.1	\$838.0	\$1,138.3	\$1,143.8	\$1,121.9
Total Assets	\$1,182.7	\$2,579.4	\$3,620.2	\$3,124.4	\$3,097.9
Total Shareholders' Equity	\$292.5	\$501.3	\$617.9	\$851.7	\$732.1
Common Stock	112.1	188.8	222.6	300.9	292.5
Other Equity	49.0	55.4	60.9	70.0	60.6
Retained Earnings	7.8	64.5	80.9	108.6	140.9
Distributable Reserves	86.4	124.5	145.1	224.6	147.2
Minority Interests	\$64.0	\$95.7	\$149.2	\$123.0	\$90.7
Long-Term Loans	\$525.0	\$680.5	\$971.9	\$1,246.2	\$1,307.7
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Revenue	\$1,777.4	\$2,365.7	\$3,181.4	\$5,219.9	\$5,301.2
Cost of Sales	\$1,736.8	\$2,172.8	\$2,893.0	\$4,986.0	\$5,073.7
R&D Expense	\$77.3	\$106.3	\$132.0	\$250.0	\$267.9
Capital Expense	\$144.8	\$178.3	\$453.9	\$811.5	\$437.9
Pretax Income	\$134.5	\$150.5	\$261.6	\$300.5	\$72.8
Pretax Margin (%)	7.57	6.36	8.22	5.76	1.32
Effective Tax Rate (%)	21.20	19.20	17.60	20.60	22.00
Net Income	\$59.1	\$34.7	\$59.6	\$85.2	(\$63.5)
Shares Outstanding, Millions					
Preferred	10.4	15.4	16.5	21.8	21.8
Common	24.4	32.4	32.4	41.1	41.1
<b>Per Share Data</b>					
Earnings	\$1.68	\$2.09	\$3.48	\$3.27	\$1.01
Dividend	\$0.39	\$0.59	\$0.86	\$0.77	\$0.65
Book Value	NA	NA	NA	NA	NA
Exchange Rate (US\$1=Fmk)	Fmk 6.20	Fmk 5.07	Fmk 4.40	Fmk 4.18	Fmk 4.30

NA = Not available

\*Nokia changed its reporting standards in 1986; 1985 figures are taken from the 1986 annual report.

Source: Nokia Corporation  
Annual Reports  
Datapost (1990)

**Table 4**  
**Comprehensive Financial Statement\***  
**Fiscal Year Ending December 31**  
**(Millions of Markka, except Per Share Data)**

<b>Balance Sheet</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Total Current Assets</b>	Fmk 7,128.8	Fmk 8,128.5	Fmk 10,016.2	Fmk 14,452.0	Fmk 13,889.0
Cash	1,275.6	2,010.4	2,964.9	708.0	659.0
Receivables	3,568.1	3,677.9	4,336.1	6,865.0	6,268.0
Inventory	2,285.1	2,440.2	2,715.2	4,638.0	4,438.0
<b>Fixed Assets</b>	Fmk 4,035.5	Fmk 4,508.4	Fmk 5,160.9	Fmk 8,189.0	Fmk 8,497.0
Net Property, Plants	Fmk 2,838.7	Fmk 3,123.3	Fmk 3,722.2	Fmk 5,414.0	Fmk 5,371.0
Long-Term Receivables	Fmk 218.4	Fmk 185.8	Fmk 128.5	Fmk 134.0	Fmk 158.0
Other Noncurrent Assets	Fmk 368.8	Fmk 440.6	Fmk 751.7	Fmk 504.0	Fmk 694.0
<b>Total Current Liabilities</b>	(Fmk 3,873.4)	(Fmk 3,880.3)	(Fmk 5,007.6)	(Fmk 9,671.0)	(Fmk 9,065.0)
<b>Net Current Assets</b>	Fmk 3,255.4	Fmk 4,248.2	Fmk 5,008.6	Fmk 4,871.0	Fmk 4,824.0
<b>Total Assets</b>	<b>Fmk 11,672.9</b>	<b>Fmk 13,077.5</b>	<b>Fmk 15,928.8</b>	<b>Fmk 13,060.0</b>	<b>Fmk 13,321.0</b>
<b>Total Shareholders' Equity</b>	Fmk 1,813.5	Fmk 2,541.7	Fmk 2,718.8	Fmk 3,560.0	Fmk 3,148.0
Common Stock	695.0	957.0	979.6	1,257.8	1,257.8
Other Equity	303.8	280.9	268.0	292.8	260.4
Retained Earnings	48.3	327.0	356.0	453.8	606.0
Distributable Reserves	535.5	631.4	638.4	939.0	633.0
Minority Interests	Fmk 397.1	Fmk 485.4	Fmk 656.4	Fmk 514.0	Fmk 390.0
<b>Long-Term Loans</b>	Fmk 3,254.7	Fmk 3,450.0	Fmk 4,276.3	Fmk 5,209.0	Fmk 5,623.0
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Revenue</b>	Fmk 11,020.0	Fmk 11,994.0	Fmk 13,998.0	Fmk 21,819.0	Fmk 22,795.0
<b>Cost of Sales</b>	Fmk 10,768.0	Fmk 11,016.0	Fmk 12,729.0	Fmk 20,842.0	Fmk 21,817.0
<b>R&amp;D Expense</b>	Fmk 479.0	Fmk 539.0	Fmk 581.0	Fmk 1,045.0	Fmk 1,152.0
<b>Capital Expense</b>	Fmk 898.0	Fmk 904.0	Fmk 1,997.0	Fmk 3,392.0	Fmk 1,883.0
<b>Pretax Income</b>	Fmk 834.0	Fmk 763.0	Fmk 1,151.0	Fmk 1,256.0	Fmk 313.0
<b>Pretax Margin (%)</b>	7.57	6.36	8.22	5.76	1.37
<b>Effective Tax Rate (%)</b>	21.20	19.20	17.60	22.80	22.0
<b>Net Income</b>	Fmk 366.4	Fmk 175.8	Fmk 262.3	Fmk 356.1	(Fmk 273.0)
<b>Shares Outstanding, Millions</b>					
Preferred	10.4	15.4	16.5	21.8	21.8
Common	24.4	32.4	32.4	41.1	41.1
<b>Per Share Data</b>					
Earnings	Fmk 10.40	Fmk 10.62	Fmk 15.32	Fmk 13.67	Fmk 4.36
Dividend	Fmk 2.44	Fmk 3.00	Fmk 3.80	Fmk 3.20	Fmk 2.80
Book Value	NA	NA	NA	NA	NA
<b>Exchange Rate (US\$1=Fmk)</b>	Fmk 6.20	Fmk 5.07	Fmk 4.40	Fmk 4.18	Fmk 4.30

NA = Not available

\*Nokia changed its reporting standards in 1986; 1985 figures are taken from the 1986 annual report.

Source: Nokia Corporation  
Annual Reports  
Dataquest (1990)

# Nokia Corporation

Mikonkatu 15 A

Helsinki, Finland

Telephone: +35 (80) 18071

Fax: 35 (80) 656388, 608027

Dun's Number: 31-000-4494

*Date Founded: 1865*

---

## CORPORATE STRATEGIC DIRECTION

Nokia Corporation, the largest Scandinavian information technology company, was founded in 1865. A company with diverse operations, Nokia is Europe's third largest color TV manufacturer, one of the largest soft tissue producers in Europe, and the world's leading manufacturer of mobile phones, cable machinery, and modems.

Nokia's products include cellular mobile telephones, digital telecommunications systems, machinery for producing fiber-optic cables, and complete information system solutions and related services. Nokia also makes satellite receivers and numerous other electronic products for professional and consumer markets.

The Company is divided into six business groups for financial and strategic simplification: Nokia Consumer Electronics, Nokia Data, Nokia Mobile Phones, Nokia Telecommunications, Cables and Machinery, and Basic Industries.

Over the past few years, the Nokia group has undergone structural changes and has become progressively more international. With increased emphasis on consumer electronics and information technology, the Company continues to diversify its activities beyond its traditional industry of cables, rubber, and paper.

In January 1988, Nokia acquired 80 percent of the Data Systems Division from Ericsson, Sweden's telecommunications giant. The ensuing Nokia Data is now the largest information technology company in the Nordic region.

The purchase of Ericsson Data Systems arose from Nokia's need for a major acquisition in order to develop its activities outside of Finland. During 1989, Nokia purchased the remainder of the Data Systems shares from Ericsson.

Nokia reported an increase of 61.8 percent in total consolidated revenue for fiscal 1988. Total revenue for this period was \$5.1 billion\* compared with \$3.2 billion the previous year. Net income rose an impressive 42.7 percent to \$273.3 million in fiscal 1988.

Nokia's research and development expenditures totaled \$246.5 million in fiscal 1988, or 4.8 percent of revenue. R&D focus was within the electronics segment, where the main focus was on applying digital technology and developing new generations of products.

Capital expenditures for fiscal 1988 totaled \$800.0 million, or 15.6 percent of total revenue.

Due to acquisitions throughout the year, the total number of employees increased from 29,276 to 44,588 worldwide. Most of Nokia's employees work outside of Finland; 48 percent work in Finland.

Nokia has more than 115 subsidiaries in Finland and abroad, operates in 31 countries, and has manufacturing facilities in 13 countries, accounting for 87 percent of Nokia's 1988 net sales. More than half of this is derived from Scandinavia and the remainder from elsewhere in Western Europe. Approximately 30 percent of Nokia's net sales are generated in Finland.

---

\*All dollar amounts are in U.S. dollars.



More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region and distribution channel. Table 4, a comprehensive financial statement, is at the end of this profile. Due to the Company's accounting practices, a financial ratio analysis is not available.

---

## BUSINESS SEGMENT STRATEGIC DIRECTION

### Consumer Electronics

Nokia's Consumer Electronics division manufactures and markets electronics equipment for consumer and industrial use. Its most important products are television sets, video recorders, and satellite receivers.

With the acquisition of the West German company Standard Elektrik Lorenz's (SEL's) entire consumer electronics and components operations, Nokia's Consumer Electronics division is now Europe-wide, and is the third largest color TV producer after Philips and Thomson.

### Nokia Data

Nokia Data is Nokia's information systems segment. Its key products are workstations, network products, work group and departmental systems, and integrated information systems, especially for banks, insurance companies, retailers, industry, and public administration. Nokia Data is moving increasingly away from being just a supplier of products toward becoming a supplier of complete systems and their associated services.

As mentioned earlier, Nokia Data was formed by the merging of Ericsson's Data Division and Nokia Information Systems. Nokia also expanded this division by acquiring the Finnish company Oy Dava Ab and the computer operations of EB-Ericsson in Norway. These acquisitions brought Nokia Data good marketing and distribution networks in West Germany, France, Britain, the Benelux countries, Spain, and Switzerland.

Nokia Data brought a new Alfaskop PC family onto the market last spring. The family has five members, ranging from compact 80286 workstations to workstations and servers based on the 80386 or 80386SX processor. All are characterized by attractive design, first-class ergonomics, and their capability for expansion and communication. This new PC family will replace all the previous Nokia and Ericsson PC products in the long run. Nokia Data has capitalized on the Alfaskop name, which comes from the highly successful Ericsson Alfaskop terminals and represents some of the first common products resulting from the acquisition.

Nokia Data also markets older Nokia and Ericsson models such as the Nokia PC (based on the 80168 chip), the AWS and PC286 workstations and ASC and WS286 servers (based on the 286 chip), the educational PC sold only in Finland, and the Alfaskop WS386 and 3TT/386 (based on the 386 chip).

Nokia's products are conceived with the idea of connectability to other existing systems, and the Company presents itself more as a supplier of advanced workstations and intelligent terminals than as a mass PC vendor. Emphasis is placed on the flexibility of Nokia Data workstations to fit into almost any existing system. This relates to the Company's overall strategy of addressing the large accounts market, where the presence of an existing installed base creates this need for compatibility and linkage rather than for an entirely new system.

### Mobile Phones

Nokia Mobile Phones manufactures and markets mobile telephones and wide-area paging equipment, as well as cordless telephones and terminals for mobile data transmission.

For its wide-area pagers, Nokia Mobile Phones concentrates its marketing efforts in North America, Scandinavia, and Western Europe.

### Telecommunications

Nokia Telecommunications develops, manufactures, and markets telecommunications equipment and systems for use in public telecommunications networks,

mobile telephone networks, and dedicated networks for use by companies and authorities. The division is divided into three business units: Public Networks, Dedicated Networks, and Cellular Systems (NCS). Public Networks makes up 70 percent of this division's sales, Cellular Systems 18 percent, and Dedicated Networks 12 percent.

The Public Networks Unit supplies transmission and switching equipment as well as telecommunications systems. During 1988, this unit concluded an outline agreement to supply the Helsinki Telephone Company with DX200 exchanges and delivered its first Integrated Services Digital Network (ISDN) exchange.

The Dedicated Networks Unit supplies telecommunications networks to oil, gas, and energy companies, railway systems, various authorities, and other large organizations needing independent communications systems. Key products in this unit include digital transmission systems and the Actionet radiotelephone system.

The Cellular Systems Unit develops equipment and services for public cellular mobile telephone networks. Its main products include digital exchanges, base stations, and cellular networks.

Nokia Telecommunications is active in the European Cellular Radio 900 (ECR 900) consortium, formed by Nokia, Alcatel, and AEG. This consortium develops, manufactures, and markets digital cellular networks for the non-European Groupe Special Mobile (GSM) standard.

### Cables and Machinery

The Cables and Machinery business group comprises cables, machinery, and electrical wholesale.

The Cable Division develops, manufactures, and markets worldwide cables, capacitors, aluminum products, accessories, and systems for use in the construction and industrial sectors, telecommunications, and power transmission networks.

Nokia Machinery develops, manufactures, and globally markets machines and equipment. Products of this division include cablemaking machines, industrial robots, and lighting equipment and systems.

Nokia's Electrical Wholesale Division, SLO, is Finland's largest electrical wholesaler. This division supplies equipment to power utilities, industry, and the telecommunications sector.

### Basic Industries

The Basic Industries business group includes Nokia's paper, power, chemicals, and rubber businesses.

Nokia Chemicals Division manufactures and markets bleaching agents for the wood-processing industry. Products include chlorine, sodium hydroxide, sodium chlorate, sodium borohydride, and water-treatment chemicals.

The Company's Paper Division markets to the Finnish and international markets soft tissue and related consumer products to large-scale users and the retail sector.

Nokia's Rubber Division designs and manufactures polymer products in Finland and Sweden and markets them locally as well as internationally.

### Further Information

For further information about the Company's business segments, please contact the appropriate industry service.

**Table 1**  
**Four-Year Corporate Highlights\* (Millions of U.S. Dollars)**

	1985	1986	1987	1988
Four-Year Revenue	\$1,777.4	\$2,365.7	\$3,181.4	\$5,146.0
Percent Change	N/A	33.10	34.48	61.75
Capital Expenditure	\$144.8	\$178.3	\$453.9	\$800.0
Percent of Revenue	8.15	7.54	14.27	15.55
R&D Expenditure	\$77.3	\$106.3	\$132.0	\$246.5
Percent of Revenue	4.35	4.49	4.15	4.79
Number of Employees	27,619	28,509	29,276	44,588
Revenue (\$K)/Employee	\$64.35	\$82.98	\$108.67	\$115.41
Net Income	\$113.4	\$105.4	\$191.6	\$273.3
Percent Change	N/A	(7.08)	81.85	42.67
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>
Quarterly Revenue	N/A	N/A	N/A	N/A
Quarterly Profit	N/A	N/A	N/A	N/A

\*Nokia changed its reporting standards in 1986. 1985 figures are taken from the 1986 annual report.  
 1984 figures are not available in the new format.  
 N/A = Not Available

Source: Nokia Corporation  
 Annual Reports  
 Dataquest  
 January 1990

**Table 2**  
**Revenue by Geographic Region\* (Percent)**

Region	1985	1986	1987	1988
Scandinavia	N/A	N/A	43.00	47.00
Western Europe	N/A	N/A	47.00	40.00
Other Countries	N/A	N/A	10.00	13.00

\*Nokia changed its reporting standards in 1986. 1985 figures are taken from the 1986 annual report.  
 1984 figures are not available in the new format.  
 N/A = Not Available

Source: Nokia Corporation  
 Annual Reports

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1987	1988
Direct Sales	N/A	N/A
Indirect Sales	N/A	N/A

N/A = Not Available

Source: Nokia Corporation  
 Annual Reports

---

**1988 SALES OFFICE LOCATIONS**

North America—4  
 Europe—56  
 Asia/Pacific—8  
 ROW—5

Tampere  
 Cables, rubber  
 Tikkakoski  
 Machinery  
 Uusikaupunki  
 Consumer electronics  
 Vammala  
 Rubber  
 Vantaa  
 Cables, machinery

---

**MANUFACTURING LOCATIONS**
*Finland*

Aetsa  
 Chemicals  
 Anaekoski  
 Telecommunications, mobile phones  
 Espoo  
 Data communications, telecommunications  
 Haukipudas  
 Telecommunications  
 Helsinki  
 Cables  
 Ikaalinen  
 Paper  
 Joutseno  
 Chemicals  
 Kemijarvi  
 Consumer electronics  
 Kempele  
 Cables  
 Kerava  
 Rubber  
 Kirkkonummi  
 Cables  
 Lieksa  
 Rubber  
 Lohja  
 Data communications  
 Muhos  
 Rubber  
 Nokia  
 Paper, rubber  
 Oulu  
 Data communications, telecommunications, cables  
 Riihimaki  
 Machinery  
 Salo  
 Mobile phones, consumer electronics

*Great Britain*

Bridgend  
 Tissue products  
 Harrow  
 Tissue products  
 London  
 Tissue products  
 Lontoo  
 Tissue products  
 Newcastle  
 Tissue products  
 Salisbury  
 Capacitors  
 Sheffield  
 Tissue products  
 Winslow  
 Tissue products  
 Wrexham  
 Tissue products

*France*

Avignon  
 Tissue products  
 Chartres  
 Televisions, consumer electronics  
 Grenoble  
 Tissue products  
 Le Mans  
 Tissue products  
 Trappes  
 Mobile telephones

*Hungary*

Budapest  
 Televisions

*Ireland*

Dublin

Tissue products

Waterford

Tissue products

*Portugal*

Cascais

Televisions

*Sweden*

Bor (2)

Technical rubber products

Brakne-Hoby

Workstations

Horda

Technical rubber products

Hos

Technical rubber products

Malmo

Technical rubber products

Motala

Televisions, consumer electronics

Ronneby

Workstations

Rydaholm

Technical rubber products

Vallingby

Technical rubber products

*Switzerland*

Ecublens

Cable machinery

*West Germany*

Altena

Components

Bochum

Televisions

Bochum

Mobile phones

Esslingen

Picture tubes

Geroldsgrun

Components

Harsum

Materials handling

Marburg/Lahn

Cables

Munchen

Mechatronics

Straubing

Loudspeakers

Ziemetshausen

Components

*United States*

Hayward, California

Machinery

South Hadley, Massachusetts

Cable machinery

*Malaysia*

Penang

Audio products

*Republic of Korea*

Masan

Mobile telephones

*Turkey*

Istanbul

Cables

---

**SUBSIDIARIES**

*Finland*

Edacom Oy Ab

Elektro-Import Finland Ltd.

Elek-Tuote Oy

Insele Oy

Kolsi Oy

Kumijaloste Oy

LK-Products Oy

Luxor Oy

Micronas Oy

Nokia Cable Machinery Oy

Oy Nordic Trading Ab

Pucast Oy

Salora Oy

Sanka Oy

SLO-Idman Oy  
 SLO-Idman Oy  
 SLO-Kaapeli Oy  
 Teval Oy  
 Tuottajain Kone Oy

Nokia Data A/S  
 Nokia Dekk A/S  
 Nokia-Mobira A/S  
 Nokia Sko A/S  
 Salora (Norge) A/S

*Belgium*

Nokia Consumer Electronics Belgium  
 Sodima Benelux N.V.

*Portugal*

Ibervisao S.A.

*Denmark*

Nokia Data A/S  
 Nokia-Mibira A/S  
 Salora A/S

*Soviet Union*

Nokia Representative Office  
 NOKO

*France*

Nokia Data S.A.  
 Nokia-Maillefer  
 Oceanic S.A.  
 Sodipan-Nokia S.A.

*Spain*

Nokia Consumer Electronics (Espana) S.A.  
 Nokia Data S.A.

*Great Britain*

British Tissues Ltd.  
 Deeko plc  
 Nokia Consumer Electronics (UK) Ltd.  
 Nokia Data Ltd.  
 Nokia-Maillefer  
 Nokia-Mobira Ltd.  
 Nokia Telecommunications Ltd.  
 Nokia (UK) Ltd.  
 Salora (UK) Ltd.

*Sweden*

Horda AB  
 Horda Compound AB  
 Horda Form AB  
 Horda Profil AB  
 Kabmatik AB  
 Luxor AB  
 Luxor Forsaljning AB  
 Luxor Hushallselektronik  
 Nokia Aluminium, Nokia Capacitors  
 Nokia Consumer Electronics  
 Nokia Dack AB  
 Nokia Data AB  
 Nokia-Mobira AB  
 Nokia Sko AB  
 Nokia Svenska AB  
 Nokia Telecommunications  
 Salora AB  
 SLO-Idman Svenska AB

*Ireland*

Nokia Ltd.

*Italy*

Nokia Consumer Electronics Italia S.p.A.

*Switzerland*

Maillefer S.A.  
 Nokia Data AG  
 Nokia Finance International B.V.  
 Nokia GmbH  
 Nokia International AG  
 Nokia-Maillefer Holding S.A.  
 Novelectric AG

*Netherlands*

Nokia Data B.V.

*Norway*

Nokia A/S

*West Germany*

Graetz Strahlungstechnik GmbH  
Monette Kabel-und Elektrowerk GmbH  
Nokia Audio Electronics Products GmbH  
Nokia Data GmbH  
Nokia Display Technik GmbH  
Nokia Electronics Products Bochum GmbH  
Nokia Graez Holzwerke GmbH  
Nokia Kunstskofftechnik GmbH  
Nokia-Maillefer  
Nokia Mechatronics GmbH  
Nokia Mobile Phones  
Nokia Reifen GmbH  
Nokia Unterhaltungselektronik GmbH  
Transnorm GmbH

*North America*

Cue Paging Corp.  
Nokia Data Communications Corp.  
Nokia Inc.  
Nokia Products Ltd.  
Nokia-Maillefer  
Nokia-Maillefer Inc.  
Nokia-Mobira Inc.  
Pacific Roller Die Co., Inc.  
Transnorm System Inc.

*Europe*

Nokia Consumer Electronics Ges.mmbH

*Japan*

Nokia Representative Office

*Australia*

Nokia Representative Office

*Bangladesh*

Nokia Representative Office

*China*

Nokia Representative Office

*Egypt*

Nokia Representative Office

*Hong Kong*

Nokia-Maillefer (Far East) Ltd.

*Indonesia*

Nokia Representative Office

*Korea*

Tandy Mobira Communications Corp.

*Malaysia*

Nokia (Malaysia) Sdn. Bhd., Sanyo Electric (joint venture)

*Middle East*

Nokia Representative Office

*Saudi Arabia*

Nokia Representative Office

*Singapore*

Nokia (S.E.A.) Pte. Ltd., Nokia Regional Office (Asia/Pacific)

*Turkey*

Turkkablo A.O.

---

**ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS**

*1989*

**AT&T**

Nokia Mobile Phones and AT&T signed an agreement to codevelop microcircuits for mobile phones for the 1990s.

**Du Pont**

Nokia and Du Pont signed an agreement to do extensive R&D for new materials and components for the electronics industry.

**Eureka 95**

The directorate of the Eureka 95 project made Nokia a member of its leading research group in developing European HDTV. Nokia now holds an "A" status along with Philips, Thomson, and Bosch.

1988

**European Cellular Radio 900 (ECR 900) Consortium**

Nokia, Alcatel, and AEG formed ECR 900 and received its first orders for networks according to the Groupe Special Mobile (GSM) standard from the French and German telecommunications authorities.

**Tandy Corp.**

The two companies formed a joint venture, Tandy Mobira Communications, to manufacture mobile phones in South Korea.

**Moskabel**

The two companies signed an agreement to establish a joint venture, Elkat, which will manufacture copper wire for use in making cables.

---

**MERGERS AND ACQUISITIONS**

1988

**Ericsson Group**

Nokia acquired Ericsson's Data Division and merged it with Nokia's Information Systems Division to create Nokia Data.

**Oy Dava Ab**

Nokia bought this Finnish company and integrated it into Nokia Data.

**EB-Ericsson**

Nokia acquired EB-Ericsson's computer operations in Norway and integrated it into Nokia Data.

**Deeko plc**

Deeko plc of Britain, which manufactures table-setting and disposable products, was acquired by Nokia's Paper Division.

**Renucci S.A.**

Renucci S.A. of France was acquired by Nokia to broaden the Nokia Paper Division's market standing.

1987

**Standard Elektrik Lorenz (SEL)**

Nokia acquired SEL's consumer electronics operations.

---

**KEY OFFICERS**
**Simo Vuorilehto**

Chairman and chief executive officer

**Paavo Rantanen**

Vice president, International Relations and Trade Policy

**Hannu Bergholm**

Vice president and controller

**Jorma Ollila**

Vice president, Finance, Allocation of Economic Resources, and Investment Planning

**Matti Ojala**

Vice president, R&D and Technology

**Matti Saarinen**

Vice president, Corporate Communications



Table 4  
 Comprehensive Financial Statement\*  
 Fiscal Year Ending December 31  
 (Millions of U.S. Dollars, except Per Share Data)

Balance Sheet	1985	1986	1987	1988
Total Current Assets	\$1,098.6	\$1,558.0	\$2,123.9	\$3,429.7
Cash	205.7	396.4	673.9	716.7
Receivables	497.7	647.7	801.4	1,619.1
Inventory	395.2	513.8	648.6	1,093.9
Fixed Assets	\$765.8	\$1,005.3	\$1,473.2	\$1,931.4
Net Property, Plants	\$555.0	\$750.3	\$992.0	\$1,276.9
Long-Term Receivables	\$23.9	\$30.8	\$29.8	\$31.6
Other Noncurrent Assets	\$186.9	\$224.3	\$451.4	\$622.9
Total Current Liabilities	(\$622.6)	(\$772.4)	(\$1,142.7)	(\$2,280.9)
Net Current Assets	\$476.1	\$785.6	\$981.1	\$1,148.8
<b>Total Assets</b>	<b>\$1,241.9</b>	<b>\$1,790.9</b>	<b>\$2,454.3</b>	<b>\$3,080.2</b>
Total Shareholders' Equity	\$624.8	\$970.6	\$1,312.3	\$1,730.0
Common Stock	112.1	188.8	222.7	296.7
Other Equity	346.6	495.1	698.2	859.9
Retained Earnings	94.0	188.0	250.2	351.9
Distributable Reserves	72.1	98.8	141.1	221.5
Minority Interests	\$82.3	\$119.5	\$143.0	\$121.7
Long-Term Loans	\$534.8	\$700.8	\$999.1	\$1,228.5
<b>Total Equity</b>	<b>\$1,241.9</b>	<b>\$1,790.9</b>	<b>\$2,454.4</b>	<b>\$3,080.2</b>
Income Statement	1985	1986	1987	1988
Revenue	\$1,777.4	\$2,365.7	\$3,181.4	\$5,146.0
Cost of Sales	\$1,620.0	\$2,172.8	\$2,893.0	\$4,915.6
R&D Expense	\$77.3	\$106.3	\$132.0	\$246.5
Capital Expense	\$144.8	\$178.3	\$453.9	\$800.0
Pretax Income	\$112.9	\$137.7	\$278.4	\$256.4
Pretax Margin (%)	6.35	5.82	8.75	4.98
Effective Tax Rate (%)	21.20	19.20	17.60	22.80
Net Income	\$113.4	\$105.4	\$191.6	\$273.3
Shares Outstanding, Millions				
Preferred	10.4	15.4	16.5	21.8
Common	24.4	32.4	32.4	41.1
Per Share Data				
Earnings	\$1.94	\$2.07	\$3.48	\$3.22
Dividends	\$0.45	\$0.59	\$0.86	\$0.75
Book Value	N/A	N/A	N/A	N/A
Exchange Rate: US\$1/Fmk	Fmk 6.2	Fmk 5.07	Fmk 4.4	Fmk 4.24

\*Nokia changed its reporting standards in 1986. 1985 figures are taken from the 1986 annual report.  
 1984 figures are not available in the new format.  
 N/A = Not Available

Source: Nokia Corporation  
 Annual Reports  
 Dataquest  
 January 1990

## Norsk Data A/S

Olaf Helsets vei 5  
P.O. Box 25, Bogerud  
N-0621 Oslo 6  
Norway

Telephone: +47-2-628000  
Telex: 0056-74448 nd n  
Telefax: +47-2-628001 (A)  
Dun's Number: 34-500-1408

*Date Founded: 1967*

---

### CORPORATE STRATEGIC DIRECTION

Norsk Data A/S is positioning itself to be a systems integrator. With focus on both technology and the market, the Company takes advantage of information technology to achieve higher productivity and better business decisions for the customer. Platform products consist of a wide variety of industry-standard and proprietary networking and software systems. Mission-critical applications, customer service, user support, training, and consulting services are added to provide complete solutions.

Norsk Data is divided into Partner and Supplier business units. Norsk Data's Partner business units have complete customer responsibility. This business unit is divided into four divisions: ND BusinessPartner, ND LokalPartner, ND StatsPartner, and ND Comtec A.S. ND BusinessPartner is responsible for mechanical industry, commerce, and service organizations; ND LokalPartner is responsible for local public administration; ND StatsPartner is responsible for the Norwegian central government and defense; while ND Comtec offers complete solutions to the printing industry.

The Supplier business unit has three divisions: ND Service Team, ND System Team, and ND DataShop. ND Service Team offers complete service programs for all business units in and outside Scandinavia. ND System Team offers horizontal applications and training to Norsk Data's clients, while ND DataShop provides sales and distribution of industry-standard products.

Total revenue decreased 15.8 percent during fiscal 1989, to NKr 2.5 billion (US\$357.7 million). (Percentage changes refer only to NKr amounts; US\$ percentage changes will differ because of fluctuations

in Dataquest exchange rates.) This is down from the previous year's total of NKr 2.9 billion (US\$450.0 million). Net loss totaled NKr 270.0 million (US\$39.1 million), a decrease of nearly 65 percent from the preceding year's loss of NKr 765.0 million (US\$117.3 million). The loss was the result of slow markets and restructuring charges accrued throughout the year. However, revenue posted a 10.0 percent increase during the first six months of fiscal 1990. Sales of standards equipment was responsible for 40.0 percent of revenue; sales of UNIX systems posted 25.0 percent of total revenue.

R&D expenditure totaled NKr 250.0 million (US\$36.2 million), representing 10.1 percent of total 1989 revenue. This figure includes the costs related to software development. The 1989 R&D activities were focused on providing product platforms and applications that combine the best of proprietary and standard systems. During the year, the Company completed the products required to have a complete, distributed system based on PCs, UNIX workstations, UNIX servers, and SINTRAN servers. Within the office automation segment, the NOTIS products have been developed further in cooperation with Notic A.S. for full integration of word processing, spreadsheets, and document storage programs running on personal computers with programs running in the host computers. Administrative and technical/administrative solutions common to several market segments have been gathered in the FORMULA family. This family covers solutions for finance control, payroll and personnel, maintenance, project management, and data capture. MIND, a medical information system mainly for patient administration tasks, became available in 1989. The system is being further developed

and marketed by InfoMedica A.S. MIND will be ported to UNIX during 1990.

Capital expenditure totaled NKr 194 million (US\$28.1 million), representing 7.9 percent of fiscal 1989 revenue. This is a decrease of nearly 55 percent from the preceding year's total of NKr 428 million (US\$65.6 million). The Company employed 2,941 people at the end of fiscal 1989.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region and distribution channel. Tables 4 and 5, comprehensive financial statements, are at the end of this profile.

---

## BUSINESS SEGMENT STRATEGIC DIRECTION

Norsk Data's business segment strategy is to combine the best of proprietary and open technology, emphasize the development of applications and solutions, and provide customer-oriented organizations within selected customer segments. Norsk believes that this strategy best combines the customers' wishes to reduce expenses and maximize their return on investments.

### Hardware

Norsk Data's hardware products consist of the ND-110 Satellite Series, the ND-110 and ND-110/CX Compact Series, the ND-110/CX Series, the ND-5000 Series, and the Uniline 88. All Norsk Data families use Tandberg terminals with optional mice.

The ND-110 Satellite is a 16-bit, entry-level system consisting of three models supporting 3, 9, or 17 workstations, up to a 125MB hard disk, and a 125MB streamer tape backup. The ND-110 Satellite systems can be networked using ND-COSMOS for larger configurations and access to shared peripherals.

The ND-110 and -110/CX Compacts are medium-range systems with more powerful processors. They can be upgraded to the 32-bit ND-5000 Series by

adding a cabinet. They support from 48 to 128 workstations, SINTRAN or UNIX operating systems, up to 72MB main memory, and up to 29GB hard-disk capacity.

The ND-5000, introduced in 1987, is Norsk Data's top-of-the-line family. The ND-5000 is based on CMOS 32-bit processors. It supports SINTRAN III and NDIX (UNIX 4.2 BSD as host operating system), and is fully compatible with other ND families. The ND-5000 consists of models 5200, 5400, 5500, 5700, 5800, and 5900 with up to 74MB of main memory.

ND-LINK integrates personal computers into the ND product family as workstations (terminal emulation), and ND/PC-LINK supports bidirectional data transfer. Networking is achieved by ND-COSMOS, an OSI-based architecture.

Norsk Data has contracted with Dolphin to develop a UNIX system for the ND-5000 product family and to develop high-performance processors for the Norsk Data ESA. Parts of the hardware in these products are the basis for Dolphin's first product line, which is based on the Motorola 88000 instruction set. Late in 1989, Norsk Data stopped producing its own minicomputers. The Company uses the Data General UNILINE 88 as its server and the Data General Avion 88/WF as its workstation. Data General OEMs the UNILINE 88 to Dolphin, which adds value and then sells to Norsk Data.

Currently, Dolphin is working on its next-generation server, Orion. The server is based on a combination of four unique technologies from Dolphin, Motorola, National Semiconductor, and Siemens. Dolphin is the designer of the main architecture and the central processing unit.

### CAD/CAM

TECHNOVISION is Norsk Data's proprietary solution for computer-aided design (CAD) and computer-aided manufacturing (CAM). It is an integrated high-end system consisting of TECHNOSTATION as the key platform, and a complete range of application, database, and networking software. TECHNOVISION has been tailored to the needs of engineers and designers in the mechanical and manufacturing industries. The system has extensive possibilities for integration into computer-integrated manufacturing

(CIM). TECHNOVISION is being ported to UNIX and the UNIX version of the complete system presented at the CeBIT fair in Hannover in March 1990.

Dataquest estimates that Norsk Data produced NKr 634.3 million (US\$91.8 million) in factory revenue, giving it less than 1 percent of the worldwide midrange market for 1989. This is a decrease of approximately NKr 553.6 million (US\$80 million) from the previous year's figure of NKr 1.2 billion (US\$179.2 million).

### Software

Norsk Data supports a variety of databases (SIBAS) as well as vertical applications in the CAD/CAM and CIM markets. All are well integrated into the NOTIS office software. NOTIS consists of text processing, electronic mail, a spreadsheet, access to databases, a report generator, information retrieval, business graphics and drawing, and archiving. NOTIS also offers integrated telex and telefax functions. Norsk Data also supports computer-aided publishing (CAP) software NOTIS-PET and NOTIS-PRO.

Norsk Data intends to integrate the Wordplex 8000 and 90 Series workstations with Norsk Data families, culminating in the availability of ND software to Wordplex users.

### Operating Systems

Norsk Data has its own operating system, SINTRAN, which it introduced in 1974. This is an interactive terminal operating system that can be used for 16- and 32-bit processors, and was the first of its type available commercially. The UNIX operating system has been incorporated as a supplement to SINTRAN. It can be used in the ND-500/CX series and can be run in parallel with SINTRAN.

Norsk Data has developed a number of other operating systems, including ND-COSMOS, a communications system for transferring data between a variety of systems, including those of outside suppliers. It is a key feature of ND-SAFE, which involves making distributed data processing available to customers using Norsk Data computers.

Norsk Data has developed several other types of operating systems and programming tools, including the ND-Dialogue. This is a series of integrated programming tools that can be used for administrative data processing. The system is a complete package that normally is included with the hardware.

### Omega

The Omega project puts Norsk Data's new structure and market-oriented strategy into practice. Omega is a joint development project between ND StatsPartner and the Norwegian Ministry of Labor and Administration. Through Omega, the partners plan to develop public administration tools for the next decade and to formulate a basis for the Norwegian government's standard specifications for these systems. Key concepts in the project are partnership with customers for mutual benefit, development on the basis of industry standards and previously purchased products, and development on customers' terms to improve the customers' profitability.

### Further Information

For further information about the Company's business segments, please contact the appropriate Dataquest industry service.

**Table 1**  
**Five-Year Corporate Highlights (Millions of US Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$234.9	\$348.6	\$424.3	\$450.0	\$357.7
Percent Change	-	48.38	21.73	6.06	(20.50)
Capital Expenditure	\$41.6	\$61.3	\$63.2	\$65.6	\$28.1
Percent of Revenue	17.72	17.59	14.89	14.59	7.85
R&D Expenditure	\$18.9	\$32.9	\$39.3	\$44.8	\$36.2
Percent of Revenue	8.04	9.45	9.27	9.95	10.11
Number of Employees	2,799	3,569	4,488	4,168	2,941
Revenue (\$K)/Employee	\$83.93	\$97.66	\$94.54	\$107.97	\$121.64
Net Income	\$8.1	\$13.4	\$1.5	(\$117.3)	(\$39.1)
Percent Change	-	64.42	(88.86)	(7,972.93)	(66.70)
Exchange Rate (US\$1=NKr)	NKr 8.60	NKr 7.39	NKr 6.71	NKr 6.52	NKr 6.91

1989 Calendar Year	Q1	Q2	Q3	Q4
Quarterly Revenue	NA	NA	NA	NA
Quarterly Profit	NA	NA	NA	NA

NA = Not available

Source: Norsk Data A/S  
Annual Reports  
Dataquest (1990)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1985	1986	1987	1988	1989
Europe	91.40	NA	89.20	90.20	92.80
Non-Europe	8.60	NA	10.80	9.80	7.20

Source: Norsk Data A/S  
Annual Reports  
Dataquest (1990)

**Table 3**  
**Revenue by Channel (Percent)**

Channel	1988	1989
Direct Sales	100.00	100.00
Indirect Sales	0	0

Source: Norsk Data A/S  
Annual Reports  
Dataquest (1990)

---

## 1989 SALES OFFICE LOCATIONS

North America—1  
 Europe—34  
 Asia/Pacific—4  
 ROW—1

---

## MANUFACTURING LOCATIONS

### *Europe*

Newbury, United Kingdom  
 Computers  
 Dublin, Ireland  
 Computers  
 Nieder Eschbach, Germany  
 Computers  
 Skullerud, Norway  
 Computers

Norsk Data Ireland Ltd. A/S (Ireland)  
 Norsk Data Italy S.R.L. (Italy)  
 Norsk Data Ltd. (England)  
 Norsk Data Nederland B.V. (Netherlands)  
 Norsk Data S.A.R.L. (France)  
 Norsk Data Switzerland S.A. (Switzerland)  
 Nortext Grafiska AB (Sweden)  
 Pauli GmbH (Germany)  
 Pauli KG (Germany)  
 Richard Norton & Co. (England)  
 Wordplex (Belgium)  
 Wordplex (Denmark)  
 Wordplex (Finland)  
 Wordplex (Ireland)  
 Wordplex (Luxembourg)  
 Wordplex GmbH (Germany)  
 Wordplex Hamburg (Germany)  
 Wordplex Holdings (England)  
 Wordplex Information Systems Ltd. (England)  
 Wordplex International (England)  
 Wordplex Leasing (England)  
 Wordplex Norge A/S (Norway)  
 Wordplex Technology (England)

### *Asia/Pacific*

Norsk Data International, Ltd. (Hong Kong)

---

## SUBSIDIARIES

### *North America*

Norsk Data N.A. Inc. (United States)

### *Europe*

Baudia (Germany)  
 Bonnier Data AB (Sweden)  
 Cimware AB (Sweden)  
 Comtec AB (Sweden)  
 Comtec A/S (Norway)  
 Dolphin Server Technology A.S. (Norway)  
 IPL-Muenster (Germany)  
 ND Administration ApS (Denmark)  
 ND Application AB (Sweden)  
 ND Comtec GmbH (Germany)  
 ND Funn A/S (Norway)  
 ND UK Ltd. (England)  
 ND Verwaltung GmbH (Germany)  
 ND Verwaltung KG (Germany)  
 Norsk Data AB (Sweden)  
 Norsk Data A/S (Denmark)  
 Norsk Data Finland OY AB (Finland)  
 Norsk Data GmbH (Germany)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

### *1989*

#### Data General

Norsk Data entered into an OEM agreement with Data General, using its UNILINE 88 server and the 88/WF workstation.

#### Exabyte

The two companies entered an OEM agreement.

---

## MERGERS AND ACQUISITIONS

### *1989*

#### Wordplex Espana

Norsk Data sold its controlling interest in the Spanish company Wordplex Espana (Spain) to Wordplex's management.

1988

**Computas Complete A/S**

Computas Complete, a software house, was acquired and merged with Norsk Data.

**Infotron A/S**

Infotron, a software house, was acquired and merged with Norsk Data.

**Wordplex Australia**

Norsk Data sold its Australian subsidiary, Wordplex Australia, to an Australian company.

**PA-Konsult AB**

Norsk Data sold its Swedish subsidiary, Pa Konsult.

---

**KEY OFFICERS**

**Erik Engebresten**

President and chief executive officer

**Tor Alfheim**

Executive vice president

**Christian Storm**

Senior vice president

**Roald Nomme**

Senior vice president

**Svein Sognen**

Executive president

**Soren Voight**

Executive vice president

---

**PRINCIPAL INVESTORS**

Information is not available.

---

**FOUNDERS**

Information is not available.

**Table 4**  
**Comprehensive Financial Analysis**  
**Fiscal Year Ending December**  
**(Millions of US Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Total Current Assets	\$229.6	\$308.0	\$462.4	\$394.8	\$295.8
Cash	90.4	118.4	174.2	141.3	115.5
Receivables	82.9	140.4	211.6	188.3	137.0
Marketable Securities	18.1	0.1	0.1	0.2	0.1
Inventory	38.1	49.0	76.5	65.0	43.1
Other Current Assets	0	0	0	0	0
Net Property, Plants	\$79.6	\$132.4	\$170.8	\$195.6	\$110.6
Other Assets	\$25.2	\$156.4	\$245.5	\$207.4	\$68.2
<b>Total Assets</b>	<b>\$334.5</b>	<b>\$596.7</b>	<b>\$878.7</b>	<b>\$797.7</b>	<b>\$474.5</b>
Total Current Liabilities	\$106.4	\$183.6	\$352.6	\$439.6	\$209.7
Long-Term Debt	\$52.3	\$138.1	\$184.2	\$150.8	\$117.5
Other Liabilities	\$64.4	\$115.0	\$143.5	\$126.2	\$105.5
<b>Total Liabilities</b>	<b>\$223.1</b>	<b>\$436.8</b>	<b>\$680.3</b>	<b>\$716.6</b>	<b>\$432.7</b>
Total Shareholders' Equity	\$111.4	\$159.9	\$198.4	\$81.1	\$41.8
Common Stock	34.4	84.7	98.4	101.8	96.7
Other Equity	26.8	64.0	104.3	103.1	(54.8)
Retained Earnings	50.2	11.2	(4.3)	(123.8)	0
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$334.5</b>	<b>\$596.7</b>	<b>\$878.7</b>	<b>\$797.7</b>	<b>\$474.5</b>
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Revenue	\$234.9	\$348.6	\$424.3	\$450.0	\$357.7
Cost of Sales	\$111.0	\$167.8	\$219.2	\$281.9	\$207.1
R&D Expense	\$18.9	\$32.9	\$39.3	\$44.8	\$36.2
SG&A Expense	\$43.3	\$72.6	\$115.1	\$131.1	\$137.5
Capital Expense	\$41.6	\$61.3	\$63.2	\$65.6	\$28.1
Pretax Income	\$42.3	\$64.2	\$36.2	(\$147.5)	(\$56.0)
Pretax Margin (%)	18.02	18.42	8.54	(32.79)	(15.66)
Effective Tax Rate (%)	17.00	18.00	17.00	NA	16.00
Net Income	\$8.1	\$13.4	\$1.5	(\$117.3)	(\$39.1)
Shares Outstanding, Millions	29.7	30.9	32.9	33.5	33.8
<b>Per Share Data</b>					
Earnings	\$2.39	\$1.69	\$0.90	(\$4.44)	(\$1.67)
Dividend	\$0.29	\$0.37	\$0.41	-	-
Book Value	\$3.75	\$5.18	\$6.03	\$2.42	\$1.24
<b>Exchange Rate (US\$1=NKr)</b>	<b>NKr 8.60</b>	<b>NKr 7.39</b>	<b>NKr 6.71</b>	<b>NKr 6.52</b>	<b>NKr 6.91</b>

NA = Not available

Source: Norsk Data A/S  
Annual Reports  
Dataquest (1990)



**Table 5**  
**Comprehensive Financial Analysis**  
**Fiscal Year Ending December**  
**(Millions of NKr, except Per Share Data)**

Balance Sheet	1985	1986	1987	1988	1989
Total Current Assets	NKr 1,974.8	NKr 2,275.9	NKr 3,103.0	NKr 2,574.0	NKr 2,044.0
Cash	777.8	874.8	1,169.0	921.0	798.0
Receivables	713.2	1,037.9	1,420.0	1,228.0	947.0
Marketable Securities	156.0	0.8	1.0	1.0	1.0
Inventory	327.8	362.4	513.0	424.0	298.0
Other Current Assets	0	0	0	0	0
Net Property, Plants	NKr 684.8	NKr 978.1	NKr 1,146.0	NKr 1,275.0	NKr 764.0
Other Assets	NKr 217.0	NKr 1,155.7	NKr 1,647.0	NKr 1,352.0	NKr 471.0
<b>Total Assets</b>	<b>NKr 2,876.6</b>	<b>NKr 4,409.7</b>	<b>NKr 5,896.0</b>	<b>NKr 5,201.0</b>	<b>NKr 3,279.0</b>
Total Current Liabilities	NKr 914.8	NKr 1,357.0	NKr 2,366.0	NKr 2,866.0	NKr 1,449.0
Long-Term Debt	NKr 449.5	NKr 1,020.5	NKr 1,236.0	NKr 983.0	NKr 812.0
Other Liabilities	NKr 554.2	NKr 850.2	NKr 963.0	NKr 823.0	NKr 729.0
<b>Total Liabilities</b>	<b>NKr 1,918.5</b>	<b>NKr 3,227.7</b>	<b>NKr 4,565.0</b>	<b>NKr 4,672.0</b>	<b>NKr 2,990.0</b>
Total Shareholders' Equity	NKr 958.1	NKr 1,182.0	NKr 1,331.0	NKr 529.0	NKr 289.0
Common Stock	296.2	625.7	660.0	664.0	668.0
Other Equity	230.2	473.2	700.0	672.0	(379.0)
Retained Earnings	431.7	83.1	(29.0)	(807.0)	0
<b>Total Liabilities and Shareholders' Equity</b>	<b>NKr 2,876.6</b>	<b>NKr 4,409.7</b>	<b>NKr 5,896.0</b>	<b>NKr 5,201.0</b>	<b>NKr 3,279.0</b>
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Revenue	NKr 2,020.2	NKr 2,575.9	NKr 2,847.0	NKr 2,934.0	NKr 2,472.0
Cost of Sales	NKr 954.2	NKr 1,239.7	NKr 1,471.0	NKr 1,838.0	NKr 1,431.0
R&D Expense	NKr 162.5	NKr 243.5	NKr 264.0	NKr 292.0	NKr 250.0
SG&A Expense	NKr 372.0	NKr 536.5	NKr 772.0	NKr 855.0	NKr 950.0
Capital Expense	NKr 358.0	NKr 453.0	NKr 424.0	NKr 428.0	NKr 194.0
Pretax Income	NKr 364.1	NKr 474.5	NKr 243.0	(NKr 962.0)	(NKr 387.0)
Pretax Margin (%)	18.02	18.42	8.54	(32.79)	(15.66)
Effective Tax Rate (%)	17.00	18.00	17.00	NA	16.00
Net Income	NKr 70.0	NKr 98.9	NKr 10.0	(NKr 765.0)	(NKr 270.0)
Shares Outstanding, Millions	29.7	30.9	32.9	33.5	33.8
<b>Per Share Data</b>					
Earnings	NKr 20.58	NKr 12.51	NKr 6.01	(NKr 28.96)	(NKr 11.51)
Dividends	NKr 2.50	NKr 2.75	NKr 2.75	-	-
Book Value	NKr 32.26	NKr 38.25	NKr 40.46	NKr 15.79	NKr 8.55

**Table 5 (Continued)**  
**Comprehensive Financial Analysis**  
**Fiscal Year Ending December**  
**(Millions of NKr, except Per Share Data)**

Key Financial Ratios	1985	1986	1987	1988	1989
<i>Liquidity</i>					
Current (Times)	2.16	1.68	1.31	0.90	1.41
Quick (Times)	1.80	1.41	1.09	0.75	1.20
Fixed Assets/Equity (%)	71.47	82.75	86.10	241.02	264.36
Current Liabilities/Equity (%)	95.48	114.81	177.76	541.78	501.38
Total Liabilities/Equity (%)	200.24	273.07	342.98	883.18	1,034.60
<i>Profitability (%)</i>					
Return on Assets	-	2.87	0.20	(14.00)	(6.14)
Return on Equity	-	9.86	0.83	(83.96)	(63.56)
Profit Margin	3.47	3.84	0.35	(26.07)	(10.92)
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	8.04	9.45	9.27	9.95	10.11
Capital Spending % of Revenue	17.72	17.59	14.89	14.59	7.85
Employees	2,799	3,569	4,488	4,168	2,941
Revenue (NKr K)/Employee	NKr 83.93	NKr 97.66	NKr 94.54	NKr 107.97	NKr 121.64
Capital Spending % of Assets	12.45	10.27	7.19	8.23	5.92
Exchange Rate (US\$1=NKr)	NKr 8.60	NKr 7.39	NKr 6.71	NKr 6.52	NKr 6.91

NA = Not available

Source: Norsk Data A/S  
Annual Reports  
Dataquest (1990)

## Norsk Data A/S

Olaf Helsets vei 5

P.O. Box 25

Bogenid

0621 Oslo 6

Norway

Telephone: 47-2-626000

Fax: 2-29-67-96

Dun's Number: 34-507-3001

*Date Founded: 1967*

---

### CORPORATE STRATEGIC DIRECTION

Norsk Data A/S, a Norwegian manufacturer of minicomputers, is one of the fastest-growing companies in the European computer sector. The Company was established in 1967 by three computer scientists from the Norwegian Defense Research Establishment. One of the founders, Rolf Skar, is president and chief executive officer of the Company. Norsk Data's main activities are the development, production, and marketing of 16- and 32-bit computers together with the necessary software systems, with particular emphasis on fast on-line operating systems.

During 1988, Norsk Data began to rethink its product and marketing strategy in order to better compete in the computer industry. Because the trend is now toward open systems and more powerful microprocessors, Norsk Data no longer believes in a future where the computer system, the basic software, and the application software are based upon proprietary technology marketed through a wholly owned distribution system. In order to face this change successfully, Norsk Data implemented a restructuring plan that incorporated three specific areas of change within the Company.

First, Dolphin Server Technology A/S was formed as a wholly owned subsidiary of Norsk Data to take over the development responsibilities of high-performance computers based on UNIX standards. These computers will be used as servers in a resource-sharing network. Dolphin will sell its products to Norsk Data, to other computer system companies, and to system integrators who need more powerful systems.

Second, Norsk Data will work to become a system integrator. Norsk Data believes the major part of the added value will be created increasingly through activities close to the customers, integrated applications, and assisting customers in integrating such applications into their own organizations.

Third, Norsk Data will redirect its end-user distribution system to be more of a solutions-oriented organization emphasizing selected vertical segments such as newspapers, graphics, and manufacturing industries, local government, and libraries.

As a result of this restructuring, Norsk Data reported its first net loss of \$116.1 million\* in fiscal 1988. However, its total consolidated revenue increased 5.4 percent over the previous year to \$445.2 million.

The restructuring also has led to a significant reduction in the number of employees. As of 1988, Norsk Data employed 4,168 people, but by the beginning of May 1989, the number was reduced to 3,388. Most of those let go, 590, were laid off or not replaced; the remaining 190 resulted from divestiture of foreign subsidiaries.

Additionally, Norsk Data has changed its manufacturing strategy. Instead of operating as a manufacturing organization, the Company will focus more on the logistics and the flow of materials, using subcontracting to a much larger extent than before. As a result, the number of manufacturing employees was reduced from 310 at the end of 1988 to 185 at the end of April 1989. The remaining manufacturing activities are

---

\*All dollar amounts are in U.S. dollars.

located at Skullerud, Norway; Dublin, Ireland; Bracknell, United Kingdom; and Nieder Eschbach, West Germany.

The Company also has sold and will continue to sell assets that no longer fit its strategies.

Research and development was affected as well by the restructuring. The Company decided to build its product strategy upon a resource-sharing network architecture called Norsk Data Extended Systems Architecture (ESA). ESA combines the Norsk Data proprietary systems with open standards in a TCP/IP (Ethernet)-type environment. Working toward this goal, Norsk Data's R&D expenditures totaled \$44.3 million in fiscal 1988, representing 10.0 percent of revenue, up from \$39.2 million in 1987.

Norsk Data's most important markets are Norway, Sweden, Denmark, the United Kingdom, and West Germany, which represent 44, 13, 8, 14, and 11 percent of sales, respectively. The remaining 10 percent is from other countries where the Company targets only a few application areas such as newspapers and computer-aided design/computer-aided manufacturing (CAD/CAM), in addition to servicing some long-term customers.

All products manufactured by Norsk Data involve the ND-SAFE (System Architecture for Expansion) concept. This concept has three basic elements: the hardware (processors, storage systems, and peripherals), the operating systems, and the systems software. One of the major advantages of this concept is that all products can be networked and are fully compatible with each other. Thus, the software that has been used in an old Norsk Data system can also be used in a new system. All of Norsk Data's computer terminals and peripherals can be attached to new systems without difficulty.

---

## BUSINESS SEGMENT STRATEGIC DIRECTION

### Hardware

Norsk Data's hardware products consist of the ND Butterfly, the ND-110 Satellite Series, the ND-110 Compact and ND-110/CX Compact Series, the

ND-110/CX Series, and the ND-5000 Series. All Norsk Data families use Tandberg terminals with optional mice.

The ND Butterfly is an office workstation based on the Intel 80286. It functions either as an MS-DOS personal computer only or supports the Norsk Data processor as a coprocessor. In both cases, the Butterfly can be connected to other Norsk Data systems as a workstation.

The ND-110 Satellite is a 16-bit, entry-level system consisting of three models supporting 3, 9, or 17 workstations, up to a 125MB hard disk, and a 125MB streamer tape backup. The ND-110 Satellite systems can be networked using ND-COSMOS for larger configurations and access to shared peripherals.

The ND-110 and -110/CX Compacts are medium-range systems with more powerful processors. They can be upgraded to the 32-bit ND-5000 Series by adding a cabinet. They support from 48 to 128 workstations, respectively; SINTRAN or UNIX operating systems; up to 72MB main memory; and up to 29GB hard-disk capacity.

The ND-5000 was introduced in 1987 and is Norsk Data's top-of-the-line family. The ND-5000 is based on CMOS 32-bit processors. It supports SINTRAN III and NDIR (UNIX 4.2BSD as host operating system), and is fully compatible with other ND families. The ND-5000 consists of models 5200, 5400, 5500, 5700, 5800, and 5900 (2, 3, or 4), with up to 74MB of main memory.

ND-LINK integrates personal computers into the ND product family as workstations (terminal emulation), and ND/PC-LINK supports bidirectional data transfer. Networking is achieved by ND-COSMOS, an OSI-based architecture.

Norsk Data has contracted with Dolphin to develop a UNIX system for the ND-5000 product family and to develop high-performance processors for the Norsk Data ESA. Parts of the hardware in these products are the basis for Dolphin's first product line, which is based on the Motorola 88000 instruction set.

Currently Dolphin is working on its next-generation server, Orion. The server is based on a combination of four unique technologies from Siemens, Motorola,

National Semiconductor, and Dolphin. Dolphin is the designer of the main architecture and the central processing unit.

### Software

Norsk Data supports a variety of databases (SIBAS) as well as vertical applications in the CAD/CAM and computer-integrated manufacturing (CIM) markets. All are well integrated into the NOTIS office software. NOTIS consists of text processing, electronic mail, a spreadsheet, access to databases, a report generator, information retrieval, business graphics and drawing, and archiving, as well as integrated telex and telefax functions. Norsk Data also supports computer-aided publishing (CAP) software NOTIS-PET and NOTIS-PRO on the Butterfly system.

Norsk Data intends to integrate the Wordplex 8000 and 90 Series workstations with Norsk Data families, culminating in the availability of ND software to Wordplex users.

### Operating Systems

Norsk Data has its own operating system, SINTRAN, which it introduced in 1974. This is an interactive

terminal operating system that can be used for 16- and 32-bit processors, and was the first of its type available commercially. The UNIX operating system has been incorporated as a supplement to SINTRAN. It can be used in the ND-500/CX series and can be run in parallel with SINTRAN.

Norsk Data has developed a number of other operating systems, including ND-COSMOS. This is a communications system for transferring data between a variety of systems, including those of outside suppliers. It is a key feature of ND-SAFE, which involves making distributed data processing available to customers using Norsk Data computers.

Norsk Data has developed several other types of operating-system and programming tools, including the ND-DIALOGUE. This is a series of integrated programming tools that can be used for administrative data processing. The system is a complete package that normally is included with the hardware.

### Further Information

For further information regarding the Company's business segments, please contact the appropriate industry service.

**Table 1**  
**Five-Year Corporate Highlights (Millions of U.S. Dollars)**

	1984	1985	1986	1987	1988
Five-Year Revenue	\$168.0	\$219.5	\$348.6	\$422.4	\$445.2
Percent Change	-	30.69	58.77	21.18	5.40
Capital Expenditure	\$26.1	\$41.6	\$61.4	\$62.9	\$64.9
Percent of Revenue	15.53	18.94	17.60	14.89	14.59
R&D Expenditure	\$12.5	\$18.9	\$32.9	\$39.2	\$44.3
Percent of Revenue	7.45	8.60	9.45	9.27	9.95
Number of Employees	2,214	2,799	3,569	4,488	4,168
Revenue (\$K)/Employee	\$75.88	\$78.44	\$97.66	\$94.12	\$106.82
Net Income	\$7.8	\$8.1	\$13.4	\$1.5	(\$116.1)
Percent Change	-	4.10	64.58	(88.94)	(7,943.24)
1989 Calendar Year	Q1	Q2	Q3	Q4	
Quarterly Revenue	N/A	N/A	N/A	N/A	
Quarterly Profit	N/A	N/A	N/A	N/A	

N/A = Not Available

Source: Norsk Data  
 Annual Reports  
 Dataquest  
 January 1990

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1984	1985	1986	1987	1988
North America	N/A	N/A	N/A	N/A	N/A
International	N/A	N/A	N/A	N/A	N/A

N/A = Not Available

Source: Norsk Data  
 Annual Reports

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1987	1988
Direct Sales	100.00	100.00
Indirect Sales	0	0

Source: Norsk Data

---

## SALES OFFICE LOCATIONS

North America—1  
 Europe—34  
 Asia/Pacific—4  
 ROW—1

---

## MANUFACTURING LOCATIONS

### *Europe*

Bracknell, United Kingdom  
 Computers  
 Dublin, Ireland  
 Computers  
 Nieder Eschbach, West Germany  
 Computers  
 Skullerud, Norway  
 Computers

---

## SUBSIDIARIES

### *Europe*

Bonnier Data AB (Sweden)  
 Cimware AB (Sweden)  
 Comtec A/S (Norway)  
 ND Administration ApS (Denmark)  
 ND Application AB (Sweden)  
 ND Comtec AB (Sweden)  
 ND Comtec GmbH (West Germany)  
 ND Funn A/S (Norway)  
 ND UK Ltd. (England)  
 ND Verwaltung GmbH (West Germany)  
 ND Verwaltung KG (West Germany)  
 Norsk Data AB (Sweden)  
 Norsk Data A/S (Denmark)  
 Norsk Data Finland OY AB (Finland)  
 Norsk Data GmbH (West Germany)  
 Norsk Data Ireland Ltd. A/S (Ireland)  
 Norsk Data Italy S.R.L. (Italy)  
 Norsk Data Ltd. (England)  
 Norsk Data Nederland b.v. (Netherlands)  
 Norsk Data s.a.r.l. (France)  
 Norsk Data Switzerland S.A (Switzerland)

Nortext Grafiska AB (Sweden)  
 Pauli GmbH (West Germany)  
 Pauli KG (West Germany)  
 Richard Norton & Co. (England)  
 Sanirac AB (Sweden)  
 Wordplex Belgium  
 Wordplex Denmark  
 Wordplex Finland  
 Wordplex GmbH (West Germany)  
 Wordplex Hamburg (West Germany)  
 Wordplex Holdings (England)  
 Wordplex Information Systems Ltd. (England)  
 Wordplex International (England)  
 Wordplex Ireland  
 Wordplex Leasing (England)  
 Wordplex Luxembourg  
 Wordplex Norge A/S (Norway)  
 Wordplex Technology (England)

### *North America*

Norsk Data N.A. Inc. (United States)

### *Asia/Pacific*

Norsk Data International, Ltd. (Hong Kong)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

1989

### *Exabyte*

The two companies entered an OEM agreement.

---

## MERGERS AND ACQUISITIONS

1989

### *Norsk Data-Wordplex Espana*

Norsk Data sold its controlling interest in the Spanish company Wordplex Spain to Wordplex's management.

1988

### *Computas Complete A/S*

Computas Complete, a software house, was acquired and merged with Norsk Data.

**Infotron A/S**

Infotron, a software house, was acquired and merged with Norsk Data.

**Wordplex Australia**

Norsk Data sold its Australian subsidiary, Wordplex Australia, to an Australian company.

**PA-Konsult AB**

Norsk Data sold its Swedish subsidiary, PA-Konsult.

1987

**Wordplex Systems PLC of Great Britain**

Norsk Data acquired this company to strengthen its position in the office market for networked information systems.

Paul GmbH (West Germany), NDB Data AB (Sweden), and ALFA Data A/S (Norway)

Norsk Data acquired these three software companies to improve its role as a complete solutions supplier.

---

**KEY OFFICERS**

**Rolf Skar**

President, chief executive officer

**Tor Alfheim**

Chairman of the board, executive vice president

**Erik Engebretsen**

Executive vice president, chief financial officer



**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December 31**  
**(Millions of U.S. Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
<b>Total Current Assets</b>	<b>\$209.0</b>	<b>\$229.6</b>	<b>\$307.9</b>	<b>\$460.4</b>	<b>\$390.6</b>
Cash	5.2	7.5	6.7	17.8	18.5
Receivables	69.9	82.9	140.4	210.7	186.3
Marketable Securities	91.3	83.0	111.7	155.6	121.2
Inventory	36.5	38.1	49.0	76.1	64.3
Other Current Assets	6.1	18.1	0.1	0.1	0.2
Net Property, Plants	\$51.5	\$79.6	\$132.4	\$170.0	\$193.5
Other Assets	\$17.2	\$25.2	\$156.4	\$244.4	\$205.2
<b>Total Assets</b>	<b>\$277.7</b>	<b>\$334.5</b>	<b>\$596.7</b>	<b>\$874.7</b>	<b>\$789.2</b>
<b>Total Current Liabilities</b>	<b>\$77.1</b>	<b>\$106.4</b>	<b>\$183.6</b>	<b>\$351.0</b>	<b>\$434.9</b>
Long-Term Debt	\$47.5	\$52.3	\$138.1	\$183.4	\$149.2
Other Liabilities	\$40.0	\$64.4	\$115.1	\$142.9	\$124.9
<b>Total Liabilities</b>	<b>\$164.5</b>	<b>\$223.1</b>	<b>\$436.9</b>	<b>\$677.3</b>	<b>\$708.9</b>
<b>Total Shareholders' Equity</b>	<b>\$113.2</b>	<b>\$111.4</b>	<b>\$159.8</b>	<b>\$197.4</b>	<b>\$80.3</b>
Common Stock	28.1	34.4	84.7	97.9	100.8
Other Equity	27.3	26.8	63.9	103.8	102.0
Retained Earnings	57.7	50.2	11.2	(4.3)	(122.5)
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$277.7</b>	<b>\$334.5</b>	<b>\$596.7</b>	<b>\$874.7</b>	<b>\$789.2</b>
<b>Income Statement</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
Revenue	\$168.0	\$219.5	\$348.6	\$422.4	\$445.2
Cost of Sales	\$82.0	\$110.9	\$167.8	\$218.2	\$278.9
R&D Expense	\$12.5	\$18.9	\$32.9	\$39.2	\$44.3
SG&A Expense	\$40.9	\$43.3	\$72.6	\$114.5	\$129.7
Capital Expense	\$26.1	\$41.6	\$61.4	\$62.9	\$64.9
Pretax Income	\$28.6	\$42.3	\$64.2	\$36.1	(\$146.0)
Pretax Margin (%)	17.00	19.28	18.42	8.53	(32.79)
Effective Tax Rate (%)	12.00	17.00	18.00	19.00	19.00
Net Income	\$7.8	\$8.1	\$13.4	\$1.5	(\$116.1)
Shares Outstanding, Thousands	10,334.0	14,492.0	30,125.0	32,237.0	33,109.0
<b>Per Share Data</b>					
Earnings	\$2.41	\$2.39	\$1.73	\$0.90	(\$4.44)
Dividends	\$0.26	\$0.29	\$0.37	\$0.40	-
Book Value	\$0.01	\$0.01	\$0.01	\$0.01	0
Exchange rate (NOK/US \$1)	8.16	8.60	7.39	6.74	6.59

Table 4 (Continued)  
 Comprehensive Financial Statement  
 Fiscal Year Ending December 31  
 (Millions of U.S. Dollars, except Per Share Data)

Key Financial Ratios	1984	1985	1986	1987	1988
<i>Liquidity</i>					
Current (Times)	2.71	2.16	1.68	1.31	0.90
Quick (Times)	2.24	1.80	1.41	1.09	0.75
Fixed Assets/Equity (%)	45.48	71.48	82.81	86.12	241.02
Current Liabilities/Equity (%)	68.10	95.49	114.88	177.81	541.80
Total Liabilities/Equity (%)	145.35	200.26	273.32	343.07	883.19
<i>Profitability (%)</i>					
Return on Assets	-	2.66	2.87	0.20	(13.95)
Return on Equity	-	7.24	9.87	0.83	(83.60)
Profit Margin	4.65	3.70	3.84	0.35	(26.07)
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	7.45	8.60	9.45	9.27	9.95
Capital Spending % of Revenue	15.53	18.94	17.60	14.89	14.59
Employees	2,214	2,799	3,569	4,488	4,168
Revenue (\$K)/Employee	\$75.88	\$78.44	\$97.66	\$94.12	\$106.82
Capital Spending % of Assets	9.40	12.43	10.28	7.19	8.23

Source: Norsk Data  
 Annual Reports  
 Dataquest  
 January 1990

# Nokia Corporation

Nokia Corporation  
Mikonkatu 15 15A  
P.O. Box 226  
SF 00101  
Helsinki  
Finland  
Telephone: +35 (80) 18071  
Telex: 1234442  
Fax: 35 (80) 656388

## THE COMPANY

### Background

Nokia Corporation, the second largest electronics company in the Nordic countries, was founded in 1965. Today it is Finland's largest publicly traded industrial enterprise and Finland's largest industrial employer, with almost 28,000 employees. A Company with diverse operations, it is one of the largest soft tissue producers in Europe. The Company's shares are listed on the Helsinki and Stockholm stock exchanges.

### Operations

Nokia's product range includes numerous future-oriented products such as cellular mobile telephones, digital telecommunication systems, machinery for the production of fiber optic cables, and computer-aided design and computer-aided manufacturing systems. Nokia also makes industrial automation systems, satellite television equipment, and numerous other electronics products for professional and consumer markets. Nokia ranks among the world's leading manufacturers of cable machinery, modems, and mobile telephones.

The Company is divided into ten groups:

- Electronics
- Salora-Luxor
- Cables
- Machinery
- Metal Products
- Engineering

# Nokia Corporation

- Forest Industries
- Chemicals
- Rubber Industries
- Plastics

Net sales by the Nokia Corporation in 1985 totaled Fmk 11 billion (more than US\$2 billion), an 18 percent increase over 1984 sales. Table 1 shows Nokia Corporation net sales for 1984 and 1985.

Table 1

## NOKIA CORPORATION NET SALES (Millions of Finnmarkka)

<u>Groups</u>	<u>1984</u>	<u>1985</u>
Electronics	Fmk 1,769	Fmk 2,477
Salora-Luxor	1,660	1,974
Cables	1,587	1,790
Machinery	387	593
Metal Products	505	389
Engineering	136	200
Forest Industries	1,710	2,036
Chemicals	365	403
Rubber Industries	821	907
Plastics	220	226
Other Subsidiaries	<u>200</u>	<u>25</u>
Total	Fmk 9,360	Fmk 11,020

Source: Nokia Corporation  
Annual Report

### International Operations

Nokia has more than 80 subsidiaries in Finland and abroad, operates in 26 countries, and has manufacturing facilities in 9 countries. Recording 27 percent growth in 1985, the Company's foreign operations accounted for 61 percent of total net sales. Nokia's exports from Finland were up 29 percent in 1985 compared with the previous year. Foreign operations employed 6,244 personnel in 1985.

# Nokia Corporation

## Research and Development

Research and development (R&D) expenditure amounted to Fmk 479 million in 1985 compared to Fmk 369 million in 1984. R&D expenditure represented more than half the investment in fixed assets. In relative terms, R&D expenditure was highest in the Electronics Group, where it equaled 13 percent of the group's net sales.

## Employees

Based on annual averages, total Nokia personnel decreased by 255 in 1985 to reach 27,619 employees. The Electronics Group, which experienced the largest growth, employed an additional 1,118 people in 1985, a growth of about 20 percent from the previous year. Domestic and foreign operations employed 21,375 and 6,244 personnel, respectively. Table 2 shows the number of employees for 1984 and 1985, broken down by group.

Table 2

### NOKIA CORPORATION NUMBER OF EMPLOYEES

<u>Group</u>	<u>1984</u>	<u>1985</u>
Electronics	6,040	7,158
Salora-Luxor	3,579	3,768
Cables	4,783	4,716
Machinery	1,526	1,539
Metal Products	1,450	1,070
Engineering	380	426
Forest Industries	3,940	3,860
Chemicals	468	442
Rubber Industries	4,086	3,813
Plastics	537	521
Others	<u>1,085</u>	<u>308</u>
Total Employees	27,874	27,619

Source: Nokia Corporation  
Annual Report

# Nokia Corporation

## Prior-Year Highlights

The Nokia Corporation's profit before taxes and appropriations amounted to Fmk 834 million in 1985, an increase of 80 percent over the previous year. Net sales increased 18 percent to Fmk 11,020 million. This increase was primarily attributable to the success of the Electronics Group, which increased its net sales to Fmk 2.5 billion, a 40 percent increase compared to 1984.

## ELECTRONICS GROUP ACTIVITIES

The Electronics Group develops, manufactures, and markets high-technology equipment, systems, and services for professional data processing, information management, and telecommunications in the public and private sectors.

The Electronics Group consists of the following divisions:

- Information Systems Division
- Mobile Radio Division
- Telecommunications Division
- Control and Instrumentation

## Information Systems Division

This division manufactures and markets bank, store, and office systems, and information systems for industry. The product line also includes modems and PABXs.

Systems deliveries are based on Nokia's own production and cooperation with major international companies in the information technology field, including Northern Honeywell, Intel, and Telecom. At the end of 1985, the computer interests of Nokia's subsidiary Salora-Luxor were transferred to become an operative part of the Information Systems Division. Subsidiaries were also established in Norway and Denmark.

The Division invested 8 percent of its sales in 1985, and its spending on product development equalled more than 10 percent of sales. The principal investment was a new computer manufacturing facility in Kilo, Espoo, which was brought on-line in September 1985.

# Nokia Corporation

## Mobile Radio Division

In 1985, the Mobile Radio Division increased its sales by 130 percent to Fmk 641 million. Exports and foreign subsidiaries accounted for 67 percent of sales. The main products of this division are the NMT 900 System, the NMT 450 System, and cellular telephones.

## Telecommunications Division

The Telecommunications Division concentrates on the supply of digital transmission and switching systems for public and private networks. Most of the growth in transmission systems in 1985 came from PCM pulse code modulation (PCM) equipment, which was supplied mainly to telecommunications authorities.

Deliveries of digital exchanges showed strong growth in 1985, and the Company's position as the market leader in the supply of digital exchanges in Finland was consolidated. The division started supplying dedicated networks with a communications system for the gas pipeline network of Neste Oy.

Net areas of development in 1985 included exchanges for cellular mobile telephone networks and integrated communications systems for dedicated networks. Development work on digital exchanges for multiservice networks continued.

Nokia also sells optical fiber products, community antenna systems, traditional telecommunications systems, and satellite reception and cable and pay television systems.

## Control and Instrumentation

The Control and Instrumentation Division's 1985 sales amounted to Fmk 230 million. The year 1985 was a period of reorganization for this division with Nokia acquiring outright two subsidiaries: Oy Advanced Forest Automation Ab (Alfora) and Oy Kontram Ab. A new market and customer-centered organization was established for the Control and Instrumentation Division, with units for automation in forest industries and the power industry, industrial instrumentation, and industrial electronic components.

## SALORA-LUXOR ACTIVITIES

The Salora-Luxor Group develops, manufactures, and markets consumer and professional electronics products. The group is well known in Europe for its consumer electronics, particularly televisions.

# Nokia Corporation

Net sales by the Salora-Luxor Group in 1985 were approximately Fmk 2,000 million, a 19 percent increase over 1984.

The Salora-Luxor Group consists of the following divisions:

- Consumer Electronics
- Components
- Monitors
- Satellite Systems
- Industrial Electronics

The Consumer Division accounts for approximately 70 percent of the Corporation's net sales. Salora-Luxor is expanding vigorously into new areas of electronic communications, such as satellite and cable television systems.



## Northern Telecom Limited

3 Robert Speck Parkway  
Mississauga, Ontario, Canada L4Z3C8  
Telephone: (416) 897-9000  
Fax: (416) 275-1143  
Dun's Number: 05-781-2224

*Date Founded: 1914*

### CORPORATE STRATEGIC DIRECTION

Northern Telecom Limited, a global supplier of fully digital telecommunications switching systems, is 53.1 percent owned by BCE Inc. BCE's core business is telecommunications, in which Northern Telecom plays an important role. Northern Telecom generated 27 percent of BCE's total revenue for 1989.

Northern Telecom operates exclusively in the telecommunications equipment market. This business focus consists of the research and design, development, manufacture, marketing, sale, installation, financing, and service of central office switching equipment, business communications systems and terminals, transmission equipment, cable and outside plant products, and other products and services.

Northern Telecom is seeking to expand the international portion of its operations through acquisitions and joint ventures worldwide. Among these is a new joint venture to manufacture digital telecommunications systems in Hungary. An agreement was also reached whereby British Telecom will distribute Northern Telecom's new Meridian business communications systems in the United Kingdom. Northern Telecom is seeking to increase sales in Japan through the acquisition of a 20 percent stake in Sanko Telecom, a Japanese manufacturer of telecommunications equipment. The Company also is pursuing ventures in Australia and the Caribbean. This commitment to expanding operations is demonstrated by the 55 percent increase in non-North American revenue in 1989.

Northern Telecom's total revenue for fiscal 1989 was \$6.1 billion,\* up 13 percent over 1988 revenue of \$5.4 billion. Revenue increases in the following business segments contributed to the overall growth: central office switching, business communications

systems and terminals, transmission, and cable and outside plant product divisions. Canadian revenue increased 18 percent to \$2.5 billion, or 41 percent of total 1989 sales. Revenue growth resulted mainly from increased capital spending programs by the telephone operating companies. US revenue was \$3.6 billion, or 59 percent of total 1989 revenue. This was an 8 percent increase from the \$3.4 billion in revenue for 1988. The increase in US sales was across product lines, but was primarily from the sale of central office switching equipment. Revenue by destination for 1989 was \$3.5 billion, \$2.0 billion, and \$588.4 million for the United States, Canada, and other areas, respectively. Revenue increased in all international markets, primarily because of higher shipments to Japan and other Pacific Rim countries and the Caribbean and Latin American markets.

Net income amounted to \$376.5 million in fiscal 1989. This represented an 18 percent increase over the 1988 prerestructuring figure of \$301 million, or an increase of 114 percent over the postrestructuring earnings of \$166 million. Improvement in net income is seen as the result of restructuring and cost reduction programs, as well as an increased sales effort.

Northern Telecom conducts the major part of its R&D activities through its Bell-Northern Research Ltd. (BNR) subsidiary, owned 70 percent by Northern Telecom and 30 percent by Bell Canada. R&D expenditure totaled \$29.8 million, or 12 percent of total revenue. This was concentrated in the fiber-optic and transmission areas, and resulted in the introduction of the new FiberWorld family of telecommunications products in October 1989 and Meridian products in 1990. Capital expenditure in fiscal 1989 amounted to \$370.0 million, or 6 percent of total revenue. Northern Telecom expects 1990 capital spending to be approximately the same as in 1989. Northern Telecom conducts business in more than 70 countries and employs over 47,500 people worldwide.

\*All dollar amounts are in US dollars.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region and distribution channel. Table 4, a comprehensive financial statement, is at the end of this background.

---

## BUSINESS SEGMENT STRATEGIC DIRECTION

Northern Telecom separates its business into five areas: central office switching, transmission equipment, business communications systems and terminals, cable and outside plant, and other, which includes interest income from its finance subsidiaries.

### Central Office Switching

Central office switching equipment is used by companies to connect one customer with another. Northern Telecom has a full line of digital office switches, the DMS family of products. Dataquest estimates that Northern Telecom ranked second in the US central office switching market with 39 percent market share in 1989. The Company's central office switching revenue in 1989 was \$3.26 billion, up 12 percent from \$2.91 billion in 1988. This segment accounted for 53 percent of Northern Telecom's total revenue in 1989.

### Transmission Equipment

Transmission equipment is used for carrying information (such as voice and data) between locations (such as between home or business and a central office). Revenue from this segment in 1989 totaled \$631 million (10 percent of total revenue), an increase of nearly 11 percent over 1988 revenue of \$571 million. Over the past three years, much of the Transmission Group's resources have been devoted to the development of FiberWorld. Northern Telecom estimates that by 1992, more than \$1 billion will have been invested in FiberWorld and related development.

With FiberWorld, Northern Telecom becomes the first telecommunications manufacturer to offer a family of switching and transmission products necessary for the construction, operation, and service of an end-to-end fiber-optic network. FiberWorld products include the S/DMS TransportNode, the S/DMS SuperNode, and the S/DMS AccessNode.

The S/DMS TransportNode carries voice, data, and video signals from point to point over long distances, between offices, or in local networks. It increases the capacity of the network up to four times and makes more efficient use of the available capacity of fiber optics. The S/DMS SuperNode is the broadband switching component in the FiberWorld system, increasing the power and capability of the high-capacity DMS SuperNode introduced in 1987. The architecture of the S/DMS SuperNode, in a single switch, provides a combination of voice network switching, SONET-network switching, and the new asynchronous transfer mode switching. S/DMS AccessNode provides the link between the user and the services made possible by the carrying capacity of S/DMS TransportNode and the processing power of S/DMS SuperNode.

Northern Telecom and BNR have contributed extensively to the development of Integrated Services Digital Network (ISDN) and the standards and protocols used to connect the public telecommunications network and subscriber apparatus. ISDN delivers end-to-end digital communication for voice, data, and visual information. Northern Telecom's Meridian 1 Communications Systems product line supports ISDN capability.

### Business Communications Systems and Terminals

Business communications systems and terminals accounted for 24 percent, or \$1.5 billion, of Northern Telecom's total revenue in 1989. These systems are primarily internal switching systems, usually located on business premises, that permit a number of local telephones or terminals to communicate with each other, with or without the use of the public telephone network. These systems consist of software running on various types of equipment that enables the transmission of data through complex communications systems on an international scale. Private branch exchanges (PBXs) are business communications systems, normally located on a customer's premises, that control voice and data communication among telephone terminals ranging in number from less than a dozen to several thousand. Dataquest estimates that Northern Telecom ranked second in the US PBX market and captured a 20.5 percent market share based on 1.5 million PBX units and total number of lines.

Meridian 1 effectively merges Northern Telecom's current PBX products—the Meridian SL-1 and the Meridian SL-100—into a single, modular product

portfolio. Its complete set of common features and applications is available across the entire product line to accommodate a growth range from 30 to 60,000 lines, offering double the line capacity of any previously available business communications system.

Two advanced customer services for Meridian users already in place in the United States are interactive computer-based training at the user's site and immediate access to product information via digital compact discs.

### Cable and Outside Plant

Cable and outside plant revenue was \$529 million (9 percent of total revenue), an increase of 17 percent from 1988 revenue of \$451 million. Northern Telecom attributes this growth to increased sales of communications cable in Canada and the United States.

### Other

Other revenue, principally comprising R&D for customers and interest income of the finance subsidiaries, totaled \$196 million in 1989, a 21 percent increase over the 1988 figure of \$162 million.

### Semiconductors

The Company has an integrated strategy of manufacturing 40 to 50 percent of the semiconductor components it needs. Northern Telecom has CMOS fab facilities located in Ottawa, Ontario, and San Diego, California, to make custom digital and mixed analog/digital semiconductors for its telecommunications equipment. None of the Northern Telecom's semiconductor production is available on the merchant market.

### Further Information

For further information about the Company's business segments, please contact the appropriate Dataquest industry service.

**Table 1**  
**Five-Year Corporate Highlights (Millions of US Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$4,262.9	\$4,383.6	\$4,914.5	\$5,407.5	\$6,105.5
Percent Change	-	2.83	12.11	10.03	12.91
Capital Expenditure	NA	NA	NA	\$500.7	\$370.0
Percent of Revenue	0	0	0	9.26	6.06
R&D Expenditure	\$430.0	\$474.5	\$587.5	\$710.6	\$729.8
Percent of Revenue	10.09	10.82	11.95	13.14	11.95
Number of Employees	46,549	46,202	48,778	50,136	47,572
Revenue (\$K)/Employee	\$91.58	\$94.88	\$100.75	\$107.86	\$128.34
Net Income	\$273.8	\$286.6	\$328.8	\$183.2	\$376.5
Percent Change	-	4.67	14.72	(44.28)	105.51
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	
Quarterly Revenue	\$1,379.7	\$1,523.8	\$1,414.8	\$1,787.2	
Quarterly Profit	NA	NA	NA	NA	

NA = Not available

Source: Northern Telecom Limited  
Annual Reports and Forms 10-K  
Dataquest (1990)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1985	1986	1987	1988	1989
Canada	28.38	29.95	33.10	37.97	40.71
International	71.62	70.05	66.90	62.03	59.29

Source: Northern Telecom Limited  
Annual Reports and Forms 10-K  
Dataquest (1990)

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1988*	1989*
Direct Sales	95	95
Indirect Sales	5	5
Distributors	2	2
Dealers	3	3

\*Dataquest estimate

Source: Dataquest (1990)

---

## SALES OFFICE LOCATIONS

Information is not available.

---

## MANUFACTURING LOCATIONS

### *North America*

Ann Arbor, Michigan, United States  
Private branch exchanges

Atlanta, Georgia, United States  
Transmission equipment

Aylmer, Quebec, Canada  
Transmission equipment

Belleville, Ontario, Canada  
Business telephones

Brampton, Ontario, Canada  
Central office switches

Calgary, Alberta, Canada  
Key telephones

Concord, New Hampshire, United States  
Network monitoring equipment

Dallas, Texas, United States  
Private branch exchanges

London, Ontario, Canada  
Residential telephones

Marlton, New Jersey, United States  
Datacom equipment and phones

Minneapolis, Minnesota, United States  
Datacom equipment

Minnetonka, Minnesota, United States  
Business systems

Montreal, Quebec, Canada  
Wire and cables

Morristown, New Jersey, United States  
Network monitoring equipment

Morton Grove, Illinois, United States  
Datacom equipment

Nashville, Tennessee, United States  
Telephones

Ottawa, Ontario, Canada  
Semiconductors

Raleigh-Durham, North Carolina, United States  
Central office switches

San Diego, California, United States  
Semiconductors

Santa Clara, California, United States  
Private branch exchanges

Saskatoon, Saskatchewan, Canada  
Optical fibers

West Palm Beach, Florida, United States  
Datacom equipment and phones

Winnipeg, Manitoba, Canada  
Transmission equipment

---

## SUBSIDIARIES

### *North America*

Bell-Northern Research, Inc., California (United States)

Bell-Northern Research Ltd. (Canada)

Northern Telecom (CALA) Corporation, Florida (United States)

Northern Telecom Canada Limited (Canada)

Northern Telecom Electronics Corporation (Canada)

Northern Telecom Finance Corporation, Tennessee (United States)

Northern Telecom Inc., Tennessee (United States)

Northern Telecom World Trade Corporation (Canada)

### *Europe*

Bell-Northern Research Limited (England)

Netas-Northern Electric Telekomunikasyon A.S. (Turkey)

Northern Telecom AG (Switzerland)

Northern Telecom Europe Limited (England)

Northern Telecom GmbH (Germany)

Northern Telecom International (Netherlands)

Northern Telecom (Ireland) Limited (Ireland)

NT Meridian S.A. (France)

### *Asia/Pacific*

AWA-Nortel Pty. Limited (Australia)

Northern Telecom (Asia) Limited (Hong Kong)

Northern Telecom Industries Sdn. Bhd. (West Malaysia)

Northern Telecom Japan Inc. (Japan)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

### *1990*

#### Hewlett-Packard (HP)

HP licensed its version of UNIX, HP-UX, to Northern Telecom. It is the first time HP has licensed HP-UX to an outside vendor. Northern Telecom has agreed to use HP-UX for its

telecommunications switching systems. The value of the pact has been estimated at several hundred million dollars over the next few years.

#### **Cybernetics Systems International (CSI)**

Under an agreement between Northern Telecom and CSI, Northern Telecom's customers with automatic call distribution (ACD) requirements will be offered a software application that helps them schedule employees, manage assignments, and record and forecast work loads. The marketing agreement enables Northern Telecom to offer a comprehensive solution for ACD environments.

#### **Centigram Communications Corporation**

Northern Telecom and Centigram Communications entered into a joint sales and marketing agreement that addresses the needs of businesses with mixed PBX networks, including both Northern Telecom and non-Northern Telecom PBXs.

#### **NYNEX Business Information Systems Company**

NYNEX and Northern Telecom launched a new joint venture, NYNEX Meridian Systems. The new company will employ 1,000 people and will provide sales and service for all Northern Telecom equipment. Northern Telecom holds the majority interest in the venture.

#### **British Telecom**

British Telecom was awarded exclusive rights as distributor for Northern Telecom's newly announced Meridian 1 global business communications system.

#### **Austria Telecommunications GmbH and BHG Telecommunications**

Northern Telecom entered a joint venture in Hungary with these two firms to manufacture a wide range of DMS-based digital public switching systems for the Hungarian telecommunications network, as well as digital switching systems for private and business customers in Hungary and export markets. The new firm will provide Northern Telecom with a manufacturing base and a marketing bridgehead into the emerging Eastern European telecommunications marketplace.

1989

#### **Digital Equipment Corporation (DEC)**

DEC's VAX computers will be integrated with the voice functions of Northern Telecom's SL-1 PBX.

#### **NYNEX**

The companies have a data networking joint venture.

#### **Digital Equipment Corporation (DEC)**

The companies have a data networking joint venture.

1988

#### **STC**

The companies undertook joint research and development programs.

#### **China Tong Guang**

The companies undertook a joint venture to manufacture and market Northern Telecom's digital PBXs and digital telephone sets.

#### **Ameritech**

The companies agreed to jointly develop ISDN applications for products and services to be offered by both companies.

#### **Motorola**

The companies agreed to jointly develop ISDN applications for products and services to be offered by both companies.

---

## **MERGERS AND ACQUISITIONS**

1990

#### **AWA Limited**

Northern Telecom purchased the remaining 40 percent of its joint venture with AWA Limited and formed NorTel Australia.

1989

#### **Microtel Limited**

Northern Telecom acquired Microtel's central office switching business.

---

## **KEY OFFICERS**

#### **Paul G. Stern**

Chairman of the board, president, and chief executive officer

#### **David G. Vice**

Vice chairman, Products and Technology

#### **J. Derek M. Davis**

Executive vice president, Corporate Strategy

#### **Donald A. Noble**

Executive vice president, Corporate Strategy

**John A. Roth**  
Executive vice president, Product Line  
Management

**Clive V. Allen**  
Senior vice president, Technology

**Stephen N. Bowen**  
Senior vice president, Public Affairs

**Martin G. Mand**  
Senior vice president, Finance, and chief financial  
officer

---

**PRINCIPAL INVESTORS**

Information is not available.

---

**FOUNDERS**

Information is not available.

**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December**  
**(Millions of US Dollars, except Per Share Data)**

Balance Sheet	1985	1986	1987	1988	1989
Total Current Assets	\$2,404.5	\$2,840.3	\$3,189.2	\$2,641.9	\$4,091.4
Cash	81.9	362.3	126.2	79.2	169.5
Receivables	1,007.1	1,150.8	1,340.0	1,620.9	1,946.0
Marketable Securities	519.0	657.0	1,008.0	0	967.0
Inventory	780.2	651.4	690.9	820.3	856.2
Other Current Assets	16.7	19.1	24.0	121.5	152.9
Net Property, Plants	\$1,065.1	\$1,097.9	\$1,263.3	\$1,480.6	\$1,485.0
Other Assets	\$20.4	\$22.9	\$553.8	\$1,755.7	\$798.6
<b>Total Assets</b>	<b>\$3,490.0</b>	<b>\$3,961.1</b>	<b>\$5,006.3</b>	<b>\$5,878.2</b>	<b>\$6,375.0</b>
Total Current Liabilities	\$952.0	\$994.9	\$1,577.7	\$2,154.5	\$2,164.5
Long-Term Debt	\$107.6	\$101.0	\$430.1	\$577.5	\$816.0
Other Liabilities	\$448.8	\$616.0	\$438.0	\$474.4	\$452.7
<b>Total Liabilities</b>	<b>\$1,508.4</b>	<b>\$1,711.9</b>	<b>\$2,445.8</b>	<b>\$3,206.4</b>	<b>\$3,433.2</b>
Total Shareholders' Equity	\$1,981.6	\$2,249.2	\$2,560.5	\$2,671.8	\$2,941.8
Converted Preferred Stock	350.8	354.3	227.2	241.0	246.3
Common Stock	720.5	755.8	801.9	858.9	921.3
Other Equity	(120.5)	(127.1)	10.4	(32.4)	(102.0)
Retained Earnings	1,030.8	1,266.2	1,521.0	1,604.3	1,876.2
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$3,490.0</b>	<b>\$3,961.1</b>	<b>\$5,006.3</b>	<b>\$5,878.2</b>	<b>\$6,375.0</b>
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Revenue	\$4,262.9	\$4,383.6	\$4,914.5	\$5,407.5	\$6,105.5
Canadian Revenue	1,209.9	1,312.8	1,626.6	2,053.0	2,485.5
Non-Canadian Revenue	3,053.0	3,070.8	3,287.9	3,354.5	3,620.0
Cost of Sales	\$2,078.9	\$2,760.5	\$2,915.5	\$3,218.4	\$3,718.6
R&D Expense	\$430.0	\$474.5	\$587.5	\$710.6	\$729.8
SG&A Expense	\$701.9	\$764.6	\$938.2	\$1,088.2	\$1,131.5
Capital Expense	NA	NA	NA	\$500.7	\$370.0
Pretax Income	\$432.0	\$441.1	\$488.7	\$234.9	\$515.1
Pretax Margin (%)	10.13	10.06	9.94	4.34	8.44
Effective Tax Rate (%)	NA	NA	NA	NA	NA
Net Income	\$273.8	\$286.6	\$328.8	\$183.2	\$376.5
Shares Outstanding, Millions	116.0	116.9	235.8*	237.6	240.9
<b>Per Share Data</b>					
Earnings	\$2.36	\$2.45	\$1.39	\$0.70	\$1.47
Dividend	\$0.36	\$0.40	\$0.23	\$0.26	\$0.28
Book Value	\$17.08	\$19.24	\$10.90	\$11.24	\$12.21



**Table 4 (Continued)**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December**  
**(Millions of US Dollars, except Per Share Data)**

<b>Key Financial Ratios</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<i>Liquidity</i>					
Current (Times)	1.52	2.85	2.02	1.23	1.89
Quick (Times)	1.03	2.20	1.58	0.85	1.49
Fixed Assets/Equity (%)	53.75	48.81	49.34	55.42	50.48
Current Liabilities/Equity (%)	79.62	44.23	61.62	80.64	73.58
Total Liabilities/Equity (%)	76.12	76.11	95.52	120.01	116.70
<i>Profitability (%)</i>					
Return on Assets	-	7.69	7.33	3.37	6.15
Return on Equity	-	13.55	13.67	7.00	13.41
Profit Margin	6.42	6.54	6.69	3.39	6.17
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	10.09	10.82	11.95	13.14	11.95
Capital Spending % of Revenue	0	0	0	9.26	6.06
Employees	46,549	46,202	48,778	50,136	47,572
Revenue (\$K)/Employee	\$91.58	\$94.88	\$100.75	\$107.86	\$128.34
Capital Spending % of Assets	0	0	0	8.52	5.80

\*Two-for-one division of common shares, year restated  
 NA = Not available

Source: Northern Telecom Limited  
 Annual Reports and Forms 10-K  
 Dataquest (1990)

## Northern Telecom Limited

3 Robert Speck Parkway  
Mississauga, Ontario, Canada L4Z3C8  
Telephone: (416) 897-9000  
Fax: (416) 275-1143  
Dun's Number: 05-781-2224

*Date Founded: 1914*

### CORPORATE STRATEGIC DIRECTION

Northern Telecom Limited, a global supplier of fully digital telecommunications switching systems, is 53.1 percent owned by BCE Inc. BCE's core business is telecommunications, in which Northern Telecom plays an important role. Northern Telecom generated 27 percent of BCE's total revenue for 1989.

Northern Telecom operates exclusively in the telecommunications equipment market. This business focus consists of the research and design, development, manufacture, marketing, sale, installation, financing, and service of central office switching equipment, business communications systems and terminals, transmission equipment, cable and outside plant products, and other products and services.

Northern Telecom is seeking to expand the international portion of its operations through acquisitions and joint ventures worldwide. Among these is a new joint venture to manufacture digital telecommunications systems in Hungary. An agreement was also reached whereby British Telecom will distribute Northern Telecom's new Meridian business communications systems in the United Kingdom. Northern Telecom is seeking to increase sales in Japan through the acquisition of a 20 percent stake in Sanko Telecom, a Japanese manufacturer of telecommunications equipment. The Company also is pursuing ventures in Australia and the Caribbean. This commitment to expanding operations is demonstrated by the 55 percent increase in non-North American revenue in 1989.

Northern Telecom's total revenue for fiscal 1989 was \$6.1 billion,\* up 13 percent over 1988 revenue of \$5.4 billion. Revenue increases in the following business segments contributed to the overall growth: central office switching, business communications

systems and terminals, transmission, and cable and outside plant product divisions. Canadian revenue increased 18 percent to \$2.5 billion, or 41 percent of total 1989 sales. Revenue growth resulted mainly from increased capital spending programs by the telephone operating companies. US revenue was \$3.6 billion, or 59 percent of total 1989 revenue. This was an 8 percent increase from the \$3.4 billion in revenue for 1988. The increase in US sales was across product lines, but was primarily from the sale of central office switching equipment. Revenue by destination for 1989 was \$3.5 billion, \$2.0 billion, and \$588.4 million for the United States, Canada, and other areas, respectively. Revenue increased in all international markets, primarily because of higher shipments to Japan and other Pacific Rim countries and the Caribbean and Latin American markets.

Net income amounted to \$376.5 million in fiscal 1989. This represented an 18 percent increase over the 1988 prerestructuring figure of \$301 million, or an increase of 114 percent over the postrestructuring earnings of \$166 million. Improvement in net income is seen as the result of restructuring and cost reduction programs, as well as an increased sales effort.

Northern Telecom conducts the major part of its R&D activities through its Bell-Northern Research Ltd. (BNR) subsidiary, owned 70 percent by Northern Telecom and 30 percent by Bell Canada. R&D expenditure totaled \$29.8 million, or 12 percent of total revenue. This was concentrated in the fiber-optic and transmission areas, and resulted in the introduction of the new FiberWorld family of telecommunications products in October 1989 and Meridian products in 1990. Capital expenditure in fiscal 1989 amounted to \$370.0 million, or 6 percent of total revenue. Northern Telecom expects 1990 capital spending to be approximately the same as in 1989. Northern Telecom conducts business in more than 70 countries and employs over 47,500 people worldwide.

\*All dollar amounts are in US dollars.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region and distribution channel. Table 4, a comprehensive financial statement, is at the end of this background.

---

## BUSINESS SEGMENT STRATEGIC DIRECTION

Northern Telecom separates its business into five areas: central office switching, transmission equipment, business communications systems and terminals, cable and outside plant, and other, which includes interest income from its finance subsidiaries.

### Central Office Switching

Central office switching equipment is used by companies to connect one customer with another. Northern Telecom has a full line of digital office switches, the DMS family of products. Dataquest estimates that Northern Telecom ranked second in the US central office switching market with 39 percent market share in 1989. The Company's central office switching revenue in 1989 was \$3.26 billion, up 12 percent from \$2.91 billion in 1988. This segment accounted for 53 percent of Northern Telecom's total revenue in 1989.

### Transmission Equipment

Transmission equipment is used for carrying information (such as voice and data) between locations (such as between home or business and a central office). Revenue from this segment in 1989 totaled \$631 million (10 percent of total revenue), an increase of nearly 11 percent over 1988 revenue of \$571 million. Over the past three years, much of the Transmission Group's resources have been devoted to the development of FiberWorld. Northern Telecom estimates that by 1992, more than \$1 billion will have been invested in FiberWorld and related development.

With FiberWorld, Northern Telecom becomes the first telecommunications manufacturer to offer a family of switching and transmission products necessary for the construction, operation, and service of an end-to-end fiber-optic network. FiberWorld products include the S/DMS TransportNode, the S/DMS SuperNode, and the S/DMS AccessNode.

The S/DMS TransportNode carries voice, data, and video signals from point to point over long distances, between offices, or in local networks. It increases the capacity of the network up to four times and makes more efficient use of the available capacity of fiber optics. The S/DMS SuperNode is the broadband switching component in the FiberWorld system, increasing the power and capability of the high-capacity DMS SuperNode introduced in 1987. The architecture of the S/DMS SuperNode, in a single switch, provides a combination of voice network switching, SONET-network switching, and the new asynchronous transfer mode switching. S/DMS AccessNode provides the link between the user and the services made possible by the carrying capacity of S/DMS TransportNode and the processing power of S/DMS SuperNode.

Northern Telecom and BNR have contributed extensively to the development of Integrated Services Digital Network (ISDN) and the standards and protocols used to connect the public telecommunications network and subscriber apparatus. ISDN delivers end-to-end digital communication for voice, data, and visual information. Northern Telecom's Meridian 1 Communications Systems product line supports ISDN capability.

### Business Communications Systems and Terminals

Business communications systems and terminals accounted for 24 percent, or \$1.5 billion, of Northern Telecom's total revenue in 1989. These systems are primarily internal switching systems, usually located on business premises, that permit a number of local telephones or terminals to communicate with each other, with or without the use of the public telephone network. These systems consist of software running on various types of equipment that enables the transmission of data through complex communications systems on an international scale. Private branch exchanges (PBXs) are business communications systems, normally located on a customer's premises, that control voice and data communication among telephone terminals ranging in number from less than a dozen to several thousand. Dataquest estimates that Northern Telecom ranked second in the US PBX market and captured a 20.5 percent market share based on 1.5 million PBX units and total number of lines.

Meridian 1 effectively merges Northern Telecom's current PBX products—the Meridian SL-1 and the Meridian SL-100—into a single, modular product

portfolio. Its complete set of common features and applications is available across the entire product line to accommodate a growth range from 30 to 60,000 lines, offering double the line capacity of any previously available business communications system.

Two advanced customer services for Meridian users already in place in the United States are interactive computer-based training at the user's site and immediate access to product information via digital compact discs.

### Cable and Outside Plant

Cable and outside plant revenue was \$529 million (9 percent of total revenue), an increase of 17 percent from 1988 revenue of \$451 million. Northern Telecom attributes this growth to increased sales of communications cable in Canada and the United States.

### Other

Other revenue, principally comprising R&D for customers and interest income of the finance subsidiaries, totaled \$196 million in 1989, a 21 percent increase over the 1988 figure of \$162 million.

### Semiconductors

The Company has an integrated strategy of manufacturing 40 to 50 percent of the semiconductor components it needs. Northern Telecom has CMOS fab facilities located in Ottawa, Ontario, and San Diego, California, to make custom digital and mixed analog/digital semiconductors for its telecommunications equipment. None of the Northern Telecom's semiconductor production is available on the merchant market.

### Further Information

For further information about the Company's business segments, please contact the appropriate Dataquest industry service.

**Table 1**  
**Five-Year Corporate Highlights (Millions of US Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$4,262.9	\$4,383.6	\$4,914.5	\$5,407.5	\$6,105.5
Percent Change	-	2.83	12.11	10.03	12.91
Capital Expenditure	NA	NA	NA	\$500.7	\$370.0
Percent of Revenue	0	0	0	9.26	6.06
R&D Expenditure	\$430.0	\$474.5	\$587.5	\$710.6	\$729.8
Percent of Revenue	10.09	10.82	11.95	13.14	11.95
Number of Employees	46,549	46,202	48,778	50,136	47,572
Revenue (\$K)/Employee	\$91.58	\$94.88	\$100.75	\$107.86	\$128.34
Net Income	\$273.8	\$286.6	\$328.8	\$183.2	\$376.5
Percent Change	-	4.67	14.72	(44.28)	105.51
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	
Quarterly Revenue	\$1,379.7	\$1,523.8	\$1,414.8	\$1,787.2	
Quarterly Profit	NA	NA	NA	NA	

NA = Not available

Source: Northern Telecom Limited  
Annual Reports and Forms 10-K  
Dataquest (1990)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1985	1986	1987	1988	1989
Canada	28.38	29.95	33.10	37.97	40.71
International	71.62	70.05	66.90	62.03	59.29

Source: Northern Telecom Limited  
Annual Reports and Forms 10-K  
Dataquest (1990)

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1988*	1989*
Direct Sales	95	95
Indirect Sales	5	5
Distributors	2	2
Dealers	3	3

\*Dataquest estimate

Source: Dataquest (1990)

---

## SALES OFFICE LOCATIONS

Information is not available.

---

## MANUFACTURING LOCATIONS

### *North America*

Ann Arbor, Michigan, United States  
Private branch exchanges  
Atlanta, Georgia, United States  
Transmission equipment  
Aylmer, Quebec, Canada  
Transmission equipment  
Belleville, Ontario, Canada  
Business telephones  
Brampton, Ontario, Canada  
Central office switches  
Calgary, Alberta, Canada  
Key telephones  
Concord, New Hampshire, United States  
Network monitoring equipment  
Dallas, Texas, United States  
Private branch exchanges  
London, Ontario, Canada  
Residential telephones  
Marlton, New Jersey, United States  
Datacom equipment and phones  
Minneapolis, Minnesota, United States  
Datacom equipment  
Minnetonka, Minnesota, United States  
Business systems  
Montreal, Quebec, Canada  
Wire and cables  
Morristown, New Jersey, United States  
Network monitoring equipment  
Morton Grove, Illinois, United States  
Datacom equipment  
Nashville, Tennessee, United States  
Telephones  
Ottawa, Ontario, Canada  
Semiconductors  
Raleigh-Durham, North Carolina, United States  
Central office switches  
San Diego, California, United States  
Semiconductors  
Santa Clara, California, United States  
Private branch exchanges  
Saskatoon, Saskatchewan, Canada  
Optical fibers

West Palm Beach, Florida, United States  
Datacom equipment and phones  
Winnipeg, Manitoba, Canada  
Transmission equipment

---

## SUBSIDIARIES

### *North America*

Bell-Northern Research, Inc., California (United States)  
Bell-Northern Research Ltd. (Canada)  
Northern Telecom (CALA) Corporation, Florida (United States)  
Northern Telecom Canada Limited (Canada)  
Northern Telecom Electronics Corporation (Canada)  
Northern Telecom Finance Corporation, Tennessee (United States)  
Northern Telecom Inc., Tennessee (United States)  
Northern Telecom World Trade Corporation (Canada)

### *Europe*

Bell-Northern Research Limited (England)  
Netas-Northern Electric Telekomunikasyon A.S. (Turkey)  
Northern Telecom AG (Switzerland)  
Northern Telecom Europe Limited (England)  
Northern Telecom GmbH (Germany)  
Northern Telecom International (Netherlands)  
Northern Telecom (Ireland) Limited (Ireland)  
NT Meridian S.A. (France)

### *Asia/Pacific*

AWA-Nortel Pty. Limited (Australia)  
Northern Telecom (Asia) Limited (Hong Kong)  
Northern Telecom Industries Sdn. Bhd. (West Malaysia)  
Northern Telecom Japan Inc. (Japan)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

### *1990*

#### **Hewlett-Packard (HP)**

HP licensed its version of UNIX, HP-UX, to Northern Telecom. It is the first time HP has licensed HP-UX to an outside vendor. Northern Telecom has agreed to use HP-UX for its

telecommunications switching systems. The value of the pact has been estimated at several hundred million dollars over the next few years.

#### **Cybernetics Systems International (CSI)**

Under an agreement between Northern Telecom and CSI, Northern Telecom's customers with automatic call distribution (ACD) requirements will be offered a software application that helps them schedule employees, manage assignments, and record and forecast work loads. The marketing agreement enables Northern Telecom to offer a comprehensive solution for ACD environments.

#### **Centigram Communications Corporation**

Northern Telecom and Centigram Communications entered into a joint sales and marketing agreement that addresses the needs of businesses with mixed PBX networks, including both Northern Telecom and non-Northern Telecom PBXs.

#### **NYNEX Business Information Systems Company**

NYNEX and Northern Telecom launched a new joint venture, NYNEX Meridian Systems. The new company will employ 1,000 people and will provide sales and service for all Northern Telecom equipment. Northern Telecom holds the majority interest in the venture.

#### **British Telecom**

British Telecom was awarded exclusive rights as distributor for Northern Telecom's newly announced Meridian 1 global business communications system.

#### **Austria Telecommunications GmbH and BHG Telecommunications**

Northern Telecom entered a joint venture in Hungary with these two firms to manufacture a wide range of DMS-based digital public switching systems for the Hungarian telecommunications network, as well as digital switching systems for private and business customers in Hungary and export markets. The new firm will provide Northern Telecom with a manufacturing base and a marketing bridgehead into the emerging Eastern European telecommunications marketplace.

1989

#### **Digital Equipment Corporation (DEC)**

DEC's VAX computers will be integrated with the voice functions of Northern Telecom's SL-1 PBX.

#### **NYNEX**

The companies have a data networking joint venture.

#### **Digital Equipment Corporation (DEC)**

The companies have a data networking joint venture.

1988

#### **STC**

The companies undertook joint research and development programs.

#### **China Tong Guang**

The companies undertook a joint venture to manufacture and market Northern Telecom's digital PBXs and digital telephone sets.

#### **Ameritech**

The companies agreed to jointly develop ISDN applications for products and services to be offered by both companies.

#### **Motorola**

The companies agreed to jointly develop ISDN applications for products and services to be offered by both companies.

---

## **MERGERS AND ACQUISITIONS**

1990

#### **AWA Limited**

Northern Telecom purchased the remaining 40 percent of its joint venture with AWA Limited and formed NorTel Australia.

1989

#### **Microtel Limited**

Northern Telecom acquired Microtel's central office switching business.

---

## **KEY OFFICERS**

#### **Paul G. Stern**

Chairman of the board, president, and chief executive officer

#### **David G. Vice**

Vice chairman, Products and Technology

#### **J. Derek M. Davis**

Executive vice president, Corporate Strategy

#### **Donald A. Noble**

Executive vice president, Corporate Strategy

**John A. Roth**  
Executive vice president, Product Line  
Management

**Clive V. Allen**  
Senior vice president, Technology

**Stephen N. Bowen**  
Senior vice president, Public Affairs

**Martin G. Mand**  
Senior vice president, Finance, and chief financial  
officer

---

**PRINCIPAL INVESTORS**

Information is not available.

---

**FOUNDERS**

Information is not available.



**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December**  
**(Millions of US Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Total Current Assets</b>	\$2,404.5	\$2,840.3	\$3,189.2	\$2,641.9	\$4,091.4
Cash	81.9	362.3	126.2	79.2	169.5
Receivables	1,007.1	1,150.8	1,340.0	1,620.9	1,946.0
Marketable Securities	519.0	657.0	1,008.0	0	967.0
Inventory	780.2	651.4	690.9	820.3	856.2
Other Current Assets	16.7	19.1	24.0	121.5	152.9
<b>Net Property, Plants</b>	\$1,065.1	\$1,097.9	\$1,263.3	\$1,480.6	\$1,485.0
<b>Other Assets</b>	\$20.4	\$22.9	\$553.8	\$1,755.7	\$798.6
<b>Total Assets</b>	<b>\$3,490.0</b>	<b>\$3,961.1</b>	<b>\$5,006.3</b>	<b>\$5,878.2</b>	<b>\$6,375.0</b>
<b>Total Current Liabilities</b>	\$952.0	\$994.9	\$1,577.7	\$2,154.5	\$2,164.5
<b>Long-Term Debt</b>	\$107.6	\$101.0	\$430.1	\$577.5	\$816.0
<b>Other Liabilities</b>	\$448.8	\$616.0	\$438.0	\$474.4	\$452.7
<b>Total Liabilities</b>	<b>\$1,508.4</b>	<b>\$1,711.9</b>	<b>\$2,445.8</b>	<b>\$3,206.4</b>	<b>\$3,433.2</b>
<b>Total Shareholders' Equity</b>	\$1,981.6	\$2,249.2	\$2,560.5	\$2,671.8	\$2,941.8
Converted Preferred Stock	350.8	354.3	227.2	241.0	246.3
Common Stock	720.5	755.8	801.9	858.9	921.3
Other Equity	(120.5)	(127.1)	10.4	(32.4)	(102.0)
Retained Earnings	1,030.8	1,266.2	1,521.0	1,604.3	1,876.2
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$3,490.0</b>	<b>\$3,961.1</b>	<b>\$5,006.3</b>	<b>\$5,878.2</b>	<b>\$6,375.0</b>
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Revenue</b>	\$4,262.9	\$4,383.6	\$4,914.5	\$5,407.5	\$6,105.5
Canadian Revenue	1,209.9	1,312.8	1,626.6	2,053.0	2,485.5
Non-Canadian Revenue	3,053.0	3,070.8	3,287.9	3,354.5	3,620.0
<b>Cost of Sales</b>	\$2,078.9	\$2,760.5	\$2,915.5	\$3,218.4	\$3,718.6
<b>R&amp;D Expense</b>	\$430.0	\$474.5	\$587.5	\$710.6	\$729.8
<b>SG&amp;A Expense</b>	\$701.9	\$764.6	\$938.2	\$1,088.2	\$1,131.5
<b>Capital Expense</b>	NA	NA	NA	\$500.7	\$370.0
<b>Pretax Income</b>	\$432.0	\$441.1	\$488.7	\$234.9	\$515.1
<b>Pretax Margin (%)</b>	10.13	10.06	9.94	4.34	8.44
<b>Effective Tax Rate (%)</b>	NA	NA	NA	NA	NA
<b>Net Income</b>	\$273.8	\$286.6	\$328.8	\$183.2	\$376.5
<b>Shares Outstanding, Millions</b>	116.0	116.9	235.8*	237.6	240.9
<b>Per Share Data</b>					
Earnings	\$2.36	\$2.45	\$1.39	\$0.70	\$1.47
Dividend	\$0.36	\$0.40	\$0.23	\$0.26	\$0.28
Book Value	\$17.08	\$19.24	\$10.90	\$11.24	\$12.21

**Table 4 (Continued)**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December**  
**(Millions of US Dollars, except Per Share Data)**

<b>Key Financial Ratios</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<i>Liquidity</i>					
Current (Times)	1.52	2.85	2.02	1.23	1.89
Quick (Times)	1.03	2.20	1.58	0.85	1.49
Fixed Assets/Equity (%)	53.75	48.81	49.34	55.42	50.48
Current Liabilities/Equity (%)	79.62	44.23	61.62	80.64	73.58
Total Liabilities/Equity (%)	76.12	76.11	95.52	120.01	116.70
<i>Profitability (%)</i>					
Return on Assets	-	7.69	7.33	3.37	6.15
Return on Equity	-	13.55	13.67	7.00	13.41
Profit Margin	6.42	6.54	6.69	3.39	6.17
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	10.09	10.82	11.95	13.14	11.95
Capital Spending % of Revenue	0	0	0	9.26	6.06
Employees	46,549	46,202	48,778	50,136	47,572
Revenue (\$K)/Employee	\$91.58	\$94.88	\$100.75	\$107.86	\$128.34
Capital Spending % of Assets	0	0	0	8.52	5.80

\*Two-for-one division of common shares, year restated  
 NA = Not available

Source: Northern Telecom Limited  
 Annual Reports and Forms 10-K  
 Dataquest (1990)

## Northrop Corporation

1840 Century Park East  
Los Angeles, California 90067  
Telephone: (213) 553-6262  
Fax: (213) 201-3023  
Dun's Number: 00-825-5408

*Date Founded: 1985*

---

### CORPORATE STRATEGIC DIRECTION

Northrop Corporation is engaged principally in the design, development, manufacture, and sale of aircraft, airframe assemblies and subassemblies, and technical support services. Other business operations include the design, development, manufacture, and sale of communications and electronic systems and equipment. Northrop was reincorporated in 1985, succeeding Northrop Aircraft Inc., which was originally incorporated in 1939.

Northrop comprises five major operating divisions: Advanced Systems, Aircraft, Defense Systems, Electronic Systems, and Precision Products.

Currently, Northrop is involved with two major air force programs, the B-2 or Stealth bomber and the YF-23 Advanced Tactical Fighter (ATF). The B-2 is the Company's single largest program. The YF-23 program is a competitive effort to design and build two flying prototypes of an ATF.

Northrop is one of about a dozen major companies in the military/aerospace industry that compete for the relatively small number of large, long-term programs that characterize this industry. Northrop also competes for a relatively large number of smaller programs, notably in the electronics area.

Total revenue decreased 9.5 percent to \$5.2 billion\* in fiscal 1989 from \$5.8 billion in fiscal 1988. Net income decreased 177 percent to an \$81 million loss in fiscal 1989 from a \$104 million profit in fiscal 1988. Northrop employs 41,000 people worldwide.

R&D expenditure totaled \$180.3 million in fiscal 1989, representing 3 percent of revenue. Customer-sponsored R&D costs, notably by the US government, totaled \$2.5 billion in fiscal 1989. During the second half of the 1980s, nearly 60 percent of the Company's total business was in R&D rather than in

production contracts. Much of the work has been considered by the government to be classified. As a result, Northrop has been unable to report on either the technologies or the programs in any detail, if at all. This R&D effort contrasts sharply with that of the first half of the decade when less than a third of Northrop's business was in R&D, and even more sharply with the 1970s when R&D accounted for less than one-fifth of the Company's business. Northrop predicts that its production-to-R&D ratio will evolve to about 70 percent production and 30 percent R&D in the 1990s.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region and distribution channel. Table 4, a comprehensive financial statement, is at the end of this backgrounder.

---

### BUSINESS SEGMENT STRATEGIC DIRECTION

#### Electronics

##### *Electronic Countermeasures*

Northrop's Defense Systems Division remains a leading supplier of airborne radar-jamming electronic countermeasure (ECM) systems. Northrop's latest ECM technology is built into the AN/ALQ-135 Internal Countermeasures Set for the F-15 fighter and the AN/ALQ-162 reprogrammable radar jammer for a variety of tactical military aircraft. The Company delivered 50 AN/ALQ-135 systems and 250 AN/ALQ-162 systems in 1989 and plans to deliver 71 AN/ALQ-135 systems and 544 AN/ALQ-162 systems in 1990.

\*All dollar amounts are in US dollars.

### *Guidance, Navigation, Control, and Sensors*

Under air force contract, Northrop's Electronic Systems Division produces the inertial measurement unit (IMU), the key guidance element for the MX Peacekeeper missile. Northrop delivered 28 new IMUs in 1989, with current contracts calling for production of 21 additional IMUs with deliveries scheduled in 1990 and 1991.

Northrop's Precision Products Division is a large supplier of strapdown systems for midcourse tactical missile guidance. In 1989, the Division produced 1,100 strapdown units for the navy's Harpoon, Tomahawk, and Improved Phoenix, and the air force/navy AMRAAM air-to-air missile, as well as other military and space systems.

Northrop's work in passive sensor systems includes the Television Camera Set for the navy's fleet of F-14 Tomcat fighters, the Mast Mounted Site for army scout helicopters, the Tracking Adjunct System for the Hawk air defense missile system, and a number of R&D programs.

### *Aircraft*

#### *B-2 Bomber*

In the B-2 bomber's first eight flights, it accumulated more than 30 flight hours and met all its primary test objectives, including operations up to design cruise speed, aerial refuelings, air starts of all four engines, and fuel flow rates that substantiate its enormous range—greater than that of any US bomber.

The Pentagon's latest defense budget request calls for \$5.39 billion in new appropriations for B-2 research, development, test, and evaluation, and for the production of five B-2s and initial spares. If approved by Congress, this will bring the total number of B-2s authorized for production to 21. This request for fiscal year 1991 funding is consistent with the fiscal year 1990 budget compromise reached by the Congress and the administration, which authorized funds for long-lead procurement items for the new B-2s requested in the fiscal 1991 Pentagon budget.

#### *YF-23 Advanced Tactical Fighter (ATF)*

As prime contractor of the YF-23 ATF, Northrop is responsible for overall design and systems integration, and Northrop and McDonnell Douglas share

about equally in the work load and the cost-sharing aspects of the program. The team also includes more than 60 other major subcontractors in 31 states.

In October 1989, the Department of Defense extended the current demonstration and validation phase of the ATF program. The Northrop-McDonnell Douglas YF-23 is competing against an ATF being built by a team led by Lockheed. Selection of the winning aircraft is scheduled for April 1991, with the actual full-scale development contract to be awarded in the June-July time frame.

#### *F/A-18 Hornet Strike Fighter*

Production began on the thousandth Northrop F/A-18 Hornet subassembly in late 1989. The Hornet, which evolved in substantial part from an original Northrop design, was developed by Northrop and McDonnell Douglas as part of an innovative fighter production partnership now in its sixteenth year. The F/A-18 brought together advances in aerodynamics, maneuverability, and the use of composites in a unique multirole strike fighter.

#### *Missiles and Unmanned Vehicle Systems*

In recent years, Northrop has won several advanced technology development contracts in the field of missiles and unmanned vehicle systems. This field, much of it classified as a matter of government policy, has become a significant business area for Northrop.

Northrop is prime contractor for the air-launched Tacit Rainbow, a new breed of smart missiles. Once launched, they independently patrol a wide area and clear a safer path for aircraft by locating and destroying enemy air defense radar systems. Designated AGM-136A, the Tacit Rainbow missile system is currently under flight test and evaluation by the US Air Force and Navy for operational use. The air force plans to acquire 90 Tacit Rainbows in the military/aerospace industry that compete for the relatively small number of large, long-term programs that characterize this industry. Northrop also competes for a relatively large number of smaller programs, notably in electronics.

Northrop's traditional product line of unmanned vehicles is the BQM-74C turbojet aerial target for the US Navy and the Chukar II and III for the international market. Northrop has built more than 4,500 targets in the BQM Chukar series since production began in 1968. The BQM-74C flies more than 75 percent of

the navy's powered target training missions at operational sites around the world. During 1989, Northrop won two navy contracts for 129 BQM-74C targets and 29 new, improved-performance BQM-74E prototype targets, bringing the backlog to 466 units.

#### *747 Commercial Jetliner*

Since 1966, Northrop has been the subcontractor on Boeing's 747 commercial jetliner. In late 1989, the 800th 747 subassembly came off Northrop's assembly line.

Northrop builds subassemblies for four different versions of the 747: the new 747-400B passenger version, the 747-300 and new 747-400 Combi, which carry both passengers and cargo on the main deck, and the 747-200 cargo-only freighter.

#### **Further Information**

For more information about the Company's business segments, please contact Dataquest's MilAero Technology Service.

**Table 1**  
**Five-Year Corporate Highlights (Millions of US Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$5,056.6	\$5,608.4	\$6,052.5	\$5,797.1	\$5,248.4
Percent Change	-	10.91	7.92	(4.22)	(9.47)
Capital Expenditure	NA	NA	NA	NA	NA
Percent of Revenue	NA	NA	NA	NA	NA
R&D Expenditure	\$287.5	\$378.3	\$166.2	\$206.0	\$180.3
Percent of Revenue	5.69	6.75	2.75	3.55	3.44
Number of Employees	46,900	46,800	48,200	44,600	41,000
Revenue (\$K)/Employee	\$108	\$120	\$126	\$130	\$128
Net Income	\$214.4	\$41.2	\$94.2	\$104.2	(\$80.5)
Percent Change	-	(80.78)	128.64	10.62	(177.26)
1989 Calendar Year	Q1	Q2	Q3	Q4	
Quarterly Revenue	\$1,280.70	\$1,397.10	\$1,245.60	\$1,325.00	
Quarterly Profit	\$9.70	(\$78.10)	\$21.50	(\$33.60)	

NA = Not available

Source: Northrop Corporation  
Annual Reports and Forms 10-K  
Dataquest (1990)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1985	1986	1987	1988	1989
North America	84.62	89.62	93.32	92.15	89.09
International	15.38	10.38	6.68	7.85	10.90

Source: Northrop Corporation  
Annual Reports and Forms 10-K  
Dataquest (1990)

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1988	1989
Direct Sales	100.00	100.00
Indirect Sales	0	0

Source: Dataquest (1990)

---

## 1990 SALES OFFICE LOCATIONS

North America—6 (US regional sales offices)

---

## MANUFACTURING LOCATIONS

### *Electronic Systems Division*

Fullerton, Gardena, and Hawthorne, California; Elk Grove and Rolling Meadows, Illinois; New Town, North Dakota; Norwood, Massachusetts; and Warner Robins, Georgia

Electronic sensors and tracking systems, automatic test equipment, fabricated products; television camera sets for the navy F-14; helicopter mast-mounted sights; Tactical Adjunct Sensor Systems; automatic test equipment for the navy's Fleet Ballistic Missile program; electro-optical subsystems; infrared systems; AAS-40 Seahawk FLIR system; electronic research and development; inertial measurement unit (IMU); navigation systems for the TR-1 and E-3A; and the BRN-7A Omega radio navigational set

### *Advanced Systems Division*

Pico Rivera and Palmdale, California

Advanced systems research and development and production of the B-2 Bomber

### *Aircraft Division*

Compton, El Segundo, Gardena, Hawthorne, Los Angeles, Newbury Park, Palmdale, Pico Rivera, and Torrance, California

Aircraft research, development, and manufacturing; development of the YF-23 ATF prototype; production of the F/A-18 Hornet ship sets

Northrop Ventura—Newbury Park, California

Unmanned aircraft and aircraft subassemblies, Tacit Rainbow, Chukar III, NV-144R medium-range unmanned aircraft; development of Supersonic Low Altitude Target (SLAT) subsystems

Northrop Worldwide Aircraft Services Inc.—Lawton, Oklahoma

Aircraft maintenance and base support services

### *Defense Systems Division*

Rolling Meadows, Illinois, and Annapolis, Maryland  
Military electronic countermeasures systems, teamed with TRW/Westinghouse for the preliminary phase of the next-generation airborne integrated electronic warfare system (INEWS), ALQ-135, band jammers for the ALQ-161, ALQ-162 reprogrammable radar jammer, Interactive Defense Avionic System (IDAS) study, traveling wave tubes, and AAQ-8

### *Precision Products Division*

Norwood, Massachusetts

Gyroscopes, accelerometers, and inertial guidance and control systems; miniature bearings; rate-integrating gyroscopes; digital strapdown guidance system; development of Standard Altitude Heading Reference System (SAHRS) and the GPS Inertial for the Global Positioning System

---

## SUBSIDIARIES

### *North America*

Northrop Worldwide Aircraft Services Inc. (United States)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

Information is not available.

---

## MERGERS AND ACQUISITIONS

Information is not available.

---

## KEY OFFICERS

**Kent Kresa**

President and chief executive officer

**Fred M. Manzella**

Executive vice president, Operations

**Oliver C. Boileau**

Vice president and general manager, B-2 Division

**Arthur F. Dauer**  
Senior vice president, Human Resources

**David N. Ferguson**  
Senior vice president, Electronics

**Robert G. Schlenzig**  
Vice president and general manager, Electronic  
Systems Division

**Edward P. Smith**  
Vice president and B-2 program manager

**Stephen R. Smith**  
Vice president and general manager, Aircraft  
Division

**Wallace C. Solberg**  
Vice president and general manager, Defense  
Systems Division

**Joseph Yamron**  
Vice president and general manager, Precision  
Products Division

---

**PRINCIPAL INVESTORS**

Bankers Trust Company—16.41 percent

---

**FOUNDERS**

Information is not available.



**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December**  
**(Millions of US Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Total Current Assets</b>	\$930.7	\$1,160.5	\$1,566.7	\$1,614.6	\$1,747.4
Cash	7.1	4.8	5.0	3.6	4.7
Receivables	492.8	620.3	905.2	954.5	1,019.6
Inventory	405.9	505.9	623.6	619.3	682.8
Other Current Assets	24.9	29.5	32.9	37.2	40.3
<b>Net Property, Plants</b>	<b>\$1,351.3</b>	<b>\$1,487.1</b>	<b>\$1,497.3</b>	<b>\$1,496.1</b>	<b>\$1,439.5</b>
<b>Other Assets</b>	<b>\$50.7</b>	<b>\$51.2</b>	<b>\$59.6</b>	<b>\$28.5</b>	<b>\$9.3</b>
<b>Total Assets</b>	<b>\$2,332.7</b>	<b>\$2,698.8</b>	<b>\$3,123.6</b>	<b>\$3,139.2</b>	<b>\$3,196.2</b>
<b>Total Current Liabilities</b>	<b>\$1,331.4</b>	<b>\$1,693.8</b>	<b>\$2,053.4</b>	<b>\$1,494.4</b>	<b>\$1,655.3</b>
<b>Long-Term Debt</b>	<b>\$51.0</b>	<b>\$47.8</b>	<b>\$31.4</b>	<b>\$577.6</b>	<b>\$583.7</b>
<b>Other Liabilities</b>	<b>\$51.3</b>	<b>\$58.5</b>	<b>\$91.3</b>	<b>\$63.6</b>	<b>\$82.1</b>
<b>Total Liabilities</b>	<b>\$1,433.7</b>	<b>\$1,800.1</b>	<b>\$2,176.1</b>	<b>\$2,135.6</b>	<b>\$2,321.1</b>
<b>Total Shareholders' Equity</b>	<b>\$899.0</b>	<b>\$898.7</b>	<b>\$947.5</b>	<b>\$1,003.6</b>	<b>\$875.1</b>
Common Stock	161.6	176.8	190.8	194.7	196.3
Other Equity	(18.1)	(19.0)	(21.1)	(16.7)	(9.9)
Retained Earnings	755.5	740.9	777.8	825.6	688.7
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$2,332.7</b>	<b>\$2,698.8</b>	<b>\$3,123.6</b>	<b>\$3,139.2</b>	<b>\$3,196.2</b>
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Revenue</b>	<b>\$5,056.6</b>	<b>\$5,608.4</b>	<b>\$6,052.5</b>	<b>\$5,797.1</b>	<b>\$5,248.4</b>
US Revenue	4,279.0	5,026.0	5,648.0	5,342.0	4,676.0
Non-US Revenue	777.7	582.4	404.5	455.1	572.0
<b>Cost of Sales</b>	<b>\$4,205.4</b>	<b>\$4,985.9</b>	<b>\$5,357.7</b>	<b>\$5,257.6</b>	<b>\$4,691.9</b>
<b>R&amp;D Expense</b>	<b>\$287.5</b>	<b>\$378.3</b>	<b>\$166.2</b>	<b>\$206.0</b>	<b>\$180.3</b>
<b>SG&amp;A Expense</b>	<b>\$543.4</b>	<b>\$551.7</b>	<b>\$527.6</b>	<b>\$514.3</b>	<b>\$533.2</b>
<b>Pretax Income</b>	<b>\$348.1</b>	<b>\$49.5</b>	<b>\$137.4</b>	<b>(\$53.9)</b>	<b>(\$111.5)</b>
<b>Pretax Margin (%)</b>	<b>6.88</b>	<b>0.88</b>	<b>2.27</b>	<b>(0.93)</b>	<b>(2.12)</b>
<b>Effective Tax Rate (%)</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>
<b>Net Income</b>	<b>\$214.4</b>	<b>\$41.2</b>	<b>\$94.2</b>	<b>\$104.2</b>	<b>(\$80.5)</b>
<b>Shares Outstanding, Millions</b>	<b>46.3</b>	<b>46.5</b>	<b>46.8</b>	<b>47.0</b>	<b>47.0</b>
<b>Per Share Data</b>					
Earnings	\$4.63	\$0.89	\$2.01	\$2.22	(\$1.71)
Dividend	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20
Book Value	\$19.42	\$19.33	\$20.25	\$21.35	\$18.62

**Table 4 (Continued)**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December**  
**(Millions of US Dollars, except Per Share Data)**

<b>Key Financial Ratios</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<i>Liquidity</i>					
Current (Times)	0.70	0.69	0.76	1.08	1.06
Quick (Times)	0.39	0.39	0.46	0.67	0.64
Fixed Assets/Equity (%)	150.31	165.47	158.03	149.07	164.50
Current Liabilities/Equity (%)	148.10	188.47	216.72	148.90	189.16
Total Liabilities/Equity (%)	159.48	200.30	229.67	212.79	265.24
<i>Profitability (%)</i>					
Return on Assets	-	1.64	3.24	3.33	(2.54)
Return on Equity	-	4.58	10.20	10.68	(8.57)
Profit Margin	4.24	0.73	1.56	1.80	(1.53)
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	5.69	6.75	2.75	3.55	3.44
Capital Spending % of Revenue	0	0	0	0	0
Employees	46,900	46,800	48,200	44,600	41,000
Revenue (\$K)/Employee	\$108	\$120	\$126	\$130	\$128
Capital Spending % of Assets	0	0	0	0	0

NA = Not available

Source: Northrop Corporation  
 Annual Reports and Forms 10-K  
 Dataquest (1990)

## Novell, Inc.

122 East 1700 South  
Provo, Utah 84601  
Telephone: (801) 379-5900  
Fax: (801) 375-0735  
Dun's Number: 03-778-7298

*Date Founded: 1982*

### CORPORATE STRATEGIC DIRECTION

Novell, Inc., designs, manufactures, markets, and supports high-performance local area network (LAN) software systems and other related connectivity products for personal computers (PCs). The Company's LAN products are based on the proprietary NetWare Operating System that enables PCs to share resources such as hard disk drives, printers, and communications devices, as well as to communicate with other PCs on the same network and to access minicomputer and mainframe host computers.

The Company has refocused its strategic direction away from the hardware segment of the industry, which accounted for 90 percent of the product mix in 1984, to the software segment of the industry. The market for network-related hardware products has become a low-margin commodity market and, in response, the Company has initiated the Independent Manufacturer Support Program, which encourages third parties to manufacture and sell certain LAN hardware products offered by the Company, such as PC terminals and file servers.

The first participant of the Independent Manufacturer Support Program was Samsung Semiconductor and Telecommunications Co., Ltd., which has begun to distribute Novell's 286 PC terminal as well as Novell's line of file servers. All responsibility for distribution and support has shifted to Samsung. Other such agreements have been reached with Anthem Corporation, Dayna Corporation, and Storage Dimensions.

The Company's strategic direction for its LAN software products has been focused toward improving host connectivity and communication capabilities of related software products as well as placing more emphasis on distributed applications that run on Net-

Ware. Furthermore, the Company is looking to become the standard network operating system software platform for multiple workstation systems. Four operating systems to develop products around have been targeted: PC-DOS, OS/2, Macintosh, and UNIX.

The shift away from the hardware market has had a significant effect on the Company. Inventory levels dropped 50 percent, and turnover ratios increased to 18.7 times a year in fiscal 1989 from 7.7 times a year in fiscal 1988. The Company's LAN software market share was approximately 50 percent in 1989, with competition from Apple, Banyan, DEC, IBM, 3Com, and TOPS.

Net sales increased 22 percent to \$421.8 million\* in fiscal 1989 (year ending October 28, 1989) from \$347.0 million in fiscal 1988. Software sales represented 67 percent of sales in fiscal 1989, up from 54 percent in fiscal 1988. International sales accounted for 35 percent of consolidated net sales in fiscal 1989, up from 31 percent and 24 percent in fiscal 1988 and 1987, respectively. Gross margin percentage increased to 64 percent in fiscal 1989 from 58 percent in fiscal 1988, primarily as a result of the Company's continued strategy to phase out certain low-margin hardware products. Net income followed suit, increasing 35 percent to \$48.5 million in fiscal 1989 from \$35.8 million in fiscal 1988.

Research and development (R&D) expenditure increased 68 percent to \$41.3 million in fiscal 1989 from \$24.6 million in fiscal 1988. As a percentage of sales, R&D expenditure increased 43 percent to approximately 10 percent in fiscal 1989 from 7 percent in fiscal 1988.

Other significant events that have directly affected the

\*All dollar amounts are in US dollars.

Company's strategic direction include the merger with Excelan and the failed merger with Lotus. In June 1989, Novell and Excelan Inc., a prominent supplier of network computing solutions, pooled their corporate interests, with Excelan becoming a wholly owned subsidiary. Excelan produces standard-based software and hardware products to unify computer resources across a wide range of dissimilar systems, including Apple Macintosh, IBM PCs and compatibles, UNIX computers, and Digital Equipment Corporation's VAX line.

In 1990, merger talks between Novell and Lotus Development Corporation surfaced. Lotus, the spreadsheet software market leader, was going to become the parent company of Novell after a pooling of corporate interests. If completed, the merged company was expected to pose a viable threat to Microsoft in its role as the software industry leader. However, because of a disagreement over control of the board of directors, the deal fell through.

More detailed information is available in Tables 1 and 2, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region. Table 3, a comprehensive financial statement, is at the end of this profile. Information on revenue by distribution channel was not available.

---

## BUSINESS SEGMENT STRATEGIC DIRECTION

### Local Area Networks

Netware is a powerful and flexible LAN operating system that is compatible with all of the current versions of PC-DOS and MS-DOS operating systems as well as the released versions of the OS/2 operating system. The Company also produces multiuser application programs that run without modification on LANs supported by the NetWare operating system. The Company estimates that over 2,000 software developers have written over 4,000 multiuser software packages that are compatible with NetWare. NetWare runs on more than 85 different types of interface cards, including its own Ethernet cards.

Novell's products are sold primarily through distributors which, in turn, sell the products to VARs and retail dealers. The Company also sells its products through OEMs and system integrators. The sales are conducted through 34 domestic and 8 international sales offices.

## Significant Products and Recent Introductions

### NetWare 386

NetWare 386 is a 32-bit network operating system that builds on the foundation of the 286-based program to provide improved speed, network management, communication capabilities, enormous storage capacity, and the ability to handle heavy loads without performance degradation. It runs in the protected mode of the 80386 and 80486 microprocessors and supports up to 32 Mbytes of disk space, 250 users, and 100,000 open files per server. The 386 is equipped with a Dynamic Resource Configuration feature, which intelligently determines the optimum values for memory allocation and buffering routing. The product supports OS/2, the IBM PC, and PS/2 families, as well as all IBM compatibles that run DOS. The entire Macintosh line of computers will be supported as well, enabling NetWare 386 to integrate DOS, OS/2, and Macintosh workstations within a single network. NetWare 386 also supports connections with a DEC VAX environment through Novell's NetWare for VMS product. The NetWare 386 architecture is very modular, allowing operating system components and applications to be loaded, unloaded, and managed easily.

Version 3.1 is the latest edition of the 386 line, proceeding Version 3.0. Version 3.1 combines the 32-bit real-time operating system, fault-tolerance, and security of release 3.0 with an array of enhancements that improve overall network performance and system reliability, facilitate network administration, provide software applications developers with an open server environment, and offer users a wide variety of Novell-certified network components.

### SFT NetWare Version 2.15

SFT NetWare version 2.15, introduced in 1989, is the premier 286-based version on NetWare. It is a high-end operating system for medium to large work groups that run critical applications. In addition to all of the 286-based features, SFT NetWare offers improved reliability features including system fault tolerance (SFT) and a transaction tracking system. Both features are designed to protect against unforeseen events, such as a power failure.

### Advanced NetWare Version 2.15

Advanced NetWare version 2.15, introduced in 1989, is designed and marketed toward small- to medium-size companies or for work groups within large companies. It is the next level of the NetWare family of products and provides all of the key NetWare

features, including advancements in performance and functionality for 80286 servers.

### *ELS NetWare Level II Version 2.15*

ELS NetWare Level II version 2.15, introduced in 1989, is designed and marketed toward small networks of up to eight users. It provides most of the features of Advanced NetWare.

### *Portable NetWare*

Portable NetWare is a "transportable" C version of NetWare, designed to run on minicomputer and mainframe hosts and be totally hardware and protocol independent. Portable NetWare is licensed to Novell's strategic partners, which port the software to their system and sell it through their own distribution channels. When integrated with a vendor's specific platform, Portable NetWare allows PC and Macintosh users on a NetWare network to share data and print services and applications with other host users.

### *OS/2-Related Products*

To combine OS/2 with LANs, the Company has introduced the following four new products:

- NetWare Requester for OS/2 1.1—Gives users access to all NetWare services, including print, file, database, resource management, and fault tolerance and allows OS/2 workstations to communicate without the intervention of a file server
- NetWare for OS/2 Server—Combines the functions of an OS/2 application server and a NetWare file server
- Portable NetWare—Based on a NetWare 386, which is a 32-bit operating system, it will require a 32-bit version of OS/2, which has not yet been announced
- NetWare support for the OS/2 Extended Edition—Scheduled to be released late in 1990, will allow OS/2 EE workstations to access Novell file servers using the IBM LAN Requester, which comes with the OS/2 EE

### **Communications and Connectivity Products**

Novell produces a comprehensive set of communications products and services that are fully integrated with NetWare LANs. These products provide the capabilities needed to support network computing. They are divided into three groups based on functions—remote PC access to LANs, host connectivity, and wide area networking.

Each of these groups requires a different set of communications capabilities. NetWare products provide services to meet each of the three groups' needs. Remote access capabilities allow users with remote

PCs to dial in to LANs and access data and resources as if they were on the network locally. Host connectivity products provide a connection between a PC user and a minicomputer or mainframe. Wide area network solutions connect separate networks, creating host gateways, as if they were local.

Another group of products that fall under this category is the TCP/IP connectivity products. TCP/IP is an established connectivity standard used by many companies and government agencies for multivendor networks. The merger with Excelan, the leader in TCP/IP connectivity, has increased the Company's ability to integrate TCP connectivity within the NetWare product line, thereby increasing the value of all related products.

### **Database Application Products**

Database applications are recognized by the Company as a critical application. Novell has made a significant effort to develop a full set of database services for the NetWare environment. The database products include NetWare Btrieve, a record manager that is integrated within the NetWare operating system and NetWare SQL, a relational database engine that also is integrated with the NetWare operating system.

### **LAN Server Applications**

NetWare loadable modules (NLMs) are server applications that are tightly integrated with the underlying NetWare 386 operating system and provide global naming services and remote configuration capabilities. The NLMs can be loaded and removed as needed.

### **Network Administration and Analysis**

The LANalyzer Product Division is a recently created division devoted entirely to network administration and analysis. LANalyzer, the division's main product line, is specialized hardware and software that analyzes NetWare, TCP/IP, and DECnet protocols.

The most recent introduction was LANtern, a remote network monitor that employs the Simple Network Management Protocol (SNMP). The product functions as a network traffic monitor and can be set to alert network managers of alarming disturbances in the network.

### **Further Information**

For further information about the Company's business segments, please contact the Software Industry Service.

**Table 1**  
**Five-Year Corporate Highlights**  
**(Thousands of US Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$55,282	\$119,689	\$221,799	\$347,010	\$421,877
Percent Change	-	116.51	85.31	56.45	21.57
Capital Expenditure	NA	NA	\$57,491	\$20,903	\$49,361
Percent of Revenue	NA	NA	25.92	6.02	11.70
R&D Expenditure	NA	NA	\$16,269	\$24,630	\$41,257
Percent of Revenue	NA	NA	7.34	7.10	9.78
Number of Employees	NA	NA	NA	2,055	2,120
Revenue (\$K)/Employee	NA	NA	NA	\$168,861	\$198,999
Net Income	\$5,643	\$14,287	\$24,417	\$35,890	\$48,547
Percent Change	-	153.18	70.90	46.99	35.27
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	
Quarterly Revenue	\$98,623	\$110,444	\$101,766	\$110,444	
Quarterly Profit	\$10,975	\$11,520	\$11,777	\$14,275	

NA = Not available

Source: Novell, Inc.  
Annual Reports and Forms 10-K  
Dataquest (1990)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1985	1986	1987	1988	1989
North America	NA	NA	76.00	69.00	65.00
International	NA	NA	24.00	31.00	35.00

NA = Not available

Source: Novell, Inc.  
Annual Reports and Forms 10-K  
Dataquest (1990)

---

## 1989 SALES OFFICE LOCATIONS

North America—34  
 Europe—5  
 Asia/Pacific—3

---

## MANUFACTURING LOCATIONS

### *North America*

Provo, Utah  
 Disk duplication, education materials, and packaging  
 Berryessa, California  
 Disk duplication, education materials, and packaging

---

## SUBSIDIARIES

### *North America*

Excelan (United States)  
 Indisy Software, Inc. (United States)  
 Novell Canada, Ltd. (Canada)  
 Novell Europe, Inc. (United States)

### *Europe*

Novell France, SARL (France)  
 Novell GmbH (West Germany)  
 Novell U.K., Ltd. (United Kingdom)

### *Asia/Pacific*

Novell Australia, Pty., Ltd. (Australia)  
 Novell K.K. (Japan)

### *ROW*

Novell International, Ltd. (Barbados)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

### *1990*

#### **SOFTBANK Corporation**

SOFTBANK and five Japanese development partners—Canon, Fujitsu, NEC, Sony, and Toshiba—have formed an agreement with Novell

establishing Novell K.K., which will market and support Japanese versions of Novell's NetWare Products.

#### **Dayna Corporation**

Dayna has agreed to participate in the Independent Manufacturers Support Program and will replace Novell's NL1000 and NL/2 LocalTalk adapters with its own.

### *1989*

#### **Fox Software**

Novell and Fox Software have agreed to form a joint venture and technology transfer agreement to codevelop FoxServer, a database server.

#### **Gupta Technologies Inc.**

Gupta and Novell have agreed to enhance Gupta's SQLWindows application toolkit to incorporate access to Btrieve, Novell's record management for NetWare. The companies also have agreed to produce NetWare support for the OS/2 version of Gupta's SQLBase server.

#### **AT&T**

Novell and AT&T embarked on a cooperative development effort that has yielded a NetWare-compatible driver for AT&T's full line of StarLAN local area network adapters.

#### **BancTec, Federal Technology, Hewlett-Packard, and Xerox**

Novell has formed a service alliance with these four large service organizations to provide national support for NetWare users.

#### **Anthem Electronics**

Anthem has agreed to assume the manufacturing and sales of certain Novell Ethernet hardware products.

#### **Sun Microsystems**

Novell licensed Sun Microsystem's ONC/NFS technologies, which are required to begin support for NFS-based UNIX workstations under NetWare.

#### **Samsung Semiconductor and Telecommunications Co. Ltd.**

Samsung agreed to distribute Novell's 286 PC terminal and Novell's line of file servers.

#### **Storage Dimensions**

Novell has transferred its disk subsystem technology to Storage Dimensions, a company that specializes in computer storage devices.

---

**MERGERS AND ACQUISITIONS**

Information is not available.

**Mary Burnside**  
Senior vice president, Operations

**Ernst Gemassmer**  
Senior vice president, International Operations

---

**KEY OFFICERS**

**Raymond J. Noorda**  
President and chief executive officer

**James C. Bills**  
Executive vice president, Sales

**Darrell Miller**  
Executive vice president, Software Group

**Kanwal Rekhi**  
Executive vice president

---

**PRINCIPAL INVESTORS**

Raymond J. Noorda—12.6 percent  
Safeguard Scientifics, Inc.—5.7 percent

---

**FOUNDERS**

Information is not available.



**Table 3**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending October 28**  
**(Thousands of US Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Total Current Assets	NA	NA	NA	\$233,844	\$270,240
Cash	NA	NA	NA	46,867	94,514
Receivables	NA	NA	NA	90,982	97,941
Marketable Securities	NA	NA	NA	33,285	35,289
Inventory	NA	NA	NA	45,110	22,611
Other Current Assets	NA	NA	NA	17,600	19,885
Net Property, Plants	NA	NA	NA	\$41,992	\$70,562
Other Assets	NA	NA	NA	\$4,423	\$5,818
<b>Total Assets</b>	<b>\$26,613</b>	<b>\$67,084</b>	<b>\$171,894</b>	<b>\$280,259</b>	<b>\$346,620</b>
Total Current Liabilities	\$12,190	\$21,321	\$35,123	\$49,573	\$53,840
Long-Term Debt	\$2,545	\$2,962	\$3,578	\$56,087	\$56,972
Other Liabilities	0	0	0	0	0
<b>Total Liabilities</b>	<b>\$14,735</b>	<b>\$24,283</b>	<b>\$38,701</b>	<b>\$105,660</b>	<b>\$110,812</b>
Total Shareholders' Equity	\$11,878	\$42,801	\$133,193	\$174,599	\$235,808
Common Stock	NA	NA	NA	101,703	115,661
Other Equity	NA	NA	NA	(69)	0
Retained Earnings	NA	NA	NA	72,965	120,147
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$26,613</b>	<b>\$67,084</b>	<b>\$171,894</b>	<b>\$280,259</b>	<b>\$346,620</b>
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Revenue	\$55,282	\$119,689	\$221,799	\$347,010	\$421,877
US Revenue	NA	NA	168,567	239,437	274,220
Non-US Revenue	NA	NA	53,232	107,573	147,657
Cost of Sales	\$22,569	\$47,841	\$90,769	\$146,986	\$152,338
R&D Expense	NA	NA	\$16,269	\$24,630	\$41,257
SG&A Expense	NA	NA	\$73,641	\$121,408	\$156,741
Capital Expense	NA	NA	\$57,491	\$20,903	\$49,361
Pretax Income	\$8,929	\$25,365	\$41,925	\$55,953	\$77,058
Pretax Margin (%)	16.15	21.19	18.90	16.12	18.27
Effective Tax Rate (%)	48.00	44.00	42.00	36.00	37.00
Net Income	\$5,643	\$14,287	\$24,417	\$35,890	\$48,547
Shares Outstanding, Millions	NA	NA	31,239	32,918	33,359
<b>Per Share Data</b>					
Earnings	\$0.21	\$0.49	\$0.78	\$1.09	\$1.46
Dividend	0	0	0	0	0
Book Value	NA	NA	\$4.26	\$5.30	\$7.07

Table 3 (Continued)  
 Comprehensive Financial Statement  
 Fiscal Year Ending October 28  
 (Thousands of US Dollars, except Per Share Data)

Key Financial Ratios	1985	1986	1987	1988	1989
<i>Liquidity</i>					
Current (Times)	NA	NA	NA	4.72	5.02
Quick (Times)	NA	NA	NA	3.81	4.60
Fixed Assets/Equity (%)	NA	NA	NA	24.05	29.92
Current Liabilities/Equity (%)	102.63	49.81	26.37	28.39	22.83
Total Liabilities/Equity (%)	124.05	56.73	29.06	60.52	46.99
<i>Profitability (%)</i>					
Return on Assets	-	30.50	20.43	15.88	15.49
Return on Equity	-	52.26	27.75	23.32	23.66
Profit Margin	10.21	11.94	11.01	10.34	11.51
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	NA	NA	7.34	7.10	9.78
Capital Spending % of Revenue	NA	NA	25.92	6.02	11.70
Employees	NA	NA	NA	2,055	2,120
Revenue(\$K)/Employee	NA	NA	NA	\$168,861	\$198,999
Capital Spending % of Assets	NA	NA	33.45	7.46	14.24

NA = Not available

Source: Novell, Inc.  
 Annual Reports and Forms 10-K  
 Dataquest (1990)

## Novell, Inc.

122 East 1700 South  
Provo, Utah 84601  
Telephone: (801) 379-5900  
Fax: (801) 375-0735  
Dun's Number: 03-778-7298

*Date Founded: 1982*

---

### CORPORATE STRATEGIC DIRECTION

Novell, Inc., is one of the top competitors in two of the three market segments within the LAN industry. The Company dominates the connectivity software market with an estimated 60 percent market share and is also a competitor in the PC LAN market segment since it acquired Excelan in 1989.

Novell's total revenue for fiscal 1988 were \$281.2 million,\* an increase of 53.8 percent from the \$182.8 million revenue reported in fiscal 1987. Net income increased 50.0 percent to \$30.4 million in fiscal 1988 from \$20.3 million in fiscal 1987. Dataquest estimates that Novell employs approximately 1,400 people worldwide.

The U.S. sales contribution to the total revenue grew to \$190.1 million in fiscal 1988. U.S. sales accounted for 68 percent of the total, down from 75 percent in fiscal 1987. Eighty-five percent of Novell's sales offices are in U.S. locations, as are all four of the Company's manufacturing locations. International sales are processed through distributors who sell to dealers and end users.

In fiscal 1988, Novell increased its product development expense 1.0 percent. The Company spent 6.0 percent of net sales on research and development. Novell does not spend huge amounts of its revenue on R&D because it is more interested in acquiring technology than developing it itself. Capital spending expenditures totaled \$15.4 million in fiscal 1988, representing 5.5 percent of revenue.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment

Strategic Direction" and present corporate highlights and revenue by region and distribution channel. Table 4, a comprehensive financial statement, is at the end of this profile.

---

### BUSINESS SEGMENT STRATEGIC DIRECTION

#### LANs

Novell is the leading independent supplier of high-performance connectivity software products. In late 1988, more than 400,000 copies of NetWare were installed worldwide, connecting more than 3 million workstations. The Company is currently shipping on average more than 12,000 new copies of NetWare per month. NetWare has the power to connect all standard operating systems, including DOS OS/2, UNIX, Macintosh, and VMS.

Novell's mission is to accelerate the growth of the network computing industry. It is striving to keep its place as a leader in the network computing industry by providing secure, high-performance, standard-based connectivity products and has a historic commitment to open architectures and support of industry standards. NetWare open systems means that Novell is in the business of connecting all popular computing environments from desktop to mainframe.

#### Further Information

For further information about the Company's business segments, please contact the appropriate industry service.

\*All dollar amounts are in U.S. dollars.

**Table 1**  
**Five-Year Corporate Highlights (Thousands of U.S. Dollars)**

	1984	1985	1986	1987	1988
Five-Year Revenue	\$17,439	\$45,181	\$96,865	\$182,800	\$281,150
Percent Change	-	159.08	114.39	88.72	53.80
Capital Expenditure	\$1,029	\$1,807	\$4,553	\$21,388	\$15,463
Percent of Revenue	5.90	4.00	4.70	11.70	5.50
R&D Expenditure	\$2,259	\$3,196	\$4,797	\$9,970	\$16,004
Percent of Revenue	12.95	7.07	4.95	5.45	5.69
Number of Employees*	100	226	451	863	1,361
Revenue (\$K)/Employee*	\$174.39	\$199.92	\$214.78	\$211.82	\$206.58
Net Income	\$375	\$5,584	\$11,892	\$20,338	\$30,431
Percent Change	-	1,389.07	112.97	71.02	49.63
1989 Calendar Year	Q1	Q2	Q3	Q4	
Quarterly Revenue	N/A	N/A	N/A	N/A	
Quarterly Profit	N/A	N/A	N/A	N/A	

\*Dataquest estimate  
N/A = Not Available

Source: Novell, Inc.  
Annual Reports and  
Forms 10-K  
Dataquest  
January 1990

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1984	1985	1986	1987	1988
North America	86.00	87.00	80.00	75.00	68.00
International	14.00	13.00	20.00	25.00	32.00
Europe	14.00	8.00	14.00	18.00	25.00
ROW	0	5.00	6.00	7.00	7.00

Source: Novell, Inc.  
Annual Reports and  
Forms 10-K  
Dataquest  
January 1990

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1987	1988
Direct Sales	7.00	10.00
Indirect Sales	93.00	90.00
VARs	13.00	20.00
Distributors	46.00	40.00
Dealers	34.00	30.00

Source: Dataquest  
January 1990

---

## 1988 SALES OFFICE LOCATIONS

North America—29  
 Europe—4  
 Asia/Pacific—1

---

## MANUFACTURING LOCATIONS

### *North America*

#### *Austin, Texas*

Software tools that allow application developers to produce sophisticated multiuser applications for NetWare

#### *Mountain View, California*

Communication products or products that provide connectivity from personal computer environments to other computer environments

#### *Provo, Utah*

Further development of NetWare and related products

#### *San Jose, California*

Manufactures hardware products and system components

---

## SUBSIDIARIES

### *North America*

CXI, Inc. (United States)  
 Excelan (United States)  
 Indisy Software, Inc. (United States)  
 Kinetics (a subsidiary of Excelan before the acquisition)(United States)  
 Novell Canada, Ltd. (Canada)  
 Novell International, Ltd. (United States)  
 Santa Clara Systems, Inc. (United States)  
 SoftCraft, Inc. (United States)

### *Asia/Pacific*

Novell Australia, PTY, Ltd. (Australia)

### *Europe*

Novell France, S.A.R.L. (France)  
 Novell GmbH (West Germany)  
 Novell U.K., Ltd. (United Kingdom)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

1989

### **Rank Xerox**

Rank Xerox to sell complete Novell LAN product line in the Soviet Union

### **Hewlett-Packard**

Service alliance

### **Xerox**

Service alliance

### **Banctec**

Service alliance

### **Federal Technology**

Service alliance

### **Xerox Ventura Publisher**

Work group publishing software package

### **Northern Telecom, Inc.**

Support Portable NetWare-based networks

### **NCR Corporation**

Portable version of NetWare

### **Prime Computer Corporation**

Portable version of NetWare

### **Data General Corporation**

Portable version of NetWare

### **Altos Computer Systems Inc.**

Portable version of NetWare

### **WATCOM**

Novell licenses compiler technology

### **Fox Software Inc.**

Jointly develop a database management system

### **Core International**

Core to preload NetWare 386 operating system onto Core's Atomizer network servers

### **Sun Microsystems**

Integrate Tops and NFS protocol with NetWare software, develop electronic mail and global directory services that work across Portable NetWare and Sun networks

**NeXT Inc.**

Develop software that will enable the NeXT computer to operate as a central server on a Portable NetWare network

**Apple**

Macintosh software joint development and open Data-link interface

**Digital Equipment Corp.**

Digital to service and support Novell networking software and hardware; also to exchange technical information to service accounts that are both Novell and Digital sites

1988

**Netwise**

Novell licenses Netwise RPC technology

1987

**Interconnections, Inc.**

Software development and license agreement

**Dayna Communications, Inc.**

Product development

---

**MERGERS AND ACQUISITIONS**

1989

**Excelan**

Acquired this LAN manufacturer and competitor

---

**KEY OFFICERS**

**Raymond J. Norda**

President and chief executive officer

**James Tolonen**

Chief financial officer

**James C. Bills**

Executive vice president, Sales and Services

**Kanwal Rekhi**

Executive vice president, Novell; president, Excelan

**Mary Burnside**

Senior vice president, Operations

**David R. Bradford**

Senior corporate counsel and secretary

**Ronald S. Ellason**

Vice president, Administration, and treasurer

---

**PRINCIPAL INVESTORS**

Raymond J. Noorda—16.7%

Safeguard Scientifics, Inc.—9.7%

**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending October**  
**(Thousands of U.S. Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
<b>Total Current Assets</b>	\$7,349	\$16,647	\$47,703	\$103,823	\$192,126
Cash	599	2,225	7,964	28,461	34,168
Receivables	4,649	9,959	22,343	38,303	78,631
Inventory	1,766	4,119	16,402	33,483	35,777
Other Current Assets	335	344	994	3,576	43,550
Net Property, Plants	\$1,273	\$2,568	\$5,666	\$22,665	\$30,875
Other Assets	\$14	\$12	\$1,173	\$2,930	\$4,411
<b>Total Assets</b>	<b>\$8,636</b>	<b>\$19,227</b>	<b>\$54,542</b>	<b>\$129,418</b>	<b>\$227,412</b>
<b>Total Current Liabilities</b>	\$5,239	\$10,383	\$17,519	\$27,544	\$39,414
Long-Term Debt	\$1,311	\$1,121	\$879	\$625	\$52,398
Other Liabilities	0	0	0	0	0
<b>Total Liabilities</b>	<b>\$6,550</b>	<b>\$11,504</b>	<b>\$18,398</b>	<b>\$28,169</b>	<b>\$91,812</b>
<b>Total Shareholders' Equity</b>	\$2,086	\$7,723	\$36,144	\$101,249	\$135,600
Converted Preferred Stock	1,890	1,890	0	0	0
Common Stock	2,069	2,115	2,407	2,674	2,729
Other Equity	0	447	21,013	64,792	68,687
Retained Earnings	(1,517)	4,056	13,411	33,822	64,253
Stock Purchase Loans	(356)	(784)	(687)	0	0
Treasury Stock	0	(1)	0	(39)	(69)
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$8,636</b>	<b>\$19,227</b>	<b>\$54,542</b>	<b>\$129,418</b>	<b>\$227,412</b>
<b>Income Statement</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
<b>Revenue</b>	\$17,439	\$45,181	\$96,865	\$182,800	\$281,150
U.S. Revenue	14,989	39,146	77,097	136,832	190,151
Non-U.S. Revenue	2,450	6,035	19,768	45,968	90,999
Cost of Sales	\$8,266	\$18,865	\$40,543	\$78,696	\$121,677
R&D Expense	\$2,259	\$3,196	\$4,797	\$9,970	\$16,004
SG&A Expense	\$6,252	\$13,950	\$29,215	\$58,415	\$96,889
Capital Expense	\$1,029	\$1,807	\$4,553	\$21,388	\$15,463
Pretax Income	\$375	\$8,870	\$22,622	\$35,680	\$47,548
Pretax Margin (%)	2.15	19.63	23.35	19.52	16.91
Effective Tax Rate (%)	N/A	45.00	47.40	43.00	36.00
Net Income	\$375	\$5,584	\$11,892	\$20,338	\$30,431
Shares Outstanding, Millions	20.7	23.1	24.9	26.2	27.8
<b>Per Share Data</b>					
Earnings	\$0.02	\$0.24	\$0.48	\$0.78	\$1.10
Dividends	0	0	0	0	0
Book Value	\$0.10	\$0.37	\$1.50	\$3.79	\$4.97

**Table 4 (Continued)**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending October**  
**(Thousands of U.S. Dollars, except Per Share Data)**

<b>Key Financial Ratios</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
<i>Liquidity</i>					
Current (Times)	1.40	1.60	2.72	3.77	4.87
Quick (Times)	1.07	1.21	1.79	2.55	3.97
Fixed Assets/Equity (%)	61.03	33.25	15.68	22.39	22.77
Current Liabilities/Equity (%)	251.15	134.44	48.47	27.20	29.07
Total Liabilities/Equity (%)	314.00	148.96	50.90	27.82	67.71
<i>Profitability (%)</i>					
Return on Assets	-	40.08	32.24	22.11	17.06
Return on Equity	-	113.85	54.22	29.61	25.70
Profit Margin	2.15	12.36	12.28	11.13	10.82
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	12.95	7.07	4.95	5.45	5.69
Capital Spending % of Revenue	5.90	4.00	4.70	11.70	5.50
Employees*	100	226	451	863	1,361
Revenue(\$K)/Employee*	\$174.39	\$199.92	\$214.78	\$211.82	\$206.58
Capital Spending % of Assets	11.92	9.40	8.35	16.53	6.80

\*Dataquest Estimate  
N/A = Not Available

Source: Novell, Inc.  
Annual Reports and  
Forms 10-K  
Dataquest  
January 1990



## N.V. Philips Gloeilampenfabrieken

Groenewoudseweg 1  
5621 BA Eindhoven  
The Netherlands  
Telephone: 31 (40) 79 11 11  
Dun's Number: 40-209-0344

*Date Founded: 1891*

---

### CORPORATE STRATEGIC DIRECTION

N.V. Philips Gloeilampenfabrieken (Philips), incorporated in 1912, is a widely diversified multinational group of companies, engaged primarily in the manufacturing and distribution of electronic and electrical products, systems, and equipment. The legal entity, N.V. Gemeenschappelijk Bezit van Aandeelen Philips Gloeilampenfabrieken (Philips N.V.), operates solely as a holding company for share capital of N.V. Philips Gloeilampenfabrieken (Philips), of which it holds 99.99 percent. Philips Industries functions as the primary holding company for the Company's numerous national organizations, which are wholly owned subsidiaries operating in over 60 countries. These subsidiaries' businesses vary from simple marketing organizations to fully integrated manufacturing and marketing concerns. Philips' product activities are grouped into five product sectors: Lighting, Consumer Products, Professional Products and Systems, Components, and Miscellaneous.

Philips views the present era as one that is characterized by economies of scale, technological innovation, and globalization of markets. In other words, the Company sees the markets within which it operates as expanding and the market players as becoming more competitive through efficiencies gained by large-scale production. Consequently, huge investment is the tool by which Philips plans to acquire and retain leading positions in its various areas of business.

The Company has implemented its strategy externally through joint ventures, takeovers, and divestments. Internally, Philips has decentralized, which allows autonomy for the individual product divisions so that they may better adjust to the major global trends of increasing competition, rising R&D costs, and shortening product life cycles. In an effort to streamline

and reduce costs, Philips has closed plants and reduced its work force by approximately 39,000 since 1987. This restructuring cost the Company F 340 million (US\$159.6 million) in 1989, F 476 million (US\$240.4 million) in 1988, and F 515 million (US\$253.7 million) in 1987.

In fiscal 1989, net sales increased 2 percent to F 57.22 billion (US\$26.87 billion) from F 56.08 billion (US\$28.32 billion) in fiscal 1988. (Percentage changes refer only to F amounts; US\$ percentage changes will differ because of fluctuations in Dataquest exchange rates.) However, the 1988 figure includes the sales of the major domestic appliances division, which are not included in the 1989 figure. The division has been transferred to a joint venture with Whirlpool and the results are not consolidated. A number of other, smaller changes on consolidations took place as a result of the disposal and acquisition of businesses. Disregarding the effects of these changes and of exchange rate movements, net sales on a comparable basis increased 7 percent in fiscal 1989.

Net income increased 25 percent to F 1.37 billion (US\$641.1 million) in fiscal 1989 from F 1.06 billion (US\$533.3 million) in fiscal 1988. Net income in North America and Latin America decreased, while net income in the rest of the world increased.

Philips remains the world leader in lighting and color picture tubes and is second in size only to Matsushita, of which the Company owns 35 percent, in consumer electronics revenue. As Europe's largest semiconductor manufacturer, Philips ranks tenth in worldwide production of integrated circuits.

The Company's R&D expense decreased 1 percent to F 4.56 billion (US\$2.14 billion) in fiscal 1989 from

F 4.62 billion (US\$2.33 billion) in fiscal 1988, but remained at approximately 8 percent of net sales. Approximately 28,000 employees are engaged in product development and approximately 12,000 in development of production methods and equipment. The responsibility for the development of products and production methods lies within each individual product division. The divisions have development laboratories at their disposal in 25 countries throughout the world. The development laboratories and mechanization departments are supported by The Centre for Manufacturing Technology, which is based in Eindhoven and has about 1,000 employees.

In early 1990, Cornelius van der Klugt, president and chairman, announced his retirement. Mr. van der Klugt developed the aforementioned restructuring strategy. Jan D. Timmer, the head of consumer operations, has been designated as his successor.

Since Mr. Timmer's appointment, an additional 210 jobs have been eliminated from the Apeldoorn, Netherlands, plant, which manufactures minicomputers and related products. The Company is drastically reducing efforts to develop systems using its own hardware technology. Plans to become the industry's technology leader have been abandoned; in its place are plans to develop computer systems that are based on industry standards. Future cuts are expected to affect the entire computer division, even though no action has been taken in the personal computer division.

More detailed information is available in Tables 1 and 2, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region. Information on revenue by distribution channel is not available. Tables 3 and 4, comprehensive financial statements, are at the end of this background.

---

## BUSINESS SEGMENT STRATEGIC DIRECTION

### Professional Products and Systems Division

The Professional Products and Systems Division comprises Information Systems, Communications Systems, Medical Systems, Industrial and

Electro-Acoustic Systems, and Defense and Control Systems, all serving the professional market. Sales of the Professional Products and Systems Division accounted for 27.5 percent of total net sales in 1989. Sales increased 4 percent to F 15.75 billion (US\$7.39 billion).

### Communications Systems

The Company's Communications Systems products include private branch exchanges and key telephone systems, cable transmission and network access equipment, switching and network management systems, radio trunk transmissions and subscriber access systems, copper and fiber-optic cables, and optical fiber. The Company also produces car and cordless telephones, mobile radio truncated networks, and wide area paging systems.

The center of Philips' telecommunications product offering and the heart of its networking concept is the Sopho-S line of PBXs. The Sopho-S line comprises five PBX products with capacities ranging from 20 to 20,000 lines. The line supports both voice and data terminals and interfaces with a number of networks that users may contact.

### Information Systems

The Company's Information Systems products include minicomputers, personal computers, document handling systems, optical media, peripherals, and dictation systems. The market for minicomputers has been slowly eroding for the past few years as the capabilities of the personal computer and workstation expand. Consequently, sales of the Company's minicomputers were stagnant in 1989, while sales of personal computers rose sharply.

Philips launched a number of new personal computer models in 1989 with larger capacities and higher operating speeds. The Company's personal computers are being used primarily in networks and for the distribution of information. As a result, the Company's computers with built-in CD-ROM systems are selling well.

The Company's document handling system, Megadoc, is based on optical recording. Megadoc sales increased with the launch of the P9000 Megadoc combination system.

Smart cards, which are optical media products, are memory components that are the size of a credit card and contain an integrated circuit. Philips currently markets these cards for personal, business, and industrial applications. Sales have been slow for these cards because of cost/benefit factors.

### *Medical Systems*

The Company's Medical Systems activities focus primarily on the production of diagnostic imaging systems, such as equipment based on X-radiation (including computer tomography), ultrasound, and magnetic resonance. Radiation therapy systems and consultancy services on the operational structure within hospitals and clinics is also offered by the Company. The market for medical systems is subject to rapid change due to developments in technology and diagnostic effectiveness.

### *Industrial and Electro-Acoustic Systems*

The Industrial and Electro-Acoustic Systems Division concentrates on the production and marketing of products and systems for applications in research, industry, business, and government. A large range of electronic test and measuring equipment is produced, including oscilloscopes, logic analyzers, and automatic test equipment.

### *Defense and Control Systems*

The Defense and Control Systems Division develops and produces electronic systems, subsystems, equipment, and strategic components for shipborne, land-based, and airborne military applications and civil derivatives. Products manufactured by this division include radars, optoelectronics, sonars, and moon-shine electronic warfare equipment, including Electronic Systems Measures (ESM), Electronic Countermeasures (ECM), Electronic Counter Countermeasures (ECCM), and chaff/flare launchers.

At the beginning of 1990, the Company disposed of a major portion of its Western European defense business to the French company Thomson-CSf, selling an 80 percent interest in Philips' Dutch subsidiary Hollandse Signaalapparaten B.V., a 49 percent interest in Philips' Belgian company MBLE, and 99 percent of the defense business of Philips' French company TRT. In the first quarter of 1990, the Company sold its German defense activities to a group that included members of management.

## Components Division

The Philips Components Division is a supplier of components and subassemblies for both its own products and outside parties. Philips produces a broad range of components such as semiconductors, passive components, picture tubes, and magnetic and ceramic materials. Component sales accounted for 14.8 percent of total net sales in 1989. Sales of this division grew 9 percent to F 8.74 billion (US\$4.10 billion) in fiscal 1989 from F 8.02 billion (US\$4.05 billion) in fiscal 1988.

### *Semiconductors*

Philips considers its semiconductors to be the heart of its electronics product business. The Company's general IC goal is to strengthen its position as an applications-oriented supplier to the world markets. Despite this goal, Dataquest's 1989 worldwide semiconductor market share estimates have Philips ranked as the tenth largest vendor (by revenue). Net sales dropped 1 percent to F 3.66 billion (US\$1.85 billion) while the market grew 12 percent. In the European market, Philips held onto its number one rank with 10 percent of the market, despite a sales decrease of 5 percent. The Company's main competition in the European semiconductor market comes from Siemens.

Philips attributes this overall decline to being inappropriately positioned in the semiconductor market. However, in digital ICs, the Company has one of the broadest MOS and bipolar product lines in the industry, with families that span both the professional and consumer markets.

In integrated circuits, the Company lost its leading position in the European market in 1989, slipping to the number 2 spot. Philips' IC revenue decreased 5.1 percent.

### *Passive Components*

The Company is the world's biggest supplier of passive components with product lines consisting of a variety of capacitors and resistors in both leaded and SMD versions. A wide range of crystals and oscillators is available for professional, industrial, and consumer equipment.

## Consumer Products Division

The Consumer Products Division includes the consumer electronics product division, PolyGram, and the operations of the former domestic appliances product sector. As previously stated, the data for domestic appliances applies only to the years prior to 1989 because this division was transferred to the Whirlpool joint venture. Major categories in consumer electronics are audio, video, and home office equipment. Sales in 1989 of the Consumer Products Division accounted for 41.1 percent of the total net sales. Sales fell 6 percent to F 23.58 billion (US\$11.07 billion) in fiscal 1989 from F 22.25 billion (US\$11.24 billion) in fiscal 1988.

### *Audio Products*

Audio products include portable radios, radio receivers, car radios, receivers, amplifiers, tuners, cassette recorders, turntables, and compact disc systems. Compact disc players and changers are still the fastest growing products in the consumer electronic market.

### *Video Products*

Video products include television sets (including receivers equipped for Teletext and stereo sound), video recorders, and camera recorders (cameras with a built-in video recorder), very high-resolution monitors, and other displays. Products in this sector are sold primarily to the original equipment manufacturer (OEM) market. Philips brand names in the United States include Philips, Magnavox, Sylvania, and Philco.

### *Home Office Equipment*

Home office equipment products include personal computers, videotex terminals, and other peripheral equipment, which are marketed specifically toward the home market. For personal computers for business applications, see "Communications Systems" above.

### *PolyGram*

Another division of the Consumer Products Division is PolyGram, which engages primarily in the acquisi-

tion, production, marketing, and distribution of recorded music.

### *Domestic Appliances and Personal Care*

The domestic appliances and personal care division includes home comfort and kitchen appliances, shavers, and other personal care products. Philips' main product of this division is Philishave, based on rotary shaving technology. Along with the other personal care products and domestic appliances, Philishave is marketed under the Norelco brand in the United States.

### *Lighting Division*

The Company has been in the lighting business since its founding in 1891. The Lighting Division's products serve a broad range of applications, including general lighting service lamps, gas-discharge and special lamps, fixtures, special products, and batteries. Net sales of the Lighting Division accounted for 12.3 percent of total net sales, or F 7.52 billion (US\$3.80 billion). Lighting sales grew 9 percent in fiscal 1989.

### *Miscellaneous*

Miscellaneous business activities, which are outside the Company's basic range of products, include ancillary activities obtained as part of other acquisitions. Companies included in this product sector are Anchor Brush Company, Inc., a producer of toothbrushes and packaging for the cosmetics and pharmaceutical industry, and Genie Manufacturing, Inc., a supplier of screw-drive garage door openers. Recently an agreement was signed to sell the assets of Anchor Brush. Miscellaneous sales accounted for 3.4 percent of total net sales in 1989. Sales in this division grew 50 percent to F 1.96 billion (US\$920.2 million).

### *Further Information*

For further information about the Company's business segments, please contact the appropriate Dataquest industry service.

**Table 1**  
**Five-Year Corporate Highlights (Millions of US Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$18,085.8	\$22,464.1	\$25,968.0	\$28,322.7	\$26,865.7
Percent Change	-	24.21	15.60	9.07	(5.14)
Capital Expenditure	\$1,367.8	\$1,904.9	\$2,342.9	\$2,093.4	\$1,940.4
Percent of Revenue	7.56	8.48	9.02	7.39	7.22
R&D Expenditure	\$1,208.1	\$1,706.9	\$2,149.8	\$2,334.8	\$2,139.4
Percent of Revenue	6.68	7.60	8.28	8.24	7.96
Number of Employees	346,000	343,800	336,700	310,300	304,800
Revenue (\$K)/Employee	\$52	\$65	\$77	\$91	\$88
Net Income	\$276.8	\$414.3	\$403.0	\$533.3	\$645.1
Percent Change	-	49.67	(2.73)	32.36	20.95
Exchange Rate (US\$1=F)	F 3.32	F 2.45	F 2.03	F 1.98	F 2.13
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	
Quarterly Revenue	\$5,935.68	\$6,362.44	\$6,370.89	\$8,213.62	
Quarterly Profit	NA	NA	NA	NA	

NA = Not available

Source: N.V. Philips Gloeilampenfabrieken  
Annual Reports  
Dataquest (1990)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1985	1986	1987	1988	1989
European	53.00	59.20	61.40	61.30	57.30
Non-European	47.00	40.80	38.60	38.70	42.70
North America	29.00	24.30	22.40	22.20	24.10
Asia/Pacific	10.00	7.60	8.60	8.70	10.00
ROW	8.00	8.90	7.60	7.80	8.60

Source: N.V. Philips Gloeilampenfabrieken  
Annual Reports

---

## 1989 SALES OFFICE LOCATIONS

Information is not available.

---

## MANUFACTURING LOCATIONS

### *North America*

Albuquerque, New Mexico

Wafer fabrication of MOS ICs

Orem, Utah

Wafer fabrication of bipolar ICs, assembly and testing of logic and bipolar memory products

Riviera Beach, Florida

Passive components, discrete semiconductors

Sunnyvale, California

Wafer fabrication, MOS and bipolar ICs

United States and Canada

All principal products

### *Europe*

Barcelona, Spain

Diodes, transistors

Caen, France

Bipolar digital, bipolar analog, and consumer ICs; discrete devices, power transistors, optoelectronic products

Hamburg, Germany

NMOS microprocessors, controllers, memories, bipolar analog consumer ICs, small-signal transistors, varicap diodes

Netherlands

All principal products

Nijmegen, Netherlands

CMOS devices

Sittard, Netherlands

Not available

Southampton, United Kingdom

NMOS ROMs, dedicated consumer logic

Stadskanaal, Netherlands

Diodes

Stockport, United Kingdom

Power transistors, power diodes

Zurich, Switzerland

ICs

### *Asia/Pacific*

Australia and New Zealand

Lighting, professional products, systems, components

Bangkok, Thailand

Assembly and testing

Hong Kong

Transistors, diodes

Kao-Hsiung, Taiwan

ICs

Manila, Philippines

Transistors, diodes, optoelectronic products

Seoul, South Korea

Assembly and testing

Tokyo, Japan

Testing

### *ROW*

Africa

Lighting, consumer electronics, professional products and systems

Latin America

All principal products

Recife, Brazil

ICs

Sao Paulo, Brazil

Discrete devices

---

## SUBSIDIARIES

### *North America*

North American Philips Corporation (United States)

Philips Canada (Canada)

PolyGram Records Inc. (United States)

### *Europe*

AT&T Network Systems International B.V. (Netherlands)

Compagnie Francaise Philips (France)

Europe Mij Voor Fabricage en Verkoop Van Gloeilampenonderdelen (E.M.G.O.) (Belgium)

Grundig Aktiengesellschaft (Germany)

Hollandse Singaalapparaten B.V. (Netherlands)

Ibertica de Alumbrado S.A. (Spain)

Nederlands Philips Bedrijven B.V. (Netherlands)

Norsk Atkieselskap Philips (Norway)

Osterreichische Philips Industrie Gesellschaft mbH (Austria)

- Oy Philips AB (Finland)  
 Philips AG (Switzerland)  
 Philips Beteiligungs AG (Switzerland)  
 Philips Consumer Electronics (Netherlands)  
 Philips Electronics Ireland Limited (Ireland)  
 Philips Export B.V. (Netherlands)  
 Philips GmbH (Germany)  
 Philips Iberica S.A.E. (Spain)  
 Philips Industri og Handels A/S (Denmark)  
 Philips International B.V. (Netherlands)  
 Philips International Finance S.A. (Luxembourg)  
 Philips Lighting B.V. (Netherlands)  
 Philips Lighting Holding B.V. (Netherlands)  
 Philips Luxembourg Consumer Products (Luxembourg)  
 Philips Luxembourg Professional Systems (Luxembourg)  
 Philips Matsushita Battery Corporation (Belgium)  
 Philips Medical Systems International B.V. (Netherlands)  
 Philips Medical Systems U.K. Limited (United Kingdom)  
 Philips Norden Aktiebolag (Sweden)  
 Philips Portuguesa S.A. (Portugal)  
 Philips S.A. (Belgium)  
 Philips S.A. Hellenique Commerciale de Produits Electrotechniques (Greece)  
 Philips Sistemi Medicali S.p.A. (Italy)  
 Philips Societa per Azioni (Italy)  
 Philips Systemes Medicaux (France)  
 Philips U.K. Limited (United Kingdom)  
 Philips and Du Pont Optical Company (Netherlands)  
 PolyGram GmbH (Germany)  
 PolyGram Leisure (United Kingdom)  
 PolyGram N. V. (Netherlands)  
 PolyGram S.A. (France)  
 Turk Philips Aydinlatma Sanayi ve Ticaret Anonim Sirketi (Turkey)  
 Turk Philips Sanayi Anonim Sirketi "Philisan" (Turkey)  
 Turk Philips Ticaret Anonim Sirketi (Turkey)  
 Whirlpool International B.V. (Netherlands)
- Asia/Pacific*
- Audio Electronics Sendirian Berhad (Malaysia)  
 Bangladesh Electrical Industries Limited (Bangladesh)  
 Bangladesh Lamps Limited (Bangladesh)  
 Beijing Philips Audio/Video Corp. (China)  
 Car Audio Electronics (China) Company Limited (China)  
 Compact Disc Industries Co. (Taiwan)
- Electrical Lamp Manufacturers Thailand Limited (Thailand)  
 Electronic Systems (Malaysia) Sendirian Berhad (Malaysia)  
 Elinthai Limited (Thailand)  
 Hanwha Domestic Appliances Co. (South Korea)  
 Hua Fei Colour Display Systems Company (China)  
 Japan New Media Systems, Inc. (Japan)  
 Malaysian Lamps Sendirian Berhad (Malaysia)  
 Marantz Japan, Inc. (Japan)  
 Matsushita Electronics Corp. (Japan)  
 Peico Electronics & Electricals Limited (India)  
 Philips Bangladesh Limited (Bangladesh)  
 Philips China Hong Kong Group Company Limited (Hong Kong)  
 Philips Components (Philippines), Inc. (Philippines)  
 Philips Electrical Company of Pakistan Limited (Pakistan)  
 Philips Electrical Company of Thailand Limited (Thailand)  
 Philips Electrical Industries of Pakistan Limited (Pakistan)  
 Philips Electrical Lamps, Inc. (Philippines)  
 Philips Electronic Building Elements Industries (Taiwan)  
 Philips Electronics (South Korea)  
 Philips Electronics Industries (Taiwan)  
 Philips Electronics South-East Asia Holding B.V. (China)  
 Philips Hong Kong Limited (Hong Kong)  
 Philips Industrial Development Inc. (Philippines)  
 Philips Industries (South Korea)  
 Philips Industries Holdings Limited (Australia)  
 Philips Japan, Ltd. (Japan)  
 Philips Lighting Taiwan (Taiwan)  
 Philips Malaysia Sendirian Berhad (Malaysia)  
 Philips New Zealand Limited (New Zealand)  
 Philips Semiconductor Corporation of Shanghai (China)  
 Philips Singapore Private Limited (Singapore)  
 Philips Taiwan (Taiwan)  
 PNN Corp. (Japan)  
 P.T. Philips Development Corp. (Indonesia)  
 P.T. Philips-Ralin Electronics (Indonesia)  
 Shenzhen Shen Fei Laser Optical Systems Company Limited (China)  
 Shenzhen Shen Fei Plastics and Metalware Company Limited (China)  
 Signetics Korea Co. Ltd. (South Korea)  
 Signetics Thailand Co. (Thailand)  
 Taiwan Lighting Industries Co. (Taiwan)  
 Thai Lamps Company Limited (Thailand)  
 Yangtze Optical Fibre and Cable Company (China)

**ROW**

Associated Electronic Products (Nigeria) Limited (Nigeria)  
El Nasr Company for Electrical and Electronic Apparatus (Egypt)  
Inbraphil-Industrias Brasileiras Philips Ltda. (Brazil)  
Industria de Productos Electricos Centro-Americana, Sociedad Anonima de Capital Variable (El Salvador)  
Industria Nacional de Refrigeracion y Calefaccion S.A. (Colombia)  
Industrias Bolivianas Philips S.A. (Bolivia)  
Industrias Philips de Colombia S.A. (Colombia)  
Industrias Philips del Uruguay S.A. (Uruguay)  
Industrias Venezolanas Philips S.A. (Venezuela)  
Manufacture Nationale pour la Refrigeration et l'Electronique "MANAR" (Morocco)  
PEC Investments Limited (South Africa)  
Philips Antillana N. V. (Netherlands Antilles)  
Philips Argentina S.A. de Lamparas Electricas y Radio (Argentina)  
Philips Chilena S.A. (Chile)  
Philips del Paraguay S.A. (Paraguay)  
Philips do Brasil Ltda. (Brazil)  
Philips Ecuador C.A. (Ecuador)  
Philips Electric Lamps (E.A.) Limited (Kenya)  
Philips Electrical (Private) Limited (Zimbabwe)  
Philips Electrical Zambia Ltd. (Zambia)  
Philips Electronics Holdings Limited (South Africa)  
Philips Electronics (E.A.) Limited (Tanzania)  
Philips Electronics (Zaire)  
Philips Ethiopia (Ethiopia)  
Philips Iran Ltd. (Iran)  
Philips (Kenya) Limited (Kenya)  
Philips Maroc (Morocco)  
Philips Mexicana, S.A. de C.V. (Mexico)  
Philips Midden Oosten B.V. (Egypt)  
Philips Midden Oosten B.V. (Iraq)  
Philips Midden Oosten B.V. (United Arab Emirates)  
Philips Middle East (Lebanon)  
Philips Moyen Orient (Syria)  
Philips (Tanzania) Limited (Tanzania)  
Societe Tunisienne d'Industrie Electronique et de Television "S.T.I.E.T." (Tunisia)

---

**ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS**

**1990**

**Matsushita Electric Industrial Co**

A joint venture was formed to develop, control, and maintain a chip standard for domestic audio and video systems.

**Texas Instruments (TI)**

An alternate-source agreement was formed to ensure a reliable supply of high-performance bus interface and integrated circuits for future high-speed systems.

**European Development Center**

Philips joined the Development Center, which develops and supports computer-aided engineering (CAE) and design tools and technology.

**Fujitsu Microelectronics**

A second-source and joint development agreement was made for local area network circuits.

**BSO/Beheer BV**

A systems integration joint venture was formed, called BSO/Pass International.

**VEB Kombinat Robotron**

An agreement was reached concerning industrial measuring systems.

**1989**

**Whirlpool**

Philips and Whirlpool entered into a joint venture agreement concerning major domestic appliances.

**Motorola Inc.**

An agreement was made to develop VLSI integrated circuits.

**Learmonth**

The companies formed a marketing agreement.

**Seeq Technology Inc.**

The companies formed a five-year agreement calling for Philips to second-source and codevelop the Seeq 512Kb and 1Mb flash EPROMs. Seeq will get an alternate source for its flash EEPROM and foundry support for its 64Kb and 256Kb EEPROMs.

**Synercom Technology**

The two companies have entered into an OEM agreement for Synercom's INFORMAP and related application software.

**Sun Microsystems**

The two companies signed a licensing agreement that will allow Philips components to design and market 32-bit RISC microprocessors based on Sun's SPARC architecture.

**Catalyst Semiconductor Inc.**

Philips signed an agreement with Catalyst to supply Catalyst with its I2C protocol.



1988

**Ant Division of the Robert Bosch Group**

The companies agreed to develop a standardized pan-European automobile telephone system.

**Canon, Data General, Hewlett-Packard, Prime, and Unisys**

Philips and these companies formed a consortium to establish a common way to implement object-oriented software technology across a network of computers and servers.

**R. R. Donnelly & Sons and Toppan Printing Co., Ltd.**

The companies agreed to develop software for interactive disks.

**Siemens**

Siemens agreed to furnish Philips with submicron technology.

**Du Pont and Sony**

The companies agreed to set CD-WORM standards.

**TI**

TI made an agreement with Signetics to develop and manufacture an advanced CMOS logic family.

**ASM Lithography**

ASM Lithography agreed to manufacture lithography equipment for producing semiconductors for Philips.

**AT&T**

AT&T agreed to develop, manufacture, and sell telecommunications network products for Philips.

**Yangtze Optical Fiber Cable Company**

The companies are manufacturing and selling optical fiber cable in China.

**Philips/Du Pont Optical Company**

The companies are manufacturing and marketing optical media for consumer and professional applications.

**ES2 and TI**

The companies are manufacturing and selling the SystemCell cell-based library.

**Matsushita**

The companies are manufacturing and marketing a broad range of lighting and electronic component products.

**Plessey**

The companies are manufacturing microchips for satellite broadcasting receiver systems.

**SMH**

The companies made a CMOS wafer-fab production agreement.

**Taiwan Semiconductor Manufacturing Co. (TSMC)**

TSMC agreed to manufacture customer-specific ICs for Philips.

**ES2**

Philips adopted E-beam direct-wire technology for ASICs; ES2 adopted a Philips' CMOS process. Customers can have devices manufactured by either company.

**Hitachi**

Hitachi produces and sells Signetics (Philips subsidiary) HD68562 and HD64941 LSI chips.

**Intel**

The companies made an agreement giving Philips access to Intel's CHMOS process and products and Intel access to Philips' serial buses.

**Vitelec**

Vitelec licensed Philips' process technology so that Vitelec could produce CMOS SRAMs for use, license, and sale for both companies.

**VLSI**

The companies made an agreement covering CAD design software, foundry services, cell libraries, and gate arrays under which VLSI would provide IC design software and Philips would provide foundry services.

**Motorola/Four-Phase**

Motorola/Four-Phase OEMs the P7000 series of minicomputers for resale.

**Acer**

Philips agreed to OEM the NMS TC100.

**Intel**

Philips was chosen to second-source Intel's 8095 16-bit MCU and use Intel's 256K EPROM technology.

**Motorola**

Signetics was chosen to second-source Motorola's 68010 16-bit MPU.

---

## MERGERS AND ACQUISITIONS

1989

**Taiwan Semiconductor Manufacturing Co. (TSMC)**

Philips exercised its option to acquire 51 percent of TSMC's shares.

---

## KEY OFFICERS

**Jan D. Timmer**

President, chairman of Group Management (GMC)

**J. C. Gooljer**

Chairman, Telecommunications and Data Systems

**H. J. G. H. Peters**

Corporate director, Information Systems and Automation

**H. Hagmeister**

Chief executive officer, Integrated Circuits

**Thierry Meyer**

Chairman of Consumer Electronics, member GMC

**P. Kramer**

Corporate director, Research

**K. J. Krombeen**

Corporate director, Human Resources

**J. H. Goris**

Group director of Finance, member GMC

---

## PRINCIPAL INVESTORS

Information is not available.

---

## FOUNDERS

Information is not available.

**Table 3**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December 31**  
**(Millions of US Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Total Current Assets</b>	\$8,987.3	\$11,153.1	\$13,117.2	\$14,325.8	\$13,811.3
Cash	454.2	453.1	712.3	623.2	655.9
Receivables	3,953.6	4,956.7	5,870.0	6,749.5	6,491.5
Marketable Securities	58.1	69.8	175.9	97.0	68.5
Inventory	4,199.4	5,245.3	5,956.7	6,373.2	6,028.2
Other Current Assets	322.0	428.2	402.5	482.8	567.1
Net Property, Plants	\$5,487.7	\$7,447.8	\$9,106.9	\$9,372.7	\$8,730.5
Other Assets	\$1,453.6	\$2,064.5	\$2,376.4	\$2,992.9	\$3,270.0
<b>Total Assets</b>	<b>\$15,928.6</b>	<b>\$20,665.3</b>	<b>\$24,600.5</b>	<b>\$26,691.4</b>	<b>\$25,811.7</b>
<b>Total Current Liabilities</b>	<b>\$5,931.6</b>	<b>\$7,531.8</b>	<b>\$9,159.6</b>	<b>\$9,739.9</b>	<b>\$10,046.0</b>
Long-Term Debt	\$2,788.6	\$3,689.4	\$4,326.1	\$5,101.0	\$4,711.7
Other Liabilities	\$1,611.7	\$1,959.6	\$2,340.4	\$2,359.1	\$2,082.6
<b>Total Liabilities</b>	<b>\$10,331.9</b>	<b>\$13,180.8</b>	<b>\$15,826.1</b>	<b>\$17,200.0</b>	<b>\$16,840.4</b>
<b>Total Shareholders' Equity</b>	<b>\$5,596.7</b>	<b>\$7,484.5</b>	<b>\$8,774.4</b>	<b>\$9,491.4</b>	<b>\$8,971.4</b>
Common Stock	1,124.4	1,612.7	2,447.8	2,562.1	2,469.0
Other Equity	3,021.4	4,269.4	5,183.7	5,699.0	5,781.7
Currency Adjustment	(847.0)	(1,723.0)	(2,753.0)	(2,942.0)	(3,583.0)
Retained Earnings	2,297.6	3,325.7	3,896.1	4,172.2	4,303.8
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$15,928.6</b>	<b>\$20,665.3</b>	<b>\$24,600.5</b>	<b>\$26,691.4</b>	<b>\$25,811.7</b>
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Revenue</b>	<b>\$18,085.8</b>	<b>\$22,464.1</b>	<b>\$25,968.0</b>	<b>\$28,322.7</b>	<b>\$26,865.7</b>
European Revenue	9,585.5	13,298.8	15,944.3	17,361.8	15,394.1
Non-European Revenue	8,500.3	9,165.3	10,023.6	10,960.9	11,471.6
Cost of Sales	\$12,265.4	\$15,069.4	\$17,403.4	\$19,010.1	\$18,244.1
R&D Expense	\$1,208.1	\$1,706.9	\$2,149.8	\$2,334.8	\$2,139.4
SG&A Expense	\$3,751.5	\$4,636.7	\$5,432.0	\$5,910.6	\$5,685.9
Capital Expense	\$1,367.8	\$1,904.9	\$2,342.9	\$2,093.4	\$1,940.4
Pretax Income	\$523.5	\$799.2	\$368.0	\$409.1	\$594.8
Pretax Margin (%)	2.89	3.56	1.42	1.44	1.04
Effective Tax Rate (%)	41.00	42.10	28.00	39.00	41.10
Net Income	\$276.8	\$414.3	\$403.0	\$533.3	\$645.1
Shares Outstanding, Millions	215.9	231.0	245.5	256.3	266.6
<b>Per Share Data</b>					
Earnings	\$1.28	\$1.79	\$1.64	\$2.08	\$2.42
Dividend	\$0.60	\$0.82	\$0.99	\$1.01	\$0.94
Book Value	\$7.81	\$5.40	\$8.67	\$18.70	\$15.80
<b>Exchange Rate (US\$1=F)</b>	<b>F 3.32</b>	<b>F 2.45</b>	<b>F 2.03</b>	<b>F 1.98</b>	<b>F 2.13</b>

Source: N.V. Philips Gloeilampenfabrieken  
Annual Reports  
Dataquest (1990)

**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December 31**  
**(Millions of Guilders, except Per Share Data)**

<b>Balance Sheet</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Total Current Assets	F 29,838.0	F 27,325.0	F 26,628.0	F 28,365.0	F 29,418.0
Cash	1,508.0	1,110.0	1,446.0	1,234.0	1,397.0
Receivables	13,126.0	12,144.0	11,916.0	13,364.0	13,827.0
Marketable Securities	193.0	171.0	357.0	192.0	146.0
Inventory	13,942.0	12,851.0	12,092.0	12,619.0	12,840.0
Other Current Assets	1,069.0	1,049.0	817.0	956.0	1,208.0
Net Property, Plants	F 18,219.0	F 18,247.0	F 18,487.0	F 18,558.0	F 18,596.0
Other Assets	F 4,826.0	F 5,058.0	F 4,824.0	F 5,926.0	F 6,965.0
<b>Total Assets</b>	<b>F 52,883.0</b>	<b>F 50,630.0</b>	<b>F 49,939.0</b>	<b>F 52,849.0</b>	<b>F 54,979.0</b>
Total Current Liabilities	F 19,693.0	F 18,453.0	F 18,594.0	F 19,285.0	F 21,398.0
Long-Term Debt	F 9,258.0	F 9,039.0	F 8,782.0	F 10,100.0	F 10,036.0
Other Liabilities	F 5,351.0	F 4,801.0	F 8,782.0	F 4,671.0	F 4,436.0
<b>Total Liabilities</b>	<b>F 34,302.0</b>	<b>F 32,293.0</b>	<b>F 36,158.0</b>	<b>F 34,056.0</b>	<b>F 35,870.0</b>
Total Shareholders' Equity	F 18,581.0	F 18,337.0	F 17,812.0	F 18,793.0	F 19,109.0
Common Stock	3,733.0	3,951.0	4,969.0	5,073.0	5,259.0
Other Equity	10,031.0	10,460.0	10,523.0	11,284.0	12,315.0
Currency Adjustment	(2,811.0)	(4,222.0)	(5,589.0)	(5,825.0)	(7,632.0)
Retained Earnings	7,628.0	8,148.0	7,909.0	8,261.0	9,167.0
<b>Total Liabilities and Shareholders' Equity</b>	<b>F 52,883.0</b>	<b>F 50,630.0</b>	<b>F 53,970.0</b>	<b>F 52,849.0</b>	<b>F 54,979.0</b>
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Revenue	F 60,045.0	F 55,037.0	F 52,715.0	F 56,079.0	F 57,224.0
European Revenue	31,824.0	32,582.0	32,367.0	34,376.4	32,789.4
Non-European Revenue	28,221.0	22,455.0	20,348.0	21,702.6	24,434.6
Cost of Sales	F 40,721.0	F 36,920.0	F 35,329.0	F 37,640.0	F 38,860.0
R&D Expense	F 4,011.0	F 4,182.0	F 4,364.0	F 4,623.0	F 4,557.0
SG&A Expense	F 12,455.0	F 11,360.0	F 11,027.0	F 11,703.0	F 12,111.0
Capital Expense	F 4,541.0	F 4,667.0	F 4,756.0	F 4,145.0	F 4,133.0
Pretax Income	F 1,738.0	F 1,958.0	F 747.0	F 810.0	F 1,267.0
Pretax Margin (%)	2.89	3.56	1.42	1.44	2.21
Effective Tax Rate (%)	41.00	42.10	28.00	39.00	41.10
Net Income	F 919.0	F 1,015.0	F 818.0	F 1,056.0	F 1,374.0
Shares Outstanding, Millions	215.9	231.0	245.5	256.3	266.6
<b>Per Share Data</b>					
Earnings	-	F 4.39	F 3.33	F 4.12	F 5.15
Dividend	F 2.00	F 2.00	F 2.00	F 2.00	F 2.00
Book Value	F 86.06	F 79.38	F 72.55	F 73.32	F 71.68

Table 4 (Continued)  
 Comprehensive Financial Statement  
 Fiscal Year Ending December 31  
 (Millions of Guilders, except Per Share Data)

Key Financial Ratios	1985	1986	1987	1988	1989
<i>Liquidity</i>					
Current (Times)	1.52	1.48	1.43	1.47	1.37
Quick (Times)	0.81	0.78	0.78	0.82	0.77
Fixed Assets/Equity (%)	98.05	99.51	103.79	98.75	97.32
Current Liabilities/Equity (%)	105.98	100.63	104.39	102.62	111.98
Total Liabilities/Equity (%)	184.61	176.11	203.00	181.22	187.71
<i>Profitability (%)</i>					
Return on Assets	-	1.96	1.63	2.05	2.55
Return on Equity	-	5.50	4.53	5.77	7.25
Profit Margin	1.53	1.84	1.55	1.88	2.40
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	6.68	7.60	8.28	8.24	7.96
Capital Spending % of Revenue	7.56	8.48	9.02	7.39	7.22
Employees	346,000	343,800	336,700	310,300	304,800
Revenue (FK)/Employee	F 174	F 160	F 157	F 181	F 188
Capital Spending % of Assets	8.59	9.22	9.52	7.84	7.52
Exchange Rate (US\$1=F)	F 3.32	F 2.45	F 2.03	F 1.98	F 2.13

Source: N.V. Philips Gloeilampenfabrieken  
 Annual Reports  
 Dataquest (1990)

## N.V. Philips Gloeilampenfabrieken

Groenewoudseweg 1  
5621 BA Eindhoven  
The Netherlands  
Telephone: 31 (40) 79 11 11  
Dun's Number: 40-209-0344

*Date Founded: 1891*

---

### CORPORATE STRATEGIC DIRECTION

N.V. Philips Gloeilampenfabrieken is one of the world's largest electrical equipment companies, with more than \$28 billion\* in revenue and approximately 310,000 employees worldwide in 1988. Revenue increased 8 percent in 1988; net income increased 31 percent to \$528 million. However, these numbers do not accurately reflect the progress of Philips' restructuring. The combination of gains from slashed production costs and the sale of 53 percent of Philips' major household appliances division to Whirlpool, together with restructuring costs, has affected the numbers.

Philips' sales by product sector are as follows: lighting, 12 percent; consumer electronics, 33 percent; domestic appliances, 12 percent; professional products and systems, 27 percent; components, 14 percent; and miscellaneous products, 2 percent.

The Company's European semiconductor sales of \$1.0 billion made it Europe's leading semiconductor manufacturer; worldwide, it ranks number 10 with sales of \$1.7 billion. Data processing revenue of \$2.8 billion ranks the Company number 19 worldwide, and with telecommunications sales estimated to be in excess of \$2.0 billion, it is one of the world's largest telecommunications companies.

Philips has undertaken sweeping organizational changes and refocusing efforts aimed at adjusting to the major global trends of increasing competition, rising R&D costs, and shortening product life cycles. The key words of the new Philips strategy are globalization, core businesses, and synergy. Joint ventures and acquisitions will be important in achieving this goal.

---

\*All dollar amounts are in U.S. dollars.

The new strategy aims at producing for a global market, with 30 percent of its business to be conducted in each of three regions—Europe, North America, and the Pacific Basin—within the next 10 years. In the past, Philips has suffered because its product development and marketing efforts were handled on what the Company calls a "local-for-local" basis. This has resulted in a plethora of different products, fragmented marketing structure, lack of coordination, and few economies of scale.

To become more competitive, Philips has defined three core product markets upon which it will focus: consumer electronics, electronic components, and professional information and communication electronics.

Philips' board will watch synergies carefully and provide guidance for future strategies. The core businesses will be regarded as global businesses led by and reporting to Company headquarters in Eindhoven.

The Company's most immediate challenge is to improve profit. More than 20,000 jobs were eliminated during 1989, and more factories were either moved from Europe or closed. Some were moved to dollar areas to combat dollar fluctuations. Philips also continued to divest itself of unprofitable operations in 1989.

Philips also is restructuring its production operations. Eighty factories have been shut down worldwide. Driving this move is Philips' program of building factories to supply world markets from a few select geographic areas. One area of importance is Asia, which is becoming a key export manufacturing center for the Company. Factories are shifting from local to worldwide production in large volumes.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region and distribution channel. Table 4, a comprehensive financial statement, is at the end of this profile.

---

## BUSINESS SEGMENT STRATEGIC DIRECTION

### Telecommunications and Data Systems

Philips merged its Telecommunications and Data Systems divisions in 1985 in order to focus on its global policy and synergy strategy. The particular goals of this new division are as follows:

- To become one of the top three vendors in Europe and one of the top six worldwide in PBX and key systems
- To double the contribution of information technology (which includes facilities management and intelligent networking markets) to its overall business to 30 percent from 15 percent
- To transform nationalized hardware and software computer products into a cohesive whole with worldwide appeal while ensuring existing customers of upward mobility
- To become a leading-edge systems integrator by interfacing computer systems to existing telecommunications systems

Under this plan, Philips will concentrate on three primary lines of business—financial markets, the transportation/travel industry, and the insurance industry.

The Company hopes to capture at least a 15 percent European market share in the financial industry and a 15 percent share in transportation/travel. Philips has developed a complete line of products in line with these goals.

#### *Telecommunications*

Because of higher R&D costs, evolving standards that are converging telecommunication needs among countries, and the trend toward deregulation, Philips decided to centralize and streamline its telecommunication operation to improve its market position. Currently, Philips offers a line of Sophomation products.

At the center of Philips' telecom products offering and the heart of its networking concept is the Sopho-S line of PBXs, which, through its family concept, Integrated Services Digital Network (ISDN) and networking capabilities, extensive features, modularity, and upgradability, has proven quite successful. From its inception in 1985, the Sopho-S family markedly improved Philips' overall European market share from ninth position several years ago to seventh in 1987. In 1988, Philips was selected to supply PBX systems to banks and government agencies in several countries.

The Sophos-S line comprises five PBX products with capacity ranging from 20 to 20,000 lines. It supports both voice and data terminals and interfaces with a number of networks to which users may connect. At present, these include current networks such as Public Switched Telephone Network (PSTN) of telex/teletex; in the future, they will also include ISDN. To complete Sophomation's integration capability, Philips also developed supporting products to provide the appropriate interfaces for the Sopho-S family.

Further improvements in Philips' market share will depend on how well the Company penetrates European countries where it currently has a small or an insignificant market position. As more markets adopt ISDN standards, creating an increased demand for ISDN-capable products like the Sopho-S, Philips should benefit from its position as a well-known European supplier with international marketing channels. For example, Lloyds Bank chose Philips as its main telecom supplier primarily because Philips could provide maintenance worldwide.

As the company focuses more intensely on the private networking sector, it will move away from the public-switching arena, as demonstrated by the sale of most of its stake in its joint venture with AT&T.

#### *Data Systems*

Philips entered the computer scene at a relatively early stage, starting in the mainframe and minicomputer systems business. In the 1970s, the Company withdrew from the mainframe business with no intention of returning. Currently, Philips develops, produces, and markets a range of micro- and minicomputers, multiuser systems, dedicated banking systems, and personal computers that include the P5020 and P5040 text processing systems; the P3800,

P4000, P6000, P7000, and P9000 computer series; Megadoc; and Megadat.

In the worldwide computer markets, Philips still has not established itself as a major player; information technology is generally considered the weak link in Philips chain.

The P5020, developed by the Philips subsidiary in Canada, was and is a very popular and successful text processing system. It captured considerable share in the standalone market during the late 1970s. But Philips has not been a trailblazer with its other computer products. In the past, Philips products were designed for specific vertical markets, ran under proprietary operating systems, and formed self-contained units linked by networks to mainframes and public networks. This left little or no conversion capability between the product families.

Philips' future plans for computer products are exemplified in the new flagship P9000 line of minicomputers. The state-of-the-art P9000 succeeds a diverse line of existing products from which applications will be ported over the next few years to give all Philips customers a clear migration path for the future. The series is based on Motorola's 32-bit 680X0 processor, supports UNIX V.3, and is an open-ended, flexible system with distributed architecture. Members of the series can function as servers for all applications and can accommodate personal computers, intelligent workstations, and display terminals as workstations. In addition, the data communications capabilities of this series allow it to be used as a server in large corporate networks. In 1988, Philips won some major deals on its P9000 system, including one from the United Kingdom's Inland Revenue worth \$3.6 million.

Dataquest believes that the choice of the P9000 as Philips' flagship, an open system capable of adhering to all standards, is a good one. However, in order to gain market share over competitors with similar products, Philips will have to distinguish itself through software it adds to the system.

Philips' present offering is ALLROUND, its integrated office systems (IOS) software package that runs on the P9000. At this time, it offers only part of what is needed in a fully developed, integrated software program. However, Philips is continuing to develop and improve ALLROUND.

Philips' PC products can function as standalone workstations, share resources when connected through the PC network, be used as intelligent workstations connected to other Philips business systems or to mainframes from other vendors, and be connected to larger networks. Philips intends to develop PCs based on the Intel 80386 chip and PS/2 with the OS/2 operating system. Personal computers will be used as workstations for all Philips servers and will emulate office and business applications.

Two Philips products that stand out are the Megadoc optical storage system and the Maestro software engineering environment. Megadoc, with a capacity of several hundred gigabytes, is one of the most successful large optical storage systems on the market. Approximately 100 systems are now installed, primarily in the government, banking, and insurance sectors.

Through Megadoc, Philips is poised to take advantage of a market that is expected to boom within the next year. A growth in volume of 80 to 100 percent per year is expected for higher-end optical filing systems. In the future, facsimile networks and ISDN will give optical filing techniques even broader market penetration. Dataquest expects Philips to take advantage of this environment by developing a number of specific software programs for Megadoc that will allow the system to be sold in a variety of vertical markets.

Maestro, one of the first computer-aided software engineering (CASE) type products on the market, has been very successful and has had a midlife boost from the recent launch of Maestro II, which is designed to run under UNIX and support the emerging open systems standards. Despite Maestro's past success, the increasing number of CASE tools hitting the market are rapidly leaving Maestro's functionality behind.

Philips believes that its ability to link computer families to its telecommunications products will produce a combined strength in the future, especially as computer and communications worlds become closer in the future ISDN environment. This is because Philips currently offers non-ISDN products that are upgradable to ISDN standards when implemented in public networks.



However, other companies in the telecommunications business, such as Northern Telecom and Ericsson, have not been successful in integrating data processing products with their traditional switching business. Dataquest believes that Philips could be more successful because it has developed networking products and appropriate terminal devices that form an effective offering in integrated office communications. In addition, Dataquest believes that openly available ISDN access is still several years away, and that the Company's Sophomation products have the potential to gain significant market position during that time.

### Semiconductors

Philips considers semiconductors to be the heart of its electronics products business. Philips' Integrated Circuits Business Unit was successful even in 1986, which was a slow year for the industry. That year, Philips' Integrated Circuits increased its lead over the second-place European producer by 50 percent and moved from ninth to seventh place worldwide. From 1980 through 1987, this division had sales growth of 133 percent.

The Company's general IC goal is to strengthen its position as an applications-oriented supplier to the Western European, U.S., and Far Eastern markets with activities focused on the consumer, telecommunications, and automotive markets.

Despite the Company's continuing European success, in 1988, Philips dropped to the number 10 rank worldwide from number 7 in 1987. As a result, Philips has decided to reorganize its worldwide semiconductor business by the end of 1990. This reorganization confronts a weak worldwide sales and marketing organization and the lack of a coherent worldwide manufacturing program.

Two new units are to take worldwide responsibility for designated products, one to be based at Signetics, a Philips subsidiary in Sunnyvale, California; the other based at corporate headquarters in Eindhoven. Worldwide marketing and sales will be managed from Eindhoven instead of locally. Products will be developed and manufactured for the global market instead of for various local markets. This move should improve Philips' global image in semiconductors, where its name has not been as well-known as the brand names of its local subsidiaries.

In addition, Philips is building a multiple-foundry supply capability and is expanding its product line and cell libraries. It is also establishing strategic alliances with key customers and other IC vendors.

Philips' product strategy will be increasingly based upon achieving the economies of scale that are possible for a broad-catalog firm supplying the global market. Its actions have stemmed from its belief that economies of scale are necessary to afford research and development for specialized components.

### *ASICs and Standard Logic*

A key forward-looking product in which Philips is showing impressive European progress is ASICs. In 1988, the Company's bipolar ASIC sales increased 140 percent to \$43 million, which upped Philips' European ranking from seventh to fourth.

Part of this success was due to Signetics-developed programmable logic devices (PLDs), which, by offering a quick-turnaround path toward logic consolidation for any application, have contributed to worldwide sales that ranked the Company among the top three worldwide.

Philips' goal is to become the leading ASIC supplier in Europe by 1991 and to be among the top 10 suppliers in the world. More research is being put into submicron processes, and the Company has set up an internal ASIC program (P-ASIC) that aims to sharpen skills by increasing the number of ASIC designs by the Company's various products divisions.

Philips claims that it already is capable of being a very broad-based supplier in ASICs, with its PLDs, cell-based circuits, gate arrays, and application-specific standard projects.

### *Microprocessors*

In microprocessors, Philips has no strong presence, but it is focusing on its digital signal processing (DSP). Philips already has a DSP family and is exploring designs for new chips that can perform calculations at extremely high speeds. The Company also claims that it will be very active in 32-bit microprocessors.

### *Memories*

Philips has not produced memories until recently. In 1988, the Company started to sell EPROMs; in 1989, it started to sell SRAMs developed under the Megaproject with Siemens. The market for 1Mb SRAMs stands at \$1 billion (and will stay flat for the next couple of years, according to Dataquest), representing an opportunity for Philips. However, there is concern about Philip's high development costs (\$600 million to \$800 million).

In 1990, the Company may be gearing up for DRAMs, but it will wait until it has finished ramping up its SRAM technology. Siemens will hand over the technology for 1- and 4Mb DRAMs under the terms of the Megaproject, and Philips may access Matsushita's 4Mb technology through its longstanding technology exchange agreement.

### *Digital Integrated Circuits*

In digital ICs, Philips has one of the broadest MOS and bipolar digital product lines in the industry, with families that span both the professional and consumer markets and have an application orientation. Developments in ISDN should help Philips' sales in the future.

Philips will undertake a new CAD project as a corollary result of the Megaproject. Future CAD tools, which will be able to design more complex sub-micron ICs, are a key area for the Company.

Another key future focus is very large-scale integration (VLSI). Philips is investing to stay competitive in process technology, to provide the foundry capacity to meet volume needs, and to offer a level of service equal to customers' needs.

Because of the importance of integration and process technology, Philips is focusing on complementary metal-oxide semiconductor (CMOS) processes, which are scalable and can handle many devices on chips that are becoming increasingly smaller. Philips' CMOS process, used in a wide range of products, is currently at the 1.0-micron level; by the early 1990s, it should be at the submicron level. Additionally, the Company's Subilo bipolar process is pushing the

state of the art and is used for a range of gate arrays, semi- and full-custom parts, and audio, video, and telephony components. The Company already is strong in digital process technologies and is investing in new technology development, particularly in bipolar MOS processes.

Worldwide strategic planning, marketing, and support functions for the Components Integrated Circuits unit are coordinated from corporate headquarters in Eindhoven. Tactical sales offices are located in the United States, the Far East, and Europe through national organizations or Major Sales Organizations (MSOs) in each major national market.

In selling digital or analog ICs, especially in the area of ASICs, Philips is striving to provide extensive customer support for application development. This is the strategy the Company has employed in its analog business for many years with great success.

The Company is setting up a worldwide network of design assistance, service, and support centers for ASICs. It also is establishing strategic alliances with key customers and other IC vendors.

An important factor for Philips' success in the semiconductor business is the success of its consumer electronics business. Consumer electronics returned to the black in 1986 after heavy losses, but demonstrated declining profits in 1988. Philips believes that 1989 and 1990 will show whether it can hold its own against competition without the benefit of protectionism. If the consumer electronics business were to collapse, it would damage Philips' chip business gravely because of the large in-house revenue that Philips makes by supplying this division.

### **Further Information**

For further information about the Company's business segments, please contact the appropriate industry service.

**Table 1**  
**Five-Year Corporate Highlights (Millions of U.S. Dollars)**

	1984	1985	1986	1987	1988
Five-Year Revenue	\$16,761.4	\$18,989.5	\$22,464.1	\$25,968.0	28,039.5
Percent Change	-	13.29	18.30	15.60	7.98
Capital Expenditure	\$1,197.2	\$1,367.8	\$1,904.9	\$2,342.9	\$2,072.5
Percent of Revenue	7.14	7.20	8.48	9.02	7.39
R&D Expenditure	\$1,122.4	\$1,208.1	\$1,706.9	\$2,149.8	\$2,311.5
Percent of Revenue	6.70	6.36	7.60	8.28	8.24
Number of Employees	344,000	345,600	344,200	336,700	310,300
Revenue (\$K)/Employee	\$48.72	\$54.95	\$65.26	\$77.12	\$90.36
Net Income	\$346.7	\$276.8	\$414.3	\$403.0	\$528.0
Percent Change	-	(20.17)	49.67	(2.73)	31.03
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	
Quarterly Revenue	N/A	N/A	N/A	N/A	
Quarterly Profit	N/A	N/A	N/A	N/A	

N/A = Not Available

Source: N.V. Philips Gloeilampenfabrieken  
 Annual Reports  
 Dataquest  
 January 1990

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1984	1985	1986	1987	1988
Netherlands	6.00	7.00	7.00	6.00	6.00
International	94.00	93.00	93.00	94.00	94.00
North America	31.00	29.00	24.00	22.00	22.00
Europe	44.00	46.00	52.00	55.00	55.00
Asia/Pacific	10.00	10.00	9.00	9.00	9.00
ROW	9.00	8.00	8.00	8.00	8.00

Source: N.V. Philips Gloeilampenfabrieken  
 Annual Reports

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1987	1988
Direct Sales	N/A	N/A
Indirect Sales	N/A	N/A

N/A = Not Available

Source: N.V. Philips Gloeilampenfabrieken  
 Annual Reports

---

## 1988 SALES OFFICE LOCATIONS

North America—Not available  
 Europe—Not available  
 Asia/Pacific—Not available  
 ROW—Not available

---

## MANUFACTURING LOCATIONS

### Europe

Barcelona, Spain  
 Diodes, transistors  
 Caen, France  
 Bipolar digital, bipolar analog, and consumer ICs; discrete devices, power transistors, optoelectronic products  
 Hamburg, West Germany  
 NMOS microprocessors, controllers, memories, bipolar analog consumer ICs, small-signal transistors, varicap diodes  
 Netherlands  
 All principal products  
 Nijmegen, Netherlands  
 CMOS devices  
 Sittard, Netherlands  
 Not available  
 Southampton, United Kingdom  
 NMOS ROMs, dedicated consumer logic  
 Stadskanaal, Netherlands  
 Diodes  
 Stockport, United Kingdom  
 Power transistor, power diodes  
 Zurich, Switzerland  
 ICs

### North America

Albuquerque, New Mexico  
 Wafer fabrication of MOS ICs  
 Orem, Utah  
 Wafer fabrication of bipolar ICs, assembly, testing of logic and bipolar memory products  
 Riviera Beach, Florida  
 Passive components, discrete semiconductors  
 Sunnyvale, California  
 Wafer fabrication, MOS and bipolar ICs

United States and Canada  
 All principal products

### Japan

Tokyo  
 Testing only

### Asia/Pacific

Australia and New Zealand  
 Lighting, professional products, systems, components  
 Bangkok, Thailand  
 Assembly and testing  
 Hong Kong  
 Transistors, diodes  
 Kao-Hsiung, Taiwan  
 ICs  
 Manila, Philippines  
 Transistors, diodes, optoelectronic products  
 Seoul, Korea  
 Assembly and testing

### ROW

Africa  
 Lighting, consumer electronics, professional products and systems  
 Latin America  
 All principal products  
 Recife, Brazil  
 ICs  
 Sao Paulo, Brazil  
 Discrete devices

---

## SUBSIDIARIES

### Europe

AT&T Network Systems International B.V. (Netherlands)  
 Allgemeine Deutsche Philips Industrie GmbH (West Germany)  
 Compagnie Francaise Philips (France)  
 Grundig Aktiengesellschaft (West Germany)  
 Nederlands Philips Bedrijven B.V. (Netherlands)  
 Norsk Atkieselskap Philips (Norway)  
 Osterreichische Philips Industrie Gesellschaft mbH (Austria)

Oy Philips AB (Finland)  
 Philips AG (Switzerland)  
 Philips Antillana N.V. (Netherlands Antilles)  
 Philips Beteiligungs AG (Switzerland)  
 Philips Electronics Ireland Limited (Ireland)  
 Philips Export B.V. (Netherlands)  
 Philips Iberica S.A.E. (Spain)  
 Philips Industri og Handels A/S (Denmark)  
 Philips Industrielle S.A. Hellenique de Produits  
 Electrotechniques et Electroniques (Greece)  
 Philips International B.V. (Netherlands)  
 Philips International Finance S.A. (Luxembourg)  
 Philips Lighting B.V. (Netherlands)  
 Philips Lighting Holding B.V. (Netherlands)  
 Philips Luxembourg Consumer Products  
 (Luxembourg)  
 Philips Luxembourg Professional Systems  
 (Luxembourg)  
 Philips Matsushita Battery Corporation (Belgium)  
 Philips Medical Systems International B.V.  
 (Netherlands)  
 Philips Medical Systems U.K. Limited (United  
 Kingdom)  
 Philips Norden Aktiebolag (Sweden)  
 Philips Portuguesa S.A. (Portugal)  
 Philips S.A. (Belgium)  
 Philips S.A. Hellenique Commerciale de Produits  
 Electrotechniques (Greece)  
 Philips Sistemi Medicali S.p.A. (Italy)  
 Philips Societa per Azioni (Italy)  
 Philips Systemes Medicaux (France)  
 Philips and Du Pont Optical Company (Netherlands)  
 Philips U.K. Limited (United Kingdom)  
 Polygram GmbH (West Germany)  
 Polygram Leisure (United Kingdom)  
 Polygram N.V. (Netherlands)  
 Polygram S.A. (France)  
 Whirlpool International B.V. (Netherlands)

*Japan*

Japan New Media Systems, Inc.  
 Marantz Japan, Inc.  
 Matsushita Electronics Corp.  
 Philips K.K.  
 PNN Corp.

*Asia/Pacific*

Audio Electronics Sendirian Berhad (Malaysia)  
 Bangladesh Electrical Industries Limited  
 (Bangladesh)  
 Bangladesh Lamps Limited (Bangladesh)  
 Beijing Philips Audio/Video Corp. (China)

Car Audio Electronics (China) Company Limited  
 (China)  
 Compact Disc Industries Co. (Taiwan)  
 Electrical Lamp Manufacturers Thailand Limited  
 (Thailand)  
 Electronic Systems (Malaysia) Sendirian Berhad  
 (Malaysia)  
 Elinthai Limited (Thailand)  
 Hanwha Domestic Appliances Co. (Korea)  
 Hua Fei Colour Display Systems Company (China)  
 Malaysian Lamps Sendirian Berhad (Malaysia)  
 P.T. Philips Development Corp. (Indonesia)  
 P.T. Philips-Ralin Electronics (Indonesia)  
 Peico Electronics & Electricals Limited (India)  
 Philips Bangladesh Limited (Bangladesh)  
 Philips China Hong Kong Group Company Limited  
 (Hong Kong)  
 Philips Components (Philippines), Inc. (Philippines)  
 Philips Electrical Company of Thailand Limited  
 (Thailand)  
 Philips Electrical Lamps, Inc. (Philippines)  
 Philips Electronic Building Elements Industries  
 (Taiwan)  
 Philips Electronics (Korea)  
 Philips Electronics Industries (Taiwan)  
 Philips Electronics South-East Asia Holding B.V.  
 (China)  
 Philips Hong Kong Limited (Hong Kong)  
 Philips Industrial Development Inc. (Philippines)  
 Philips Industries (Korea)  
 Philips Industries Holdings Limited (Australia)  
 Philips Lighting Taiwan (Taiwan)  
 Philips Malaysia Sendirian Berhad (Malaysia)  
 Philips New Zealand Limited (New Zealand)  
 Philips Singapore Private Limited (Singapore)  
 Philips Taiwan (Taiwan)  
 Shenzhen Shen Fei Laser Optical Systems Company  
 Limited (China)  
 Signetics Korea Co. Ltd. (Korea)  
 Signetics Thailand Co. (Thailand)  
 Taiwan Lighting Industries Co. (Taiwan)  
 Thai Lamps Company Limited (Thailand)  
 Yangtze Optical Fibre and Cable Company (China)

*ROW*

Associated Electronic Products (Nigeria) Limited  
 (Nigeria)  
 El Nasr Company for Electrical and Electronic  
 Apparatus (Egypt)  
 Inbraphil-Industrias Brasileiras Philips Ltda. (Brazil)  
 Industria de Productos Electricos Centro-Americana,  
 Sociedad Anonima de Capital Variable (El  
 Salvador)

Industria Nacional de Refrigeracion y Calefaccion S.A. (Columbia)  
 Industrias Bolivianas Philips S.A. (Bolivia)  
 Industrias Philips de Colombia S.A. (Columbia)  
 Industrias Philips del Uruguay S.A. (Uruguay)  
 Industrias Venezolanas Philips S.A. (Venezuela)  
 Manufacture Nationale pour la Refrigeration et l'Electronique "MANAR" (Morocco)  
 PEC Investments Limited (South Africa)  
 Philips Argentina S.A. de Lamparas Electricas y Radio (Argentina)  
 Philips Chilena S.A. (Chile)  
 Philips del Paraguay S.A. (Paraguay)  
 Philips do Brasil Ltda. (Brazil)  
 Philips Ecuador C.A. (Ecuador)  
 Philips Electric Lamps (E.A.) Limited (Kenya)  
 Philips Electrical (Private) Limited (Zimbabwe)  
 Philips Electrical Company of Pakistan Limited (Pakistan)  
 Philips Electrical Industries of Pakistan Limited (Pakistan)  
 Philips Electrical Zambia Ltd. (Zambia)  
 Philips Electronics Holdings Limited (South Africa)  
 Philips Electronics (E.A.) Limited (Tanzania)  
 Philips Electronics (Zaire)  
 Philips Ethiopia (Ethiopia)  
 Philips Iran Ltd. (Iran)  
 Philips (Kenya) Limited (Kenya)  
 Philips Maroc (Morocco)  
 Philips Mexicana, S.A. de C.V. (Mexico)  
 Philips Midden Oosten B.V. (Egypt)  
 Philips Midden Oosten B.V. (Iraq)  
 Philips Middle East (Lebanon)  
 Philips Moyen Orient (Syria)  
 Philips Peruana S.A. (Peru)  
 Philips (Tanzania) Limited (Tanzania)  
 Societe Tunisienne d'Industrie Electronique et de Television "S.T.I.E.T." (Tunisia)  
 Turk Philips Aydinlatma Sanayi ve Ticaret Anonim Sirketi (Turkey)  
 Turk Philips Sanayi Anonim Sirketi "Philisan" (Turkey)  
 Turk Philips Ticaret Anonim Sirketi (Turkey)

#### *North America*

FGP Corporation (United States)  
 Philips Canada (Canada)  
 Philips Medical Systems North America Inc. (United States)  
 Polygram Records Inc. (United States)  
 U.S. Philips Corporation (United States)

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

1989

### Synercom Technology

The two companies have entered into an OEM agreement for Synercom's INFORMAP and related application software.

### Sun Microsystems

The two companies signed a licensing agreement that will allow Philips components to design and market 32-bit RISC microprocessors based on Sun's SPARC architecture.

### Catalyst Semiconductor Inc.

Philips signed an agreement with Catalyst to supply the company with its I2C protocol.

1988

### Ant/Robert Bosch

The companies agreed to develop a standardized pan-European automobile telephone system.

### Consortium

Canon, Data General, Hewlett-Packard, Prime, and Unisys agreed to establish a common way to implement object-oriented software technology across a network of computers and servers.

### R.R. Donnelly & Sons/Toppan Printing Co., Ltd.

The companies agreed to develop software for interactive disks.

### Siemens

Siemens agreed to furnish Philips with submicron technology.

### Sony/Du Pont

The companies agreed to set CD-WORM standards.

### Texas Instruments

TI made an agreement with Signetics to develop and manufacture an advanced CMOS logic family.

### ASM Lithography

ASM Lithography agreed to manufacture lithography equipment for producing semiconductors.

**AT&T**

AT&T agreed to develop, manufacture, and sell telecommunications network products.

**Yangtze Optical Fiber Cable Company**

The companies' agreement involves manufacturing and selling optical fiber cable in China.

**Philips/Du Pont Optical Company**

The companies' agreement involves manufacturing and marketing optical media for consumer and professional applications.

**ES2/Texas Instruments**

The companies' agreement involves manufacturing and selling the SystemCell cell-based library.

**Matsushita**

The companies' agreement involves manufacturing and marketing a broad range of lighting and electronic component products.

**Plessey**

The companies' agreement involves manufacturing microchips for satellite broadcasting receiver systems.

**SMH**

The companies' agreement involves CMOS wafer-fab production.

**Taiwan Semiconductor Manufacturing Co. (TSMC)**

TSMC agreed to manufacture customer-specific ICs.

**ES2**

Philips adopted E-beam direct-wire technology for ASICs; ES2 adopted a Philips' CMOS process. Customers can have devices manufactured by either company.

**Hitachi**

Hitachi produces and sells Signetics HD68562 and HD64941 LSI chips.

**Intel**

The companies made an agreement giving Philips access to Intel's CHMOS process and products and Intel access to Philips' serial buses.

**Vitelec**

Vitelec licensed Philips' process technology so that Vitelec could produce CMOS SRAMs for use, license, and sale for both companies.

**VLSI**

The companies made an agreement covering CAD design software, foundry services, cell libraries, and gate arrays under which VLSI would provide IC design software and Philips would provide foundry services.

**Motorola/Four-Phase**

Motorola/Four-Phase OEMs the P7000 series of minicomputers for resale.

**Acer**

Philips agreed to OEM the NMS TC100.

**Intel**

Philips was chosen to second source Intel's 8095 16-bit MCU and use Intel's 256K EPROM technology.

**Motorola**

Signetics was chosen to second source Motorola's 68010 16-bit MPU.

---

**MERGERS AND ACQUISITIONS**

1989

**Taiwan Semiconductor Manufacturing Co. (TSMC)**

Philips exercised its option to acquire 51 percent of TSMC's shares.

---

**KEY OFFICERS**

**C. J. van der Klugt**

President, chairman of Group Management (GMC)

**J. C. Gooljer**

Chairman, Telecommunication and Data Systems Division

**H. J. G. H. Peters**

Corporate director, Information Systems and Automation

**H. Hagmeister**

Chief executive officer, Integrated Circuits

**J. D. Timmer**  
Chairman of Consumer Electronics, member GMC

**K. J. Krombeen**  
Corporate director, Human Resources

**P. Kramer**  
Corporate director, Research

**J. H. Goris**  
Group director of Finance, member GMC



**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December 31**  
**(Millions of U.S. Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
Total Current Assets	\$9,957.6	\$9,268.1	\$11,496.7	\$13,673.4	\$14,890.0
Cash	496.0	522.3	540.4	907.4	714.5
Receivables	4,618.4	4,546.4	5,711.0	6,809.4	7,866.0
Inventory	4,843.3	4,199.4	5,245.3	5,956.7	6,309.5
Net Property, Plants	\$5,818.1	\$5,487.7	\$7,447.8	\$9,106.9	\$9,279.0
Other Assets	\$1,213.4	\$1,172.9	\$1,720.8	\$1,820.2	\$2,255.5
<b>Total Assets</b>	<b>\$16,989.1</b>	<b>\$15,928.6</b>	<b>\$20,665.3</b>	<b>\$24,600.5</b>	<b>\$26,424.5</b>
Total Current Liabilities	\$6,162.3	\$5,931.6	\$7,531.8	\$9,159.6	\$9,642.5
Long-Term Debt	\$4,706.5	\$4,400.3	\$5,649.0	\$6,666.5	\$7,385.5
<b>Total Liabilities</b>	<b>\$10,868.8</b>	<b>\$10,331.9</b>	<b>\$13,180.8</b>	<b>\$15,826.1</b>	<b>\$17,028.0</b>
Total Shareholders' Equity	\$5,284.7	\$4,864.7	\$6,472.6	\$7,642.4	\$8,270.0
Common Stock	664.5	682.2	949.0	1,257.6	1,299.5
Other Equity	2,392.8	1,884.9	2,198.0	2,488.7	2,840.0
Retained Earnings	2,227.4	2,297.6	3,325.7	3,896.1	4,130.5
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$16,153.6</b>	<b>\$15,196.7</b>	<b>\$19,653.4</b>	<b>\$23,468.5</b>	<b>\$25,298.0</b>
<b>Income Statement</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
Revenue	\$16,761.4	\$18,989.5	\$22,464.1	\$25,968.0	\$28,039.5
Domestic	1,055.1	1,163.9	1,500.4	1,696.6	1,857.0
International	15,706.2	17,825.6	20,963.7	24,271.4	26,182.5
Cost of Sales	\$12,372.0	\$13,443.4	\$16,776.3	\$19,553.2	\$21,131.5
R&D Expense	\$1,122.4	\$1,208.1	\$1,706.9	\$2,149.8	\$2,311.5
SG&A Expense	\$3,415.9	\$3,781.6	\$4,636.7	\$5,432.0	\$5,851.5
Capital Expense	\$1,197.2	\$1,367.8	\$1,904.9	\$2,342.9	\$2,072.5
Pretax Income	\$575.1	\$491.6	\$799.2	\$368.0	\$405.0
Pretax Margin (%)	3.43	2.59	3.56	1.42	1.44
Effective Tax Rate (%)	39.00	28.00	42.00	41.00	37.00
Net Income	\$346.7	\$276.8	\$414.3	\$403.0	\$528.0
Shares Outstanding, Millions	213.3	226.5	232.5	255.2	259.9
<b>Per Share Data</b>					
Earnings	\$5.32	\$6.65	\$8.36	\$22.34	\$26.30
Dividends	\$0.62	\$0.60	\$0.81	\$0.98	\$2.00
Book Value	\$24.78	\$21.48	\$27.84	\$29.95	\$31.82

Table 4 (Continued)  
 Comprehensive Financial Statement  
 Fiscal Year Ending December 31  
 (Millions of U.S. Dollars, except Per Share Data)

Key Financial Ratios	1984	1985	1986	1987	1988
<i>Liquidity</i>					
Current (Times)	1.62	1.56	1.53	1.49	1.54
Quick (Times)	0.83	0.85	0.83	0.84	0.89
Fixed Assets/Equity (%)	110.09	112.80	115.07	119.16	112.20
Current Liabilities/Equity (%)	116.61	121.93	116.36	119.85	116.60
Total Liabilities/Equity (%)	205.67	212.38	203.64	207.08	205.90
<i>Profitability (%)</i>					
Return on Assets	-	1.68	2.26	1.78	2.07
Return on Equity	-	5.45	7.31	5.71	6.64
Profit Margin	2.07	1.46	1.84	1.55	1.88
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	6.70	6.36	7.60	8.28	8.24
Capital Spending % of Revenue	7.14	7.20	8.48	9.02	7.39
Employees	344,000	345,600	344,200	336,700	310,300
Revenue (\$K)/Employee	\$48.72	\$54.95	\$65.26	\$77.12	\$90.36
Capital Spending % of Assets	7.05	8.59	9.22	9.52	7.84
Exchange Rate: US\$/F	F 3.21	F 3.32	F 2.45	F 2.03	F 2.00

Source: N.V. Philips Gloeilampenfabrieken  
 Annual Reports  
 Dataquest  
 January 1990

# N.V. Philips Gloeilampenfabrieken

Table 1

**N.V. Philips Gloeilampenfabrieken  
Signetics Corporation  
Estimated Worldwide Semiconductor Revenue by Product Line  
(Millions of Dollars)**

	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
Total Semiconductor	\$917	\$1,325	\$1,065	\$1,361	\$1,602	\$1,738
Total Integrated Circuit	\$694	\$1,090	\$ 808	\$1,028	\$1,186	\$1,281
Bipolar Digital (Technology)	\$344	\$ 589	\$ 372	\$ 389	\$ 405	\$ 413
TTL	320	551	337	363	380	393
ECL	22	37	34	22	25	20
Other Bipolar Digital	2	1	1	4	0	0
Bipolar Digital (Function)	\$344	\$ 589	\$ 372	\$ 389	\$ 405	\$ 413
Bipolar Digital Memory	89	121	80	61	61	58
Bipolar Digital Logic	255	468	292	328	344	355
MOS (Technology)	\$155	\$ 266	\$ 228	\$ 312	\$ 342	\$ 402
NMOS	103	187	138	179	178	175
CMOS	52	79	90	133	164	227
MOS (Function)	\$155	\$ 266	\$ 228	\$ 312	\$ 342	\$ 402
MOS Memory	27	32	35	14	18	35
MOS Microdevices	45	104	64	85	100	114
MOS Logic	83	130	129	213	224	253
Linear	\$195	\$ 235	\$ 208	\$ 327	\$ 439	\$ 466
Total Discrete	\$204	\$ 217	\$ 232	\$ 298	\$ 390	\$ 432
Transistor	124	131	142	169	233	248
Diode	74	78	81	119	137	159
Thyristor	5	6	9	7	10	12
Other Discrete	1	2	-	3	10	13
Total Optoelectronic	\$ 19	\$ 18	\$ 25	\$ 35	\$ 26	\$ 25
Exchange Rate (Yen per US\$1)	235	237	238	167	144	130

Source: Dataquest  
December 1989

# N.V. Philips Gloeilampenfabrieken

Table 2

**Philips-Signetics  
Worldwide Ranking by Semiconductor Markets  
(Sales in Millions of Dollars)**

	<u>1988 Rank</u>	<u>1987 Rank</u>	<u>1988 Revenue</u>	<u>Revenue % Change 1987-1988</u>	<u>Industry % Change 1987-1988</u>
Total Semiconductor	10	7	\$1,738	8.5%	33.0%
Total Integrated Circuit	11	10	\$1,281	8.0%	37.4%
Bipolar Digital (Function)	7	7	413	2.0%	9.2%
Bipolar Digital Memory	4	4	58	(4.9%)	11.0%
Bipolar Digital Logic	7	6	355	3.2%	9.0%
MOS (Function)	16	14	402	17.5%	54.5%
MOS Memory	30	33	35	94.4%	93.1%
MOS Microdevices	15	13	114	14.0%	39.9%
MOS Logic	10	9	253	12.9%	29.2%
Analog	5	4	466	6.2%	16.0%
Total Discrete	5	5	\$ 432	10.8%	14.4%
Total Optoelectronics	19	18	\$ 25	(3.8%)	27.5%

Source: Dataquest  
December 1989

# N.V. Philips Gloeilampenfabrieken

Table 3

**N.V. Philips Gloeilampenfabrieken  
Signetics Corporation  
Estimated Worldwide Semiconductor Revenue by Region—1988  
(Millions of Dollars)**

	<u>U.S.</u>	<u>Japan</u>	<u>Europe</u>	<u>ROW</u>	<u>Worldwide</u>
Total Semiconductor	\$375	\$62	\$1,018	\$283	\$1,738
Total Integrated Circuit	\$346	\$60	\$ 683	\$192	\$1,281
Bipolar Digital (Technology)	206	29	117	61	413
TTL	200	28	105	60	393
ECL	6	1	12	1	20
Other Bipolar Digital	--	--	--	--	--
Bipolar Digital (Function)	206	29	117	61	413
Bipolar Digital Memory	35	3	14	6	58
Bipolar Digital Logic	171	26	103	55	355
MOS (Technology)	72	7	285	38	402
NMOS	34	1	117	28	175
PMOS	--	--	--	--	--
CMOS	38	6	168	15	227
MOS (Function)	72	7	285	38	402
MOS Memory	16	3	14	2	35
MOS Microdevices	39	1	55	19	114
MOS Logic	17	3	216	17	253
Analog	68	24	281	93	466
Total Discrete	\$ 28	\$ 2	\$ 313	\$ 89	\$ 432
Total Optoelectronic	\$ 1	0	\$ 22	\$ 2	\$ 25

Source: Dataquest  
December 1989

# N.V. Philips' Gloeilampenfabrieken

N.V. Philips' Gloeilampenfabrieken  
Groenewoudseweg 1  
5621 Ba Eindhoven  
The Netherlands

N.V. Philips' Gloeilampenfabrieken is a European company. Although not privately owned, balance sheet and income statement data are unavailable.

# N.V. Philips' Gloeilampenfabrieken

(Page intentionally left blank)

# N.V. Philips' Gloeilampenfabrieken

## THE COMPANY

### Overview

N.V. Philips Gloeilampenfabrieken consists of a widely diversified group of companies, engaged primarily in the manufacture and distribution of electronic and electrical products, systems, and equipment. Philips was founded in 1891 in Eindhoven, The Netherlands, and has grown from a small incandescent lamp factory to a leading worldwide manufacturer of consumer and industrial products. Philips ranks 28th among the international Fortune 500.

### Organization

N.V. Philips' Gloeilampenfabrieken (Philips Industries) functions as the primary holding company for the Philips group of companies. Responsibility for management of the Philips group lies with the Board of Management, which is supported by Philips International B.V. and comprises the management and international policy-making departments of the product divisions together with corporate staff departments.

In December 1986, the US Philips Trust was terminated in order to create a more integrated world organization. All assets of the trust passed to N.V. Philips, including all shares in Signetics Corporation and the 42 percent of shares in North American Philips Corporation (NAPC). In 1988, N.V. Philips announced a reorganization of its U.S. activities, including the creation of a new company. The new corporation, named Consolidated Electronics Industries Corporation, will include a number of businesses under NAPC whose activities are unrelated to Philips' product divisions as well as NAPC's defense systems activities.

After assuming control of the American operations, Philips listed shares on the New York Stock Exchange under the symbol PHG. In May 1987, 20.75 million shares were issued and sold at NLG 48.60 and in the United States at \$24.00.

Philips employs approximately 366,700 people and is structured along two lines—organization by product and by country. The Company has national organizations in more than 60 countries that are generally wholly owned subsidiaries, varying from marketing organizations to integrated manufacturing and marketing concerns. Product-related activities are grouped into six sectors, which are also used by Philips for financial reporting. Sales by product sector are shown in Table 1.



# N.V. Philips' Gloeilampenfabrieken

Table 1

**N.V. Philips Gloeilampenfabrieken  
Estimated Revenue by Product Sector  
(Millions of Guilders)**

<u>Product Sector</u>	<u>Fiscal Year Ending December 31</u>				
	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
Lighting	F 6,348	F 7,471	F 7,910	F 6,771	F 6,481
Consumer Electronics	11,639	12,417	16,732	16,831	16,534
Domestic Appliances	5,090	6,114	6,639	6,291	6,331
Professional Products and Systems	14,386	15,931	17,520	15,686	14,336
Components	6,257	8,550	8,069	7,379	7,345
Miscellaneous	<u>2,795</u>	<u>3,321</u>	<u>3,175</u>	<u>2,079</u>	<u>1,688</u>
<b>Total Revenue</b>	<b>F 46,515</b>	<b>F 53,804</b>	<b>F 60,045</b>	<b>F 55,037</b>	<b>F 52,715</b>

Source: N.V. Philips Gloeilampenfabrieken  
Annual Reports  
Dataquest  
November 1988

Since January 1, 1985, Philips has been organized operationally into product divisions within the six major product sectors. The product divisions are:

- Lighting
- Consumer Electronics
- Home Interactive Systems
- Domestic Appliances and Personal Care
- Telecommunications and Data Systems
- Defense and Control Systems
- Medical Systems
- Elcoma
- Industrial and Electro-Acoustic Systems (I & E)

# N.V. Philips' Gloeilampenfabrieken

## **International Operations**

Philips operates in more than 100 countries. The Company has its own operations in more than 60 countries and operates through agents in the others. The Company's worldwide aim is to conduct 30 percent of its business in each of the three "centers of competence"—Europe, North America, and the Pacific Basin—within the next 10 years.

Philips is structured as a matrix organization. Each of the national organizations is divided into product divisions and several main supply groups (as listed under the "Organization" subsection). These national organizations and product divisions operate together as equal partners, but they exercise substantial autonomy for maximum marketing adaptability.

Philips is currently engaged in several cooperative activities worldwide. Some of its cooperative activities that are not consolidated are as follows:

- **AT&T International**—A joint venture with AT&T International (ATTI) to develop, produce, and market public telecommunications network products. The venture is called AT&T and Philips Telecommunications (APT). Philips recently sold 10 percent of the APT shares to ATTI, raising ATTI's share to 60 percent, with the remainder held by Philips.
- **Grundig AG**—Philips holds 31.6 percent of the capital stock of Grundig AG, a producer of consumer electronic products. Grundig is a major customer of the Components sector of Philips. Effective August 1984, Philips agreed to provide funds for financing Grundig's losses, if any, and to guarantee the payments of dividends. Accordingly, Philips includes all of Grundig's results in its financial statements.
- **Matsushita Electronics Corporation**—Philips has a 35 percent interest in Matsushita Electronics Corporation (MEC), which produces electronic components and lighting products in Japan. The other 65 percent is held by Matsushita Electric Industrial Company Ltd. of Japan. In 1987, the cooperative effort was extended for a period of 10 years.
- **Du Pont de Nemours & Company**—In 1986, Philips and Du Pont Optical Company (PDO) was formed as a joint venture with E.I. Du Pont de Nemours & Company of the United States with each partner having a 50 percent interest. PDO is engaged in manufacturing and marketing optical media for consumer and professional applications. Worldwide headquarters for PDO are located in The Netherlands.
- **R.R. Donnelly & Sons Company**—Philips established joint ventures with R.R. Donnelly & Sons Company (United States) and Toppan Printing Company Ltd. (Japan) to promote the development of software for interactive compact disks.

## N.V. Philips' Gloeilampenfabrieken

- **Willi Studer AG**—Philips has a joint venture with Willi Studer AG (Switzerland) to research and develop professional compact disk systems for radio and television studios.
- **Robert Bosch GmbH**—Philips and Robert Bosch GmbH (Federal Republic of Germany) established the **BTS—Broadcast Television Systems GmbH** in which Philips has a 30 percent interest.

Recently, Philips made the following announcements:

- In June 1986, Philips agreed to a joint-venture agreement with **Gold Peak Industries of Hong Kong** to produce and market automotive audio equipment for the Far East.
- In February 1987, Philips invested £9 million pounds in the expansion of its **Bishopsbriggs plant in Glasgow, Scotland**, to prepare for the launch of its digital private telephone exchange in the United Kingdom.

Table 2 presents estimates of Philips' sales by geographic area in 1987.

**Table 2**

**N.V. Philips Gloeilampenfabrieken  
Estimated Sales by Geographic Area  
(Millions of Guilders)**

	<u>1986</u>	<u>1987</u>
<b>The Netherlands</b>	F 3,676	F 3,444
<b>Europe (excluding The Netherlands)</b>	28,884	28,919
<b>North America</b>	13,372	11,801
<b>Latin America</b>	3,070	3,019
<b>Africa</b>	1,104	1,018
<b>Asia</b>	3,617	3,535
<b>Australia and New Zealand</b>	<u>1,314</u>	<u>979</u>
<b>Total Sales</b>	F 55,037	F 52,715

Source: N.V. Philips Gloeilampenfabrieken  
Annual Reports  
Dataquest  
November 1988

# N.V. Philips' Gloeilampenfabrieken

## Semiconductor Facilities

Philips' and Signetics' worldwide semiconductor plant locations are listed in Table 3. Recently, Philips made the following changes:

- Philips announced that advanced lithography has been installed from The Netherlands into Signetics' Albuquerque, New Mexico, facility, where EPROM processes are ramping up EPLD production. The Albuquerque and Eindhoven sites will be major foundries for Signetics and Elcoma.
- In December 1986, Philips announced that it was building a \$50 million highly automated liquid crystal display production center in Heerlen, The Netherlands.
- In April 1986, Philips moved its Philips Electronic Building Elements Industries Ltd. (PEBEI) operations from the Kaohsiung Export Processing Zone into a new factory in the Nantze Export Processing Zone as part of a plan to step up production of both ICs and passive components. PEBEI now consists of three divisions: IC Assembly and Test, Passive Components Division, and a recently launched IC design center.

Table 3

### N.V. Philips Gloeilampenfabrieken Semiconductor Plant Locations

<u>Philips Location</u>	<u>Size (Sq. Ft.)</u>	<u>Products and Technologies</u>
Recife, Brazil	N/A	Assembly and testing of ICs
Sao Paulo, Brazil	N/A	Assembly and testing of discretes
Caen, France	N/A	Integrated circuits: bipolar digital (ECL, TTL), bipolar analog, consumer; discrete devices: power transistors; optoelectronic products
Hong Kong	N/A	Assembly and testing of transistors and diodes

(Continued)

# N.V. Philips' Gloeilampenfabrieken

Table 3 (Continued)

## N.V. Philips Gloeilampenfabrieken Semiconductor Plant Locations

<u>Philips Location</u>	<u>Size (Sq. Ft.)</u>	<u>Products and Technologies</u>
Nijmegen, The Netherlands	N/A	CMOS standard logic families, CMOS custom/semicustom, CMOS analog; bipolar analog; consumer; HF transistors, power transistors; small signal diodes; lasers; assembly for ICs
Sittard, The Netherlands	N/A	N/A
Stadskanaal, The Netherlands	N/A	Diodes
Manila, Philippines	N/A	Assembly and testing of transistors, diodes, and optoelectronic products
Barcelona, Spain	N/A	Assembly and testing of small signal diodes and small signal transistors
Zurich, Switzerland	N/A	ICs: CMOS for clocks, watches, telecommunications, CMOS memories, CLIPS; assembly for small outline packaging
Kao-Hsiung, Taiwan	N/A	Assembly and testing of ICs
Southampton, United Kingdom	N/A	NMOS ROMs; dedicated consumer logic
Stockport, United Kingdom	N/A	Power transistors, power diodes
<u>Sigmetics</u>		
Sunnyvale, California	1,107,300	Wafer fabrication; MOS and bipolar ICs
Tokyo, Japan	15,600	Testing only

(Continued)

# N.V. Philips' Gloeilampenfabrieken

Table 3 (Continued)

## N.V. Philips Gloeilampenfabrieken Semiconductor Plant Locations

<u>Philips Location</u>	<u>Size (Sq. Ft.)</u>	<u>Products and Technologies</u>
Seoul, Korea	148,700	Assembly and testing
Albuquerque, New Mexico	238,300	Wafer fabrication; MOS ICs
Bangkok, Thailand	107,600	Assembly and testing
Orem, Utah	171,000	Wafer fabrication-bipolar ICs, assembly; testing of logic and bipolar memory products
Hamburg, West Germany	N/A	NMOS microprocessors, controllers, memories; bipolar analog consumer ICs; small signal transistors; varicap diodes

N/A = Not Available

Source: Dataquest  
November 1988

### Capital Spending

In 1987, expenditures for property, plants, and equipment amounted to F 4,756 million, approximately 9 percent of total sales. Table 4 illustrates investment by product sector.

Capital investment by geographic area is shown in Table 5.

# N.V. Philips' Gloeilampenfabrieken

Table 4

**N.V. Philips Gloeilampenfabrieken  
Capital Investment by Product Sector  
(Millions of Guilders)**

<u>Product Sector</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
Lighting	F 239	F 368	F 523	F 486	F 398
Consumer Electronics	358	570	843	860	852
Domestic Appliances	129	216	268	314	267
Professional Products and Systems	528	677	722	865	740
Components	710	1,341	1,509	1,393	1,717
Miscellaneous	177	234	199	215	168
Other	<u>350</u>	<u>437</u>	<u>477</u>	<u>534</u>	<u>614</u>
Total	F 2,491	F 3,843	F 4,541	F 4,667	F 4,756

Source: N.V. Philips Gloeilampenfabrieken  
Form 20-F  
Dataquest  
November 1988

# N.V. Philips' Gloeilampenfabrieken

Table 5

**N.V. Philips Gloeilampenfabrieken  
Capital Investment by Geographic Area  
(Millions of Guilders)**

<u>Region</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
The Netherlands	F 597	F 799	F 1,245	F 1,410	F 1,463
Europe (excluding The Netherlands)	1,024	1,573	2,070	2,093	2,156
North America	560	1,026	767	691	572
Latin America	115	121	113	157	212
Africa	20	25	26	16	17
Asia	119	212	268	275	311
Australia and New Zealand	<u>56</u>	<u>87</u>	<u>52</u>	<u>25</u>	<u>25</u>
Total	F 2,491	F 3,843	F 4,541	F 4,667	F 4,756

Source: N.V. Philips Gloeilampenfabrieken  
Form 20-F  
Dataquest  
November 1988

## Semiconductor Capital Spending

From calendar 1979 to 1981, Signetics' semiconductor capital spending in North America rose from \$50 million to \$115 million as Signetics expanded its Orem, Utah, facility. In 1986, Signetics spent \$60 million, up 20 percent from the 1985 level of \$50 million, as shown in Table 6. Approximately 83 percent, or \$50 million, of its 1986 expenditures was for equipment. Signetics' 1987 spending was \$90 million, which was used to bring Fab 23 in Albuquerque, New Mexico, on line in 1988. This new fab runs 6-inch CMOS, 1-micron wafers.



# N.V. Philips' Gloeilampenfabrieken

Table 6

**Philips-Signetics  
Semiconductor Capital Spending in North America  
(Millions of Dollars)**

<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
\$115	\$55	\$58	\$133	\$50	\$60	\$90

Source: Dataquest  
November 1988

## Research and Development

Philips spent F 4,364 million, or 8.3 percent of sales, on R&D in 1987. The Company employs about 4,700 people in R&D, including more than 1,500 graduate scientists. The Philips Research Laboratories, in Eindhoven, houses half of the total research staff and carries out the majority of the research activities for Philips. In addition, the Company has major research laboratories in the following locations:

- Philips Research Labs—Redhill, Surrey, England
- Laboratoires d'Electronique et de Physique Appliquee (LEP)—Limeil-Brevannes, France
- Philips Forschungslaboratorium (PFA)—Aachen, West Germany
- Philips Forschungslaboratorium (PFA)—Hamburg, West Germany
- Philips Research Laboratory Brussels (PRLB)—Brussels, Belgium
- Philips Laboratories—Briarcliff Manor, New York
- Philips Research Laboratories Sunnyvale (PRLS)—Sunnyvale, California

A small research group in Belgium specializes in software research.

Semiconductor-related R&D includes the following:

- Continuing research into gallium arsenide products, including methods for growing gallium arsenide and indium-phosphide ingots; methods for depositing thin layers such as vapor-phase, liquid-phase, molecular beam epitaxy, and metal organic chemical vapor deposition; ion implantation techniques; and aids for design and characterization of devices

## N.V. Philips' Gloeilampenfabrieken

- Cooperation with other European companies and universities under the auspices of the ESPRIT program
- The Megaproject, a five-year, \$470 million joint-research project with Siemens to develop a submicron CMOS process technology
  - The program has resulted in a prototype 1Mb SRAM device. Related work is carried out in the development of computer-aided design.
  - A special R&D center, built at Eindhoven for the Megaproject program, was opened in December 1986. The new center was built at a cost of more than \$220 million and includes both design and technology facilities.
- A \$12 million research project launched in December 1986 by Philips and four Dutch universities to develop a prototype of a parallel processing computer
  - The four-year program will receive a \$2 million government subsidy, with the balance coming from Philips. About 20 researchers will be employed on the project.
- The formation of a \$2.9 million R&D company, Silicon Software Systems, Ltd., in Dublin, Ireland
  - The new company will develop digital signal processing and image processing ICs and software for use in consumer products and for worldwide sales.

### **Semiconductor Product Markets**

Combined, Philips-Signetics is the seventh largest worldwide semiconductor manufacturer. Revenue for calendar year 1987 was \$1,603 million, an 18 percent increase from calendar year 1986. Table 7 shows Dataquest's estimates of the combined worldwide semiconductor revenue for Philips and Signetics.

Philips-Signetics achieved growth greater than the industry growth rate in two areas—linear and total discrete. Table 8 shows the worldwide semiconductor ranking for Philips-Signetics based on Dataquest's estimated semiconductor revenue.

# N.V. Philips' Gloeilampenfabrieken

Table 7

**N.V. Philips Gloeilampenfabrieken  
Signetics Corporation  
Estimated Worldwide Semiconductor Revenue by Product Line  
(Millions of Dollars)**

	1983	1984	1985	1986	1987
<b>Total Semiconductor</b>	<b>\$917</b>	<b>\$1,325</b>	<b>\$1,065</b>	<b>\$1,361</b>	<b>\$1,603</b>
<b>Total Integrated Circuit</b>	<b>\$694</b>	<b>\$1,090</b>	<b>\$ 808</b>	<b>\$1,028</b>	<b>\$1,187</b>
Bipolar Digital (Technology)	\$344	\$ 589	\$ 372	\$ 389	\$ 406
TTL	320	551	337	363	380
ECL	22	37	34	22	25
Other Bipolar Digital	2	1	1	4	1
Bipolar Digital (Function)	\$344	\$ 589	\$ 372	\$ 389	\$ 406
Bipolar Digital Memory	89	121	80	61	61
Bipolar Digital Logic	255	468	292	328	345
MOS (Technology)	\$155	\$ 266	\$ 228	\$ 312	\$ 342
NMOS	103	187	138	179	178
CMOS	52	79	90	133	164
MOS (Function)	\$155	\$ 266	\$ 228	\$ 312	\$ 342
MOS Memory	27	32	35	14	18
MOS Micro Devices	45	104	64	85	100
MOS Logic	83	130	129	213	224
Linear	\$195	\$ 235	\$ 208	\$ 327	\$ 439
<b>Total Discrete</b>	<b>\$204</b>	<b>\$ 217</b>	<b>\$ 232</b>	<b>\$ 298</b>	<b>\$ 390</b>
Transistor	124	131	142	169	233
Diode	74	78	81	119	137
Thyristor	5	6	9	7	10
Other Discrete	1	2	--	3	10
<b>Total Optoelectronic</b>	<b>\$ 19</b>	<b>\$ 18</b>	<b>\$ 25</b>	<b>\$ 35</b>	<b>\$ 26</b>
<b>Exchange Rate (Yen per US\$)</b>	<b>235</b>	<b>237</b>	<b>238</b>	<b>167</b>	<b>144</b>

Source: Dataquest  
November 1988

# N.V. Philips' Gloeilampenfabrieken

**Table 8**

**Philips-Signetics  
Worldwide Ranking by Semiconductor Markets  
(Sales in Millions of Dollars)**

	<u>1986</u> <u>Rank</u>	<u>1987</u> <u>Rank</u>	<u>1987</u> <u>Sales</u>	<u>Sales</u> <u>% Change</u> <u>1986-1987</u>	<u>Industry</u> <u>% Change</u> <u>1986-1987</u>
<b>Total Semiconductor</b>	8	7	\$1,603	18%	23%
<b>Total IC</b>	8	10	\$1,187	16%	26%
Bipolar Digital	6	6	406	5%	8%
MOS Digital	13	14	342	10%	35%
Linear	6	4	439	34%	19%
<b>Total Discrete</b>	5	5	\$ 390	31%	13%
<b>Total Optoelectronics</b>	16	20	\$ 26	(10%)	16%

Source: Dataquest  
November 1988

Table 9 shows Philips-Signetics' semiconductor revenue by geographic region.

**Table 9**

**N.V. Philips Gloeilampenfabrieken  
Signetics Corporation  
Estimated Worldwide Semiconductor Revenue by Region—1987  
(Millions of Dollars)**

	<u>U.S.</u>	<u>Japan</u>	<u>Europe</u>	<u>ROW</u>	<u>Worldwide</u>
<b>Total Semiconductor</b>	\$392	\$40	\$930	\$241	\$1,603
<b>Total Integrated Circuit</b>	\$359	\$39	\$618	\$171	\$1,187
Bipolar Digital	237	15	97	57	406
MOS	45	3	262	32	342
Linear	77	21	259	82	439
<b>Total Discrete</b>	\$ 31	\$ 1	\$290	\$ 68	\$ 390
<b>Total Optoelectronic</b>	\$ 2	-	\$ 22	\$ 2	\$ 26

Source: Dataquest  
November 1988

# N.V. Philips' Gloeilampenfabrieken

## **Semiconductor Products and Technologies**

Elcoma is Philips' semiconductor and passive components operation. During 1988, Philips Elcoma will become Philips Components. The product range of Philips Components covers components for display systems, passive components, discrete semiconductors, ICs, components for broadcasting, electro-optical devices, and materials.

## **Signetics Corporation**

Signetics Corporation manufactures ICs for a wide range of applications, including many that meet military specifications. It employs more than 8,000 people and maintains its headquarters in Sunnyvale, California.

Signetics maintains a very close relationship with Philips Components, even though Signetics is officially a separate organization. Philips Research Laboratory Sunnyvale (PRLS), California, comes under the auspices of Philips' research in Eindhoven, although it is part of Signetics. PRLS also works closely with other research establishments in the United States, namely Stanford University and the University of California at Berkeley.

Signetics maintains its own marketing network that includes 34 sales offices in the United States, Japan, and Canada, as well as 30 representatives and authorized distributors in 150 locations. In addition, 60 Philips national sales organizations market Signetics circuits in various countries around the world.

Signetics offers a wide range of products in six product areas, as follows:

- Digital logic—TTL/LSI, FAST, ALS, 10K/100K/100S ECL, 4000 Series, HC/HCT, ACL, LSI
- Microcomponents—NMOS/CMOS/bipolar microcontrollers, I2C microcontrollers, 68000, microperipherals
- Memory—PROMs, EPROMs, bipolar RAMs
- ASICs—Programmable logic, ECL gate array, CMOS SystemCell
- Linear—Amplifiers, communication and video devices, power conversion, interface/data conversion, I2C, automotive

Highlights of Philips' and Signetics' recent announcements are summarized in the following subsections.

# N.V. Philips' Gloeilampenfabrieken

## **Analog**

- In May 1988, Signetics announced the NE/SA604A and NE/SA605 high-performance, low-power FM RF/IF ICs with high-sensitivity, wide AC bandwidth. The devices are designed for applications such as cellular phones, RF data communications, intermediate frequency (IF) amplifiers, spectrum analyzers, broadband LANs, and other performance-oriented RF products.

## **ASICs**

- In January 1988, Signetics introduced the PLC16V8 Series PLD family, which is the Company's first PLD offering. The CMOS family consists of four quarter-power and half-power 20-pin EPROM-based devices.
- In June 1988, Signetics introduced the PLHS16L8B and PLHS18P8B PLDs, which feature maximum propagation delay of 15ns.
- In July 1988, Signetics unveiled the PLUS173D 24-pin PLD with a worst-case propagation delay of 12ns.

## **Memory**

- In November 1986, Philips offered its first EEPROM, the PCF8582. The 256x8 CMOS device is designed in a floating-gate technology and targets data processing, automotive, and battery-powered consumer product applications.
- In November 1986, Philips offered the 27C256, a 256K CMOS EPROM. It joins a 64K CMOS UV EPROM, which was offered in July 1986. Philips plans to use the newly acquired CMOS EPROM technology, the result of a technology agreement with Intel, to develop other products in its Programmable Products Group.
- In July 1987, Philips announced that it had produced a functional submicron 1Mbit SRAM in its research facilities in The Netherlands, achieving its first major goal under the Megaproject. The device, which was produced using a CMOS process with a six-transistor cell, has access times of 25-ns at 20 MHz.
- In February 1988, Signetics introduced the 74HC/HCT40105 and 74HC/HCT7030, the first in a family of FIFO registers. The former is a 4-word x 16-bit part, whereas the latter is a 9-bit x 64-word part.
- In May 1988, Signetics announced the 74F1764 and 74F1765 series of 1Mb DRAM controllers that offer synchronous single- and dual-port operation at 100 MHz. The devices also provide arbitration, signal timing, and refresh address generation for 40ns DRAMs.

# N.V. Philips' Gloeilampenfabrieken

## **Microcomponents**

- In December 1987, Signetics announced that it is now the sole second source for Motorola's 68010 16-bit MPU. The SCN68010 features virtual memory operations and comes in 8-MHz, 10-MHz, and 12.5-MHz versions.
- In 1987, Signetics offered the SC87C451, an MCU that Signetics claims is the first EPROM-based MCU with 7 ports. The ports add 24 more I/O pins to the 87C51 design, bringing the total count to 56.
- In January 1988, Philips offered the PCB83C652, a general-purpose 8-bit MCU featuring an I2L-bus interface, 8K ROM, and 256 bytes of volatile data RAM. Both memories are expandable to 64K off-chip.
- In February 1988, Philips introduced the 83C552, an MCU for automotive applications. The device features a two-line I2L-bus interface and five 8-bit I/O ports, plus one input port targeted at automotive applications, especially ignition, injection system, and gearbox.
- In March 1988, Signetics announced two high-speed, enhanced video display controllers. The SCN2672T ("Turbo") and the SCN264T are higher-speed versions of two video controllers that bear the same part numbers but offer improvements in performance.
- In June 1988, Signetics introduced the S87C51, a CMOS single-chip, 8-bit MCU. The device is a direct functional replacement for Intel's 87C51/80C51 MCU products.
- In June 1988, Signetics introduced the PLS159A, a programmable logic sequencer with an 18.2-MHz operating frequency. The PLS159A supports complex state machines and controller functions.

## **Process Technology**

- In November 1987, Signetics announced that it plans to have a fast BICMOS technology that will be used for PLD and linear parts by the end of 1988. The development is a result of the research by Philips Research Laboratory Sunnyvale (PRLS).
- In November 1987, Signetics announced that it has been working on a 1-micron CMOS process that is compatible with Texas Instrument's EPIC process. The process uses double-metal layers, silicides, and 1.2-micron drawn gate lengths. Signetics and TI have a goal of producing truly interchangeable logic parts.

# N.V. Philips' Gloeilampenfabrieken

## **Semiconductor Agreements**

Philips-Signetics has formed numerous alliances with companies worldwide. Some of these alliances are described in the following list:

- **ASM**—In August 1988, Philips announced plans to acquire the controlling interest in its joint-lithography venture, ASM Lithography, from Advanced Semiconductor Materials (ASM).
- **AMCC**—In 1979, Applied Micro Microcircuits Corp. licensed Signetics to alternate-source the Q700 Quick-Chip series in exchange for Signetics' 8A-1200 gate array family.
- **Bosch**—In December 1987, Philips and Bosch announced that they will cooperate in the area of a standard serial communication link for automotive applications.
- **General Instrument**—In June 1983, General Instrument and Philips agreed to develop a new line of nonvolatile memory devices that support the Philips 12C bus standard.
- **Hitachi**—In October 1985, Hitachi received Signetics' communication controller; Signetics received Hitachi's CRT controller.

In June 1986, Signetics gave Hitachi the rights to produce and sell its communication application LSI chips, HD68562 and HD64941.

- **Intel**—In 1982, Intel and Philips-Signetics signed a seven-year technology exchange agreement that gave Philips-Signetics access to Intel's CHMOS process and products, including 8-bit single-chip microcomputers. Intel received two Philips-developed serial buses.

In 1985, Intel licensed Philips to alternate-source Intel's 8095 16-bit MCU and provided its 256K EPROM technology to Signetics.

- **LTC**—In July 1984, LTC and Signetics signed a three-year agreement that grants Signetics the right to purchase die in wafer form and manufacturing rights for three precision op amps and other unnamed products. Signetics provided LTC with certain small-outline packaging services.
- **Matsushita**—in December 1987, Matsushita and Philips renewed their business cooperation agreement for a 10-year period.

In December 1986, Philips and Matsushita agreed to join forces to launch a new family of 8-bit CMOS microcontrollers. Under the agreement, Matsushita will manufacture and market the PCF84CXX family designed by Philips.



## N.V. Philips' Gloeilampenfabrieken

- **Motorola**—In 1983, Motorola signed Philips-Signetics as a second source for the 68000 microprocessor family.
- **Plessey**—In June 1987, Elcoma and Plessey Semiconductors agreed to codevelop a I2L bus-controlled phase-locked-loop (PLL) synthesizer circuit for television tuning. Both companies will make the device but will market it independently.
- **S3**—In 1988, Philips established Silicon & Software Systems (S3) Inc., in which Philips has a majority interest. S3 specializes in the design of ICs and software for DSP applications aimed at the consumer and information area.
- **Siemens**—In 1984, Siemens and Philips joined a venture to develop marketable 1Mb and 4Mb DRAMs. Siemens and Philips provided \$400 million; the Dutch government provided \$90 million, and the West German government provided \$135 million.

Also in 1984, Siemens and Philips agreed to a joint venture to set up a semiconductor fabrication plant in Holland to produce 4Mb RAMs. This venture involved an investment of approximately \$10 million.

- **SMH**—In July 1987, Philips and the Societe Suisse de Microelectronique d'Horlogerie (SMH), a Swiss watchmaker, agreed in principle to merge their Swiss semiconductor operations into a joint venture. SMH will hold a majority stake in the new company, which will include assets of its own technology division and Philips Faselec AG affiliate. The joint venture focuses on circuits for the watch industry and niche markets for low-power telephony and consumer circuits.
- **Soviet Union**—In February 1988, Philips agreed to a \$13.7 million deal to help the Soviet Union make semiconductors. Philips will supply the Soviet Ministry for Electronic Engineering with parts and technological expertise to manufacture semiconductors for consumer products such as color televisions.
- **Synertek**—In January 1985, Synertek's dual-port RAM technology was sold to Signetics after Synertek shut down.
- **TSMC**—In 1986, Philips took a 27.5 percent interest in Taiwan Semiconductor Manufacturing Corporation (TSMC). The remainder is held by the Taiwan government and Taiwanese firms. Philips has an option to purchase a controlling interest in TSMC.
- **TI**—In 1984, Texas Instruments and Signetics agreed to develop an Electronic Design interchange Format (EDIF).

In 1985, TI and Signetics agreed to cooperate on a 1-micron CMOS logic family.

# N.V. Philips' Gloeilampenfabrieken

In January 1986, Texas Instruments and Philips-Signetics agreed to codevelop and manufacture an advanced CMOS logic (ACL) family.

In May 1986, European Silicon Structures, Philips-Elcoma, and Texas Instruments agreed to cooperate on the SystemCell cell-based library.

In February 1987, ES2, TI, and Philips signed an agreement covering the manufacture of the SystemCell. TI and Philips will supply volume parts; ES2 will provide prototypes and low-volume quantities.

In April 1988, Signetics and TI agreed to codevelop an ACL family with 47 new functions.

- Vitelic—In April 1986, Philips and Vitelic agreed to a broad-ranging agreement that gave Vitelic access to Philips' process technology. Vitelic will design a family of high-performance CMOS SRAMs for manufacture, use, license, and sale by both companies.
- VLSI Technology—In May 1988, Philips International and VLSI Technology announced an agreement that covers CAD design software, foundry services, cell libraries, and gate arrays. VLSI will provide IC design software for use in Philips' operations. Philips will provide foundry services.

## **NONSEMICONDUCTOR PRODUCTS SUMMARY**

Philips product sectors offer a wide range of products, as described in the following paragraphs.

### **Lighting**

The Lighting and Batteries sector produces incandescent lamps, high- and low-pressure gas discharge lamps, luminaires, lighting projects, appliances for photographic purposes and photoflash lamps, batteries and solar collectors, glass, diamond drawing dies, wires, and other components.

### **Consumer Electronics**

This product sector includes the Consumer Electronics product division, the Home Interactive Systems group, and Polygram B.V. Major product categories in this sector are television and radio receivers, video and audio recorders, playback equipment for sound and vision, projection television, video cameras, video games, magnetic tape, home computers, and hearing aids.

# N.V. Philips' Gloeilampenfabrieken

## **Domestic Appliances**

This product sector comprises the Major Appliance division and the Domestic Appliances and Personal Care division. Products include washing machines and dryers, dishwashers, refrigerators and freezers, cooking appliances, vacuum cleaners, floor polishers and electric irons, food preparation machines, mixers and other small kitchen appliances, microwave ovens, coffee makers, toasters and grills, heating appliances and fans, clocks, electric shavers, solaria, and other personal care products.

In August 1988, Philips and Westinghouse agreed to combine their appliance lines, which will have a projected annual revenue of \$6 billion. Whirlpool will control the company, which will assume all of Philips' worldwide appliance lines in January 1989 and retain an option to buy out Philips later. The company will be headed by Willem G. Meyer, senior managing director of Philips Major Domestic Appliance operation.

## **Professional Products and Systems**

This product sector comprises the Medical Systems division, Industrial and Electro-Acoustic Systems division, Telecommunication and Data Systems division, and Defense and Control Systems division. In 1986, Philips sold Felton & Guillaume Energietechnik GmbH and significantly reduced its interests in Unidare p.l.c. and NKF Kabel B.V. Products include telecommunications systems, cable products and systems, defense systems, small computer systems, electronic office equipment, medical systems for diagnosis and therapy, instruments for laboratories and industry, television studio and transmitting equipment and cable television, audiovisual communication and security systems, machines, instruments, and tools.

## **Components**

The activities in this field are conducted by the Elcoma division and by the Subsystems and Peripherals group. This sector produces integrated circuits, transistors and diodes, passive components, displays, CD-ROMs, digital optical recording systems, and magnetic tape drives.

## **Miscellaneous**

The Miscellaneous product sector encompasses a number of activities not covered by the basic program of the other product sectors. These include activities that were acquired in the takeover of other companies, mainly those in France, the United States, and Australia. Products in this sector include equipment for satellite and spacecraft, antennae and communications systems for satellite television, musical instruments, and pharmaceuticals.

## NYNEX Corporation

335 Madison Avenue  
New York, New York 10017  
Telephone: (212) 370-7400  
Fax: (212) 370-7615  
Dun's Number: 10-115-2403

*Date Founded: 1984*

---

### CORPORATE STRATEGIC DIRECTION

NYNEX Corporation (NYNEX) is one of seven regional holding companies (RHCs) created as a result of the US District Court's decision to restructure the Bell System and American Telephone and Telegraph (AT&T). The historic AT&T antitrust settlement ordered AT&T to divest its 22 Bell operating companies (BOCs) and its control of the local exchange services. The 22 BOCs have been reorganized into 7 RHCs.

On January 1, 1984, NYNEX and six other RHCs began operations as independent corporations, separate from their former parent, AT&T. NYNEX is a holding company with various subsidiaries engaged in the provision of telecommunications products and services, information systems, software, directory publishing, and other business services. NYNEX provides products and services in several industry segments. The Company's dominant industry segment is telecommunications, which includes New York Telephone Company (New York Telephone) and New England Telephone and Telegraph Company (New England Telephone). These telephone operating companies provide local exchange services and long distance services within calling regions termed local access and transport areas (LATAs). They also provide local exchange access to interexchange carriers.

William C. Ferguson was elected to the position of president and chief executive officer, effective June 1, 1989. Mr. Ferguson succeeded D. C. Staley in the CEO role until October 1, 1989, when, upon Mr. Staley's retirement, he became chairman and CEO.

NYNEX's consolidated operating revenue during 1989 increased to \$13.2 billion\* from \$12.7 billion, a

---

\*All dollar amounts are in US dollars.

growth rate of 4.3 percent. Net income for 1989 was \$807.6 million compared with 1988 net income of \$1.3 billion. The Company took several one-time charges totaling approximately \$325 million after taxes in its fourth quarter financial results in operational restructuring, asset write-downs, work stoppage, benefit plan changes, and regulatory and other. The combined revenue inflow from the operations of both New York Telephone and New England Telephone amounted to \$10.9 billion and represented approximately 83 percent of NYNEX's total 1989 operating revenue. The remaining 17 percent of the consolidated revenue was generated by nontelephone operations such as sales of customer premises equipment, telephone directories, and systems integration services. NYNEX estimates that it will have 23,000 installed Integrated Services Digital Network (ISDN) lines by the end of 1990.

Headquartered in New York City, New York Telephone provides telecommunications services in New York and a small portion of Connecticut. As of December 1989, New York Telephone operated approximately 9.4 million network access lines and had 47,300 employees. New England Telephone is headquartered in Massachusetts and operates within Massachusetts, Maine, New Hampshire, Rhode Island, and Vermont. As of December 1989, New England Telephone operated approximately 5.6 million network access lines and had 26,100 employees.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights. Table 4, a comprehensive financial statement, is at the end of this backgrounder.

## BUSINESS SEGMENT STRATEGIC DIRECTION

In addition to acting as the holding company for the two operating telephone companies, New York Telephone and New England Telephone, NYNEX controls a number of nontelephone business units, which are discussed in the following paragraphs.

NYNEX Service Company, a wholly owned subsidiary of New York Telephone and New England Telephone, provides staff and operational support services primarily for the telephone subsidiaries. NYNEX Service Company owns a one-seventh interest in Bell Communications Research, Inc. (Bellcore). Each of the other six regional holding companies formed in connection with the AT&T divestiture owns an equal interest. Bellcore furnishes the RHCs and certain of their subsidiaries with technical and support services relating to exchange telecommunications and exchange access services.

NYNEX Materiel Enterprises Company was formed initially as a wholly owned subsidiary of NYNEX. As of March 16, 1990, ownership of NYNEX Materiel Enterprises Company was transferred to New York Telephone and New England Telephone. The subsidiary provides various procurement, procurement support, and materials handling services to NYNEX and its subsidiaries.

NYNEX Information Resources Company serves the yellow pages market in the Los Angeles area through its wholly owned subsidiary, United Publishers Corporation. Based in El Segundo, California, United Publishers annually publishes 45 directories with a circulation of 4.5 million.

NYNEX Credit Company provides a range of financial services to customers of other NYNEX subsidiaries. It offers leases, installment sales, and other financing for products and services provided by NYNEX Business Information Systems Company, NYNEX Mobile Communications Company, and other NYNEX companies. NYNEX Credit Company also offers financial services to businesses that are not customers of NYNEX affiliates.

NYNEX Properties Company manages real properties for NYNEX and certain of its subsidiaries, serves as a broker for acquisition and disposition of properties

owned and leased by NYNEX and its subsidiaries, and is an investor and developer of real estate located primarily in the Northeastern United States.

NYNEX Capital Funding Company was formed on January 18, 1990, to provide debt financing to the nontelephone subsidiaries and NYNEX corporate.

In May 1990, the Company created the Worldwide Information and Cellular Services Group, which combines the resources of four existing NYNEX business units with a focus on emerging telecommunications and information industry markets. The Group includes NYNEX Information Solutions Group, NYNEX Business Information Systems Company, NYNEX Mobile Communications Company, and NYNEX International Company.

NYNEX Information Solutions Group, Inc. (NYNEX ISG), consolidates into one organization six information systems, professional services, and software units: AGS Computers, Inc.; The BIS Group Limited; NYNEX Complex Systems Integration Group; the DATA Group Corporation; NYNEX Computer Services; and Telco Research Corporation. NYNEX ISG is involved in the creation of integrated systems for the financial industry. The group seeks to establish itself in other areas, including the development of telecommunications management systems, video information systems, and consulting and software design.

NYNEX Business Information Systems Company, through its NYNEX Business Centers and Office Systems Division, markets a wide range of business telecommunications systems and office automation products to business customers across the nation.

NYNEX Mobile Communications Company, through its operating subsidiaries and partnerships, provides a variety of mobile telecommunications services and products, including services and products that incorporate cellular technology, throughout areas in the Northeastern United States.

Penetration of international markets is the responsibility of NYNEX International Company, which has offices located in Frankfurt, Geneva, Hong Kong, Singapore, and London, and is headquartered in White Plains, New York. This company develops international relationships and markets the products and services of the NYNEX subsidiaries in foreign

markets. Recently, NYNEX acquired 50 percent of the Gibraltar Telephone Company, with a view toward upgrading the small British colony's system. NYNEX has expanded further into Europe with a teaming agreement with Scandinavian Telecommunications Services (STS) to offer NYNEX's Infopath packet-switched services to 22 members of the Norvans group, a Norwegian business consortium.

#### Further Information

For more information about NYNEX's business segments, please contact Dataquest's Telecommunications Industry Service.

**Table 1**  
**Five-Year Corporate Highlights (Millions of US Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$10,314.0	\$11,341.0	\$12,084.0	\$12,661.0	\$13,210.6
Percent Change	-	9.96	6.55	4.77	4.34
Capital Expenditure	\$2,108.0	\$2,414.0	\$2,551.0	\$2,784.0	\$2,420.6
Percent of Revenue	20.44	21.29	21.11	21.99	18.32
R&D Expenditure	\$136.1	\$152.7	\$191.5	\$211.4	\$218.4
Percent of Revenue	1.32	1.35	1.58	1.67	1.65
Number of Employees	89,600	90,200	95,300	97,400	95,400
Revenue (\$K)/Employee	\$115.11	\$125.73	\$126.80	\$129.99	\$138.48
Net Income	\$1,095.0	\$1,215.0	\$1,277.0	\$1,315.0	\$807.6
Percent Change	-	10.96	5.10	2.98	(38.59)
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	
Quarterly Revenue	\$3,234.7	\$3,299.2	\$3,308.9	\$3,367.8	
Quarterly Profit	\$283.6	\$279.0	\$288.7	(\$43.7)	

Source: NYNEX Corporation  
 Annual Reports  
 Dataquest (1990)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1985	1986	1987	1988	1989
North America	100.00	100.00	100.00	100.00	100.00
International	0	0	0	0	0

Source: Dataquest (1990)

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1988	1989
Direct Sales	100.00	100.00
Indirect Sales	0	0

Source: Dataquest (1990)

---

## 1989 SALES OFFICE LOCATIONS

Information is not available.

---

## MANUFACTURING LOCATIONS

According to the Modified Final Judgment (MFJ), which is the final set of instructions for the restructuring of the Bell System, the RHCs are not allowed to manufacture telecommunications products.

---

## SUBSIDIARIES

### *North America*

New England Telephone and Telegraph Company (United States)  
 New York Telephone Company (United States)  
 NYNEX Business Information Systems Company (United States)  
 NYNEX Credit Company (United States)  
 NYNEX Information Resources Company (United States)  
 NYNEX Information Solutions Group, Inc. (United States)  
 NYNEX International Company (United States)  
 NYNEX Materiel Enterprises Company (United States)  
 NYNEX Mobile Communications Company (United States)  
 NYNEX Properties Company (United States)  
 NYNEX Service Company (United States)  
 NYNEX Systems Marketing Company (United States)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

### *1990*

#### **Lotus Development Corporation**

Lotus Development Corporation and NYNEX created an alliance to integrate NYNEX's broadband data communications technologies with

Lotus' personal computer client/server applications. As partners, the two companies will explore joint marketing research and technical specifications and requirements, and will conduct joint R&D.

#### **Sun Microsystems, Inc.**

NYNEX Information Solutions Group and Sun agreed to jointly pursue large-scale systems and network integration projects in the commercial market, both domestically and internationally. NYNEX and Sun are concentrating on the banking, insurance, brokerage/investment, manufacturing, and health care industries.

#### **Northern Telecom, Inc.**

Northern Telecom and NYNEX Business Information Systems formed a joint venture, NYNEX Meridian Systems, to provide sales and service for all Northern Telecom customer premises equipment.

#### **New England Telephone**

NYNEX and New England Telephone will develop the world's first fiber-based, multimedia conferencing service that will combine images, voice, and text. The service will be called Media Broadband Service and will be conducted as a three-year trial service that will evolve into a switched multimegabit data service.

#### **Codenoll Technology Corporation**

NYNEX Science and Technology, the R&D subsidiary of NYNEX Corporation, signed a five-year agreement with Codenoll Technology for the development of a modular multiport bridge for local area networks (LANs). As part of the agreement, Codenoll will purchase communications software from NYNEX and NYNEX will utilize Codenoll's Industry Standard and Extended Industry Standard Architecture cards as a platform for the bridge.

#### **Ford Aerospace**

Ford Aerospace signed a joint marketing agreement with NYNEX Information Solutions Group. The companies will work together on government systems integration and network contracts.

### *1989*

#### **Northern Telecom and Digital Equipment Corporation (DEC)**

NYNEX conducted a joint trial with Northern Telecom and DEC of a new high-capacity digital data communications service for public networks.



**Government of Gibraltar**

NYNEX and the government of Gibraltar entered into a joint venture to own, operate, and modernize the telecommunications system in Gibraltar.

**Telecommunications Authority of Singapore**

NYNEX International Company and the Telecommunications Authority of Singapore signed a cooperative exchange agreement. The companies will explore joint projects such as marketing and technical studies and personnel exchanges.

**Compression Labs Inc. (CLI)**

CLI is to supply videoconferencing equipment for NYNEX turnkey videoconferencing.

**AGS Computers, Inc.**

NYNEX acquired AGS, which is a leading supplier of systems development, software products, and professional services to finance, telecommunications, manufacturing, and government organizations.

1987

**The BIS Group Limited**

NYNEX acquired this London-based information technology and marketing services group.

**Computer Catalysts Inc.**

NYNEX acquired Computer Catalysts, which develops trade and finance software for domestic money centers and international banks.

---

**MERGERS AND ACQUISITIONS**

1990

**Lamarian Systems, Inc.**

NYNEX acquired Lamarian Systems, Inc., a Maryland-based management and systems consulting firm.

1989

**Atkinson, Tremblay & Assoc., Inc.**

NYNEX acquired this Canada-based software and professional services company.

**Robertson Marketing Services Group**

NYNEX acquired this Scotland-based direct marketing company.

**Multiple Technologies Corporation**

NYNEX acquired this Detroit-based developer of information systems for the automotive industry.

**TECO Technologies Inc.**

NYNEX acquired this Florida-based information management services company for the utilities industry.

1988

**CAP International**

NYNEX acquired CAP, which provides market research and consulting services to the information processing industry.

---

**KEY OFFICERS**

**William C. Ferguson**

Chairman of the board and chief executive officer

**Robert J. Eckenrode**

Vice chairman of the board

**Raymond F. Burke**

Executive vice president and general counsel

**Ivan G. Seidenberg**

Executive vice president

**Alfred F. Boschulte**

Vice president, Marketing and Planning

**Jeffery Rubin**

Treasurer and vice president, Finance

**Dwight A. Kellogg**

Vice president and comptroller

---

**PRINCIPAL INVESTORS**

Information is not available.

---

**FOUNDERS**

Information is not available.

**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December**  
**(Millions of US Dollars, except Per Share Data)**

<b>Balance Sheet<sup>1</sup></b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Total Current Assets</b>	\$2,967.0	\$3,414.0	\$3,527.8	\$3,630.2	\$3,668.6
Cash	170.8	232.8	358.2	125.7	155.0
Receivables	2,072.1	2,201.2	2,241.8	2,510.4	2,498.5
Inventory	202.5	330.5	381.9	386.4	401.4
Other Current Assets	521.6	649.5	545.9	607.7	613.7
<b>Net Property, Plants</b>	\$17,106.7	\$17,903.5	\$18,531.0	\$19,288.5	\$19,464.5
<b>Other Assets</b>	\$526.0	\$487.1	\$947.0	\$2,443.4	\$2,775.9
<b>Total Assets</b>	\$20,599.7	\$21,804.6	\$23,005.8	\$25,362.1	\$25,909.0
<b>Total Current Liabilities</b>	\$2,649.6	\$2,886.2	\$2,925.2	\$4,147.5	\$4,550.2
<b>Long-Term Debt</b>	\$5,403.4	\$5,475.6	\$6,269.9	\$6,241.3	\$6,465.0
<b>Other Liabilities</b>	\$4,197.9	\$4,574.4	\$4,614.2	\$5,553.8	\$5,524.7
<b>Total Liabilities</b>	\$12,250.9	\$12,936.2	\$13,809.3	\$15,942.6	\$16,539.9
<b>Total Shareholders' Equity</b>	\$8,348.8	\$8,868.4	\$9,196.5	\$9,419.5	\$9,369.1
Common Stock	101.1	202.7	204.4	204.5	204.6
Other Equity	5,774.4	5,776.7	5,585.2	5,289.9	5,295.1
Retained Earnings	2,473.3	2,889.0	3,406.9	3,925.1	3,869.4
<b>Total Liabilities and Shareholders' Equity</b>	\$20,599.7	\$21,804.6	\$23,005.8	\$25,362.1	\$25,909.0
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Revenue</b>	\$10,314.0	\$11,341.0	\$12,084.0	\$12,661.0	\$13,210.6
<b>R&amp;D Expense</b>	\$136.1	\$152.7	\$191.5	\$211.4	\$218.4
<b>Maintenance Expense</b>	\$2,120.0	\$2,186.0	\$2,268.0	\$3,303.0	\$3,375.0
<b>Capital Expense<sup>2</sup></b>	\$2,108.0	\$2,414.0	\$2,551.0	\$2,784.0	\$2,420.6
<b>Pretax Income</b>	\$2,408.0	\$2,105.0	\$1,954.7	\$1,688.2	\$1,073.5
<b>Pretax Margin (%)</b>	23.35	18.56	16.18	13.33	8.13
<b>Effective Tax Rate (%)</b>	39.90	40.30	34.38	21.90	24.00
<b>Net Income</b>	\$1,095.0	\$1,215.0	\$1,277.0	\$1,315.0	\$807.6
<b>Shares Outstanding, Millions</b>	202.0	202.0	204.0	198.3	197.0
<b>Per Share Data<sup>3</sup></b>					
<b>Earnings</b>	\$5.42	\$6.01	\$6.26	\$6.63	\$4.10
<b>Dividend</b>	\$3.20	\$3.48	\$3.80	\$4.04	\$4.36
<b>Book Value</b>	\$41.29	\$43.75	\$45.65	\$47.83	\$47.55

Table 4 (Continued)  
 Comprehensive Financial Statement  
 Fiscal Year Ending December  
 (Millions of US Dollars, except Per Share Data)

Key Financial Ratios	1985	1986	1987	1988	1989
<i>Liquidity</i>					
Current (Times)	1.12	1.18	1.21	0.88	0.81
Quick (Times)	1.04	1.07	1.08	0.78	0.72
Fixed Assets/Equity (%)	204.90	201.88	201.50	204.77	207.75
Current Liabilities/Equity (%)	31.74	32.54	31.81	44.03	48.57
Total Liabilities/Equity (%)	146.74	145.87	150.16	169.25	176.54
<i>Profitability (%)</i>					
Return on Assets	-	5.73	5.70	5.44	3.15
Return on Equity	-	14.11	14.14	14.13	8.60
Profit Margin	10.62	10.71	10.57	10.39	6.11
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	1.32	1.35	1.58	1.67	1.65
Capital Spending % of Revenue	20.44	21.29	21.11	21.99	18.32
Employees	89,600	90,200	95,300	97,400	95,400
Revenue (\$K)/Employee	\$115.11	\$125.73	\$126.80	\$129.99	\$138.48
Capital Spending % of Assets	10.23	11.07	11.09	10.98	9.34

<sup>1</sup> Certain financial information for the years prior to 1988 has been reclassified.

<sup>2</sup> Capital expense excludes additions under capital lease obligations and the equity component of interest charged for construction.

<sup>3</sup> Amounts for 1985 have been restated to reflect the stock split effected in the form of a 100 percent stock dividend declared on March 20, 1986.

Source: NYNEX Corporation  
 Annual Reports  
 Dataquest (1990)

# NYNEX Corporation

335 Madison Avenue  
New York, New York 10017  
Telephone: (212) 370-7400  
Fax: (212) 370-7615  
Dun's Number: 10-115-2403

*Date Founded: 1984*

## CORPORATE STRATEGIC DIRECTION

NYNEX Corporation (NYNEX) is one of seven regional Bell operating companies (RBOCs) created as a result of the U.S. District Court's decision to restructure the Bell System and American Telephone and Telegraph (AT&T). The historic AT&T antitrust settlement ordered AT&T to divest its 22 Bell operating companies (BOCs) and its control of the local exchange services. The 22 BOCs have been reorganized into 7 RBOCs.

On January 1, 1984, NYNEX and the six other RHCs began operations as independent corporations, separate from their former parent, AT&T. NYNEX is the holding company for two telephone operating subsidiaries: New York Telephone Company (New York Telephone) and New England Telephone and Telegraph Company (New England Telephone). These telephone operating companies provide local exchange services and long distance services within calling regions, termed Local Access and Transport Areas (LATAs), and provide local exchange access to interexchange carriers. In terms of revenue, NYNEX is the second largest of the RBOCs, following BellSouth Corporation.

NYNEX's consolidated operating revenue during 1988 increased at a decreasing rate, from \$12.1 billion\* in 1987 to \$12.7 billion in 1988, a growth rate of 4.8 percent.

The combined revenue inflow from the operations of both New York Telephone and New England Telephone amounted to \$7.4 billion and \$3.6 billion, respectively, and represented approximately 86 percent of NYNEX's total 1988 operating revenue. The remaining 14 percent of the consolidated revenue was generated by nontelephone operations such as sales of

customer premises equipment, telephone directories, and systems integration services.

During 1988, local service revenue increased \$50.3 million to \$5.7 billion by year-end and amounted to 45 percent of the consolidated revenue. Long distance service, also called toll services, increased from \$1.3 billion in 1987 to \$1.4 billion in 1988.

Total access revenue increased from \$3.1 billion in 1987 to \$3.3 billion in 1988. Interstate access minutes rose from 31.9 billion in 1987 to 35.1 billion in 1988; intrastate access minutes increased from 4.7 billion in 1987 to 5.1 billion in 1988. Other revenue, which includes a small portion of the revenue generated by the two telephone operating companies, as well as revenue generated by the nontelephone subsidiaries, increased 16 percent during 1988 to a level of \$2.3 billion. Net income grew 3 percent over 1988 to a level of \$1.3 billion. Net income growth rates for 1986 and 1987 were 11 and 5 percent, respectively.

New York Telephone is headquartered in New York, New York, and operates within New York and a portion of Connecticut. As of December 1988, New York Telephone operated approximately 9.4 million network access lines and had 49,400 employees.

New England Telephone is headquartered in Boston, Massachusetts, and operates within Massachusetts, Maine, New Hampshire, Rhode Island, and Vermont. As of December 1988, New England Telephone operated approximately 5.4 million network access lines and had 27,500 employees.

Penetration of international markets is the job of NYNEX International Company, which has offices located in Geneva, Hong Kong, and London, and is

\*All dollar amounts are in U.S. dollars.

headquartered in White Plains, New York. This company develops international relationships and markets the products and services of the NYNEX subsidiaries.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region and distribution channel. Table 4, a comprehensive financial statement, is at the end of this profile.

---

## **BUSINESS SEGMENT STRATEGIC DIRECTION**

In addition to acting as the holding company for the two operating telephone companies, New York Telephone and New England Telephone, NYNEX controls a number of nontelephone business units, which are discussed in the following paragraphs.

NYNEX Service Company supplies its joint owners, the two telephone operating companies, with new product support, regulatory information, and operations support. Its responsibilities also include the ownership and management of one-seventh interest in Bell Communications Research, Inc. (Bellcore).

NYNEX Business Information Systems Company employs 2,100 people and is segmented into two divisions: Business Centers, which supplies software and microcomputers; and Office Systems, which supplies customer premises equipment. NYNEX Credit Company offers financial products to business customers and offers financing arrangements to firms that purchase products and services other than those of NYNEX. NYNEX Information Resources Company publishes white-and-yellow-pages directories.

NYNEX Information Solutions Group, Inc., provides software, systems integration, and professional services. This subsidiary is segmented into five business units: AGS Computers, Inc; The BIS Group, Ltd.; The DATA Group Corporation; NYNEX Computer Services; and Telco Research Corporation.

As mentioned previously, NYNEX International Company markets NYNEX products and services internationally and promotes international relationships.

NYNEX Material Enterprises Company supports the NYNEX companies in material management and engineering services, and also conducts business outside of NYNEX.

NYNEX Mobile Communications Company offers cellular mobile telephone systems and paging systems in the Northeast portion of the United States. At the end of 1988, this company had 132 cell sites in operation and supported 127,000 customers.

NYNEX Properties Company provides real estate services to NYNEX companies and leases real estate to companies outside of NYNEX.

NYNEX Systems Marketing provides account management and marketing for NYNEX subsidiaries to NYNEX's largest customers.

### **Further Information**

For further information about the Company's business segments, please contact the appropriate industry service.

**Table 1**  
**Five-Year Corporate Highlights (Millions of U.S. Dollars)**

	1984	1985	1986	1987	1988
Five-Year Revenue	\$9,573.0	\$10,314.0	\$11,341.0	\$12,084.0	\$12,661.0
Percent Change	-	7.74	9.96	6.55	4.77
Capital Expenditure	\$1,844.0	\$2,108.0	\$2,414.0	\$2,551.0	\$2,784.0
Percent of Revenue	19.26	20.44	21.29	21.11	21.99
R&D Expenditure					
Percent of Revenue	N/A	N/A	N/A	N/A	N/A
Number of Employees	94,900	89,600	90,200	95,300	97,400
Revenue (\$K)/Employee	\$100.87	\$115.11	\$125.73	\$126.80	\$129.99
Net Income	\$986.0	\$1,095.0	\$1,215.0	\$1,277.0	\$1,315.0
Percent Change	-	11.05	10.96	5.10	2.98
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	
Quarterly Revenue	\$3,234.7	\$3,299.2	N/A	N/A	
Quarterly Profit	N/A	N/A	N/A	N/A	

N/A = Not Available

Source: NYNEX Corporation  
 Annual Reports  
 Dataquest  
 January 1990

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1984	1985	1986	1987	1988
North America	100.00	100.00	100.00	100.00	100.00
International	0	0	0	0	0

Source: Dataquest  
 January 1990

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1987	1988
Direct Sales	100.00	100.00
Indirect Sales	0	0

Source: Dataquest  
 January 1990

---

## 1988 SALES OFFICE LOCATIONS

North America—Not available  
Japan—Not available  
Europe—Not available  
Asia/Pacific—Not available  
ROW—Not available

---

## MANUFACTURING LOCATIONS

According to the Modified Final Judgment (MFJ), which is the final set of instructions for the restructuring of the Bell System, the RBOCs are not allowed to manufacture telecommunications products after the divestiture.

---

## SUBSIDIARIES

### *North America*

New England Telephone and Telegraph Company  
New York Telephone Company

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

1989

**Compression Labs Inc. (CLI)**  
CLI is to supply videoconferencing equipment for NYNEX turnkey videoconferencing.

---

## MERGERS AND ACQUISITIONS

1989

**Centigram Corporation**  
NYNEX is to purchase Centigram voice processing systems.

1988

**AGS Computers Inc.**  
NYNEX acquired systems development and software.

1987

**CAP International**  
NYNEX acquired this business systems market research and consulting company.

---

## KEY OFFICERS

**William C. Ferguson**  
President, chief executive officer, and chairman of the board

**William G. Burns**  
Vice chairman of the board

**Raymond F. Burke**  
Executive vice president and general counsel

**Robert J. Eckenrode**  
Executive vice president

**James E. Hennessy**  
Executive vice president

**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December**  
**(Millions of U.S. Dollars, except Per Share Data)**

<b>Balance Sheet*</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
<b>Total Current Assets</b>	\$3,037.5	\$2,967.0	\$3,414.0	\$3,527.8	\$3,630.2
Cash	452.1	170.8	232.8	358.2	125.7
Receivables	1,953.7	2,072.1	2,201.2	2,241.8	2,510.4
Inventory	164.9	202.5	330.5	381.9	386.4
Other Current Assets	466.8	521.6	649.5	545.9	607.7
<b>Net Property, Plants</b>	\$16,376.9	\$17,106.7	\$17,903.5	\$18,531.0	\$19,288.5
<b>Other Assets</b>	\$439.0	\$526.0	\$487.1	\$947.0	\$2,443.4
<b>Total Assets</b>	<b>\$19,853.4</b>	<b>\$20,599.7</b>	<b>\$21,804.6</b>	<b>\$23,005.8</b>	<b>\$25,362.1</b>
<b>Total Current Liabilities</b>	\$2,700.2	\$2,649.6	\$2,886.2	\$2,925.2	\$4,147.5
<b>Long-Term Debt</b>	\$5,442.6	\$5,403.4	\$5,475.6	\$6,269.9	\$6,241.3
<b>Other Liabilities</b>	\$3,856.2	\$4,197.9	\$4,574.4	\$4,614.2	\$5,553.8
<b>Total Liabilities</b>	<b>\$11,999.0</b>	<b>\$12,250.9</b>	<b>\$12,936.2</b>	<b>\$13,809.3</b>	<b>\$15,942.6</b>
<b>Total Shareholders' Equity</b>	\$7,854.4	\$8,348.8	\$8,868.4	\$9,196.5	\$9,419.5
Common Stock	100.5	101.1	202.7	204.4	204.5
Other Equity	5,728.9	5,774.4	5,776.7	5,585.2	5,289.9
Retained Earnings	2,025.0	2,473.3	2,889.0	3,406.9	3,925.1
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$19,853.4</b>	<b>\$20,599.7</b>	<b>\$21,804.6</b>	<b>\$23,005.8</b>	<b>\$25,362.1</b>
<b>Income Statement</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
<b>Revenue</b>	\$9,573.0	\$10,314.0	\$11,341.0	\$12,084.0	\$12,661.0
<b>Maintenance Expense</b>	\$2,085.0	\$2,120.0	\$2,186.0	\$2,268.0	\$3,303.0
<b>Capital Expense**</b>	\$1,844.0	\$2,108.0	\$2,414.0	\$2,551.0	\$2,784.0
<b>Pretax Income</b>	\$1,623.5	\$2,408.0	\$2,105.0	\$1,954.7	\$1,688.2
<b>Pretax Margin (%)</b>	16.96	23.35	18.56	16.18	13.33
<b>Effective Tax Rate (%)</b>	37.30	39.90	40.30	31.69	20.20
<b>Net Income</b>	\$986.0	\$1,095.0	\$1,215.0	\$1,277.0	\$1,315.0
<b>Shares Outstanding, Millions</b>	195.0	202.0	202.0	204.0	198.3
<b>Per Share Data***</b>					
Earnings	\$5.05	\$5.42	\$6.01	\$6.26	\$6.63
Dividends	\$3.00	\$3.20	\$3.48	\$3.80	\$4.04
Book Value	\$39.08	\$41.29	\$43.75	\$45.65	\$47.83

\*Certain financial information for years prior to 1988 has been reclassified.

\*\*Excludes additions under capital lease obligations and the equity component of interest charged construction.

\*\*\*Amounts for 1985 and 1984 have been restated to reflect the stock split effected in the form of a 100 percent stock dividend declared on March 20, 1986.



**Table 4 (Continued)**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December**  
**(Millions of U.S. Dollars, except Per Share Data)**

Key Financial Ratios	1984	1985	1986	1987	1988
<i>Liquidity</i>					
Current (Times)	1.12	1.12	1.18	1.21	0.88
Quick (Times)	1.06	1.04	1.07	1.08	0.78
Fixed Assets/Equity (%)	208.51	204.90	201.88	201.50	204.77
Current Liabilities/Equity (%)	34.38	31.74	32.54	31.81	44.03
Total Liabilities/Equity (%)	152.77	146.74	145.87	150.16	169.25
<i>Profitability (%)</i>					
Return on Assets	-	5.41	5.73	5.70	5.44
Return on Equity	-	13.52	14.11	14.14	14.13
Profit Margin	10.30	10.62	10.71	10.57	10.39
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	N/A	N/A	N/A	N/A	N/A
Capital Spending % of Revenue	19.26	20.44	21.29	21.11	21.99
Employees	94,900	89,600	90,200	95,300	97,400
Revenue (\$K)/Employee	\$100.87	\$115.11	\$125.73	\$126.80	\$129.99
Capital Spending % of Assets	9.29	10.23	11.07	11.09	10.98

N/A = Not Available

Source: NYNEX Corporation  
 Annual Reports  
 Dataquest  
 January 1990



## Océ-van der Grinten N.V.

P.O. Box 101  
5900 MA Venlo  
Netherlands  
Telephone: 077-592222  
Telex: 58037  
Fax: 077-544700  
Dun's Number: 40-200-6928  
*Date Founded: 1877*

### CORPORATE STRATEGIC DIRECTION

Océ-van der Grinten N.V. is the parent company of an international group of companies called the Océ Group. The Océ Group product line consists of a range of copiers and copier supplies for both commercial and design engineering offices; it also includes pen plotters, thermal plotters, and office automation products such as word processors and laser printers. The Group is divided into two product segments: office systems and design engineering.

In the United States, the organization of the Company's office and design engineering copying businesses has been streamlined by combining the two main offices within one organization, Océ-USA Inc., located in Chicago. The Company's goal is to strengthen its market share.

Total revenue increased 14.1 percent to F 2.1 billion (US\$1 billion) in 1989 from F 1.9 billion (US\$934 million) in the previous year. Investments in rented copiers amounted to F 270 million (US\$127 million). In addition to rentals, the Company offers the possibility of leasing to support the sale of machines. The lease portfolio increased nearly 30 percent to F 225 million (US\$106 million). (Percentage changes refer only to F amounts; US\$ percentage changes will differ because of fluctuations in Dataquest exchange rates.)

In 1989, sales in the office systems market grew 8.0 percent to F 1.1 billion (US\$519 million), representing 53.4 percent of total revenue. Sales and rentals of office copiers grew most notably in Western Europe. Sales in the design engineering market,

including those of Océ Graphics, increased 22.0 percent, reaching F 994 million, or 46.4 percent of total revenue.

Net income increased in 1989 11.3 percent to F 84.7 million (US\$40.0 million) from F 76.1 million (US\$38.1 million) in 1988 because of increases in revenue and decreases in associated selling costs.

R&D expenditure totaled F 141.5 million (US\$66.8 million) in 1989, showing an increase of 25.7 percent from F 112.6 million (US\$56.3 million) posted in 1988. The increase was primarily because of the addition of 131 employees in this sector, as well as the costs of research equipment and further apparatus involved in product development. The Company aims to achieve an increase in R&D efforts that is in line with the growth in sales.

Capital expenditure decreased 9.6 percent, totaling F 111 million (US\$52 million) and representing 5.2 percent of total revenue. Following the completion of an extensive program aimed at the expansion of research capacity and production lines in the Netherlands and of office premises in various countries, the capital projects in 1989 primarily involved replacement investment. The Company employed 11,117 people during 1989.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region and distribution channel. Tables 4 and 5, comprehensive financial statements, are at the end of this profile. Because of the Company's accounting methods, a financial ratio analysis is not available.

## BUSINESS SEGMENT STRATEGIC DIRECTION

### Office Systems

The Company has strengthened its position in the office market on the basis of copiers in the mid- and high-volume segment (15,000 to 500,000 copies per month). In recent years, Océ's strategy has enhanced its product line by offering customers a complete product range, devoting attention to lower-volume copiers. In March 1989, Océ introduced the Océ 2500, developed for high-volume applications (100,000 to 500,000 copies per month). Océ in late 1990 introduced the Océ 2400, which is designed to reinforce the Océ product offering for the high-volume self-service corridor copying. The Company placed a great emphasis on continuous improvements of the reliability and customer uptime of its product by the following:

- The installation of an automated information system for service call and dispatch
- Training and education of service technicians
- Making improvements to the previously installed machines on the customer's premises to further increase quality and reliability

For the Company's activities in the area of office automation, Océ focuses on the market for the automated production of forms, reports, and documents. Océ expects this market to grow in the years ahead. At the heart of this market is the Océ 6750 laser printer. The Company now offers interfaces to link up with leading computer networks as well as a complete system for integrated document generation. However, this is a new market for Océ, one that will require a significant cash outlay before the Company will be competitive. The market will contribute to the bottom line only in the long run.

Dataquest estimates that Océ had less than a 1 percent market share in the US plain paper copier (PPC) market, with an estimated 2,600 placements in 1989. However, in Segment 4 Océ had 2.9 percent of the

market in 1989. In the Western European PPC market, Océ had 1.7 percent of the market, with an estimated 20,700 placements in 1989.

In early 1980, Océ-van der Grinten became active in the office automation market word processing segment. Since then, the Company has included desktop publishing systems and the 6750 laser page printer in its product line. The laser printer, currently marketed in Europe, is intended for applications in the medium- and high-volume segments and is compatible with most computer systems and networks currently in use. The presentation of these systems to a large-volume user market is still in its initial stages and is now more of a test market than a strong sales market.

### Design Engineering

The diazo machines and materials for copying large-format originals made the most important contribution to the development of products in the design engineering market. Océ improved and modernized its ten-year-old 4000 series diazo machines, which again increased sales of the low-volume machine. Océ also develops, manufactures, and markets large-size plain paper copiers and microfilm technology.

Design and drawing automation is playing a role of growing importance for the Company. With the acquisition of the graphics division of Schlumberger Ltd., Océ has acquired a strong position in the area of plotters for the computer-aided design (CAD) market. The graphics organization has continued its activities under the name Océ Graphics, expanding both technologically and commercially the activities of Océ-van der Grinten in the design engineering market.

### Further Information

For further information on the Company's business segments, please contact the appropriate Dataquest industry service.

**Table 1**  
**Five-Year Corporate Highlights (Thousands of US Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$591,997.0	\$772,072.7	\$900,381.8	\$934,123.0	\$1,005,952.4
Percent Change	-	30.42	16.62	3.75	7.69
Capital Expenditure	\$29,518.1	\$48,571.4	\$62,069.0	\$60,820.5	\$52,358.5
Percent of Revenue	4.99	6.29	6.89	6.51	5.20
R&D Expenditure	\$25,350.0	\$37,623.3	\$44,566.0	\$56,303.5	\$66,752.4
Percent of Revenue	4.28	4.87	4.95	6.03	6.64
Number of Employees	11,231	11,717	11,492	10,258	11,117
Revenue (\$K)/Employee	\$52,710.98	\$65,893.37	\$78,348.57	\$91,062.88	\$90,487.75
Net Income	\$23,306.0	\$34,321.2	\$36,988.7	\$38,056.5	\$39,959.0
Percent Change	-	47.26	7.77	2.89	5.00
Exchange Rate (US\$1=F)	F 3.32	F 2.45	F 2.03	F 2.00	F 2.12
1989 Calendar Year		Q1	Q2	Q3	Q4
Quarterly Revenue		NA	NA	NA	NA
Quarterly Profit		NA	NA	NA	NA

NA = Not available

Source: Océ-van der Grinten N.V.  
Annual Reports  
Dataquest (1990)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1985	1986	1987	1988	1989
Europe	68.00	74.00	75.00	78.00	79.00
International	32.00	26.00	25.00	22.00	21.00
North America	16.00	14.00	14.00	14.00	14.00
Asia/Pacific and ROW	16.00	12.00	11.00	8.00	7.00

Source: Océ-van der Grinten N.V.  
Annual Reports  
Dataquest (1990)

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1988*	1989*
Direct Sales	80.00	80.00
Indirect Sales	20.00	20.00
Distributors	20.00	20.00

\*Dataquest estimate

Source: Dataquest (1990)

---

## 1989 SALES OFFICE LOCATIONS

Information is not available.

---

## MANUFACTURING LOCATIONS

### *North America*

Abso Blue Prints Ltd. (Canada)  
Copiers and supplies  
Access Corporation (United States)  
Copiers and supplies  
Arkwright Inc. (United States)  
Copiers and supplies  
Océ Industries Inc. (United States)  
Copiers

### *Europe*

Ciap S.A. (France)  
Supplies  
Ficut S.p.A. (Italy)  
Supplies  
Océ-France S.A. (France)  
Supplies  
Océ-Graphics France S.A. (France)  
Plotters  
Océ-Italia S.p.A. (Italy)  
Supplies  
Océ-Nederland B.V. (Netherlands)  
Copiers and supplies  
Océ Svenska AB (Sweden)  
Supplies  
Ozalid (U.K.) Limited (England)  
Copiers and supplies

### *Asia/Pacific*

Océ-Australia Limited (Australia)  
Copiers and supplies  
Océ-New Zealand Limited (New Zealand)  
Copiers and supplies

### *ROW*

Océ-Copirama Comercio e Industrias Ltda. (Brazil)  
Copiers and supplies

---

## SUBSIDIARIES

### *North America*

Abso Blue Prints Ltd. (10 percent) (Canada)  
Access Corporation (32 percent) (United States)  
Arkwright Inc. (United States)  
Océ Credit Corporation (United States)  
Océ-Graphics USA Inc. (United States)  
Océ Industries Inc. (United States)  
Océ-USA Inc. (United States)

### *Europe*

A. Messerli A.G. (20 percent) (Switzerland)  
Ciap S.A. (France)  
Ficut S.p.A. (Italy)  
Heliozid Océ Reprographic Ltd. (25 percent)  
(Cyprus)  
Océ-Belgium S.A./N.V. (Belgium)  
Océ Copiers (U.K.) Limited (England)  
Océ-Denmark AS (Denmark)  
Océ-Deutschland GmbH (Germany)  
Océ-España S.A. (Spain)  
Océ-France Financement S.A. (France)  
Océ-France S.A. (France)  
Océ Graphics A.G. (Switzerland)  
Océ-Graphics Belgium S.A., (Belgium)  
Océ-Graphics Danmark AG (Denmark)  
Océ Graphics Deutschland GmbH (Germany)  
Océ Graphics España S.A. (Spain)  
Océ Graphics Italia S.p.A. (Italy)  
Océ-Graphics Nederland B.V. (Netherlands)  
Océ Graphics Norge A.G. (Norway)  
Océ-Graphics S.A. (France)  
Océ Graphics Svenska AB (Sweden)  
Océ Graphics U.K. Ltd. (United Kingdom)  
Océ -Herverzekekeringsmaatschappij B.V.  
(Netherlands)  
Océ Holding Deutschland GmbH (Germany)  
Océ-Interholdings B.V. (Netherlands)  
Océ-International B.V. (Netherlands)  
Océ-Italia S.p.A. (Italy)  
Océ-Nederland B.V. (Netherlands)  
Océ Nederlandse Verkoopmaatschappij B.V.  
(Netherlands)  
Océ-New Zealand Limited (New Zealand)  
Océ-Norge A.S. (Norway)  
Océ-Osterreich Ges m.b.H. (Austria)  
Océ Svenska AB (Sweden)  
Océ (U.K.) Limited (England)

Océ (U.K.) Office Automation Limited (England)  
Océ-Wissenschaftliches Forschungsinstitut A.G.  
(Switzerland)  
Ozalid Group Export Limited (England)  
Ozalid (U.K.) Limited (England)

*Asia/Pacific*

Océ-Asia Limited (Hong Kong)  
Océ-Australia Limited (Australia)  
Océ-Hagemeyer (Far East) Pte. (Singapore)  
Océ-Hagemeyer (Hong Kong) Ltd. (51 percent)  
(Hong Kong)  
Océ-Hagemeyer (Singapore) Pte. Ltd. (51 percent)  
(Singapore)

*ROW*

Jati Océ Sendirian Berhat (Brunei)  
Lemac Empreendimentos S.A. (49 percent) (Brazil)  
Océ-Copirama Comercio e Industrias Ltda. (Brazil)  
Océ-Hagemeyer (Singapore) Pte. (Darus-  
salam-Brunei)

---

**ALLIANCES, JOINT VENTURES, AND  
LICENSING AGREEMENTS**

Information is not available.

---

**MERGERS AND ACQUISITIONS**

Information is not available.

---

**KEY OFFICERS**

**J. V. H. Pennings**  
Chairman of the board of executive directors

**HJ. A. F. Neertens**  
Member of the board of executive directors

**M. J. Raajmakers**  
Director of Business Unit Office Systems

**E. C. de la Houssaye**  
Director of Business Unit Design Engineering

**H. H. Weersink**  
Director of Business Unit Office Automation

**L. J. A. Giesen**  
Director of Corporate Personnel and Organization

---

**PRINCIPAL INVESTORS**

Information is not available.

---

**FOUNDERS**

Information is not available.

**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending November**  
**(Thousands of US Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Total Current Assets</b>	\$275,646.7	\$396,335.9	\$465,618.7	\$487,792.5	\$541,379.7
Stocks and WIP	116,501.5	168,065.3	168,318.2	166,548.5	169,711.8
Debtors	148,698.5	205,310.6	271,036.5	291,982.0	318,062.7
Receivables from Nonconsolidated					
Holdings	263.9	358.4	604.4	909.5	670.8
Payments in Advance	2,492.2	4,175.5	6,072.9	8,096.5	13,737.3
Liquid Assets	7,690.7	18,426.1	19,586.7	20,256.0	39,197.2
<b>Tangible Fixed Assets</b>	\$241,386.4	\$335,186.1	\$406,216.7	\$436,942.0	\$459,842.9
Net Property, Plants	138,404.5	193,179.2	219,128.1	243,369.0	263,091.0
Rented Copiers	125,561.7	173,114.3	227,859.6	234,037.5	227,411.3
Investment Grants	(22,579.8)	(31,107.3)	(40,770.9)	(40,464.5)	(30,659.4)
<b>Financial Fixed Assets</b>	\$18,494.0	\$42,621.6	\$31,884.4	\$44,595.3	\$54,798.3
Nonconsolidated Holdings	2,251.5	3,321.6	6,705.4	8,111.5	14,530.7
Other Financial Assets	16,242.5	39,300.0	51,113.3	72,967.5	85,367.5
<b>Total Assets</b>	<b>\$535,527.1</b>	<b>\$774,143.7</b>	<b>\$903,719.9</b>	<b>\$969,329.8</b>	<b>\$1,056,021.0</b>
<b>Total Current Liabilities</b>	<b>\$168,069.6</b>	<b>\$309,093.9</b>	<b>\$375,681.8</b>	<b>\$352,812.0</b>	<b>\$393,838.7</b>
<b>Long-Term Debt</b>	<b>\$101,192.5</b>	<b>\$98,305.3</b>	<b>\$94,917.2</b>	<b>\$144,075.0</b>	<b>\$184,424.5</b>
<b>Other Liabilities</b>	<b>\$43,325.0</b>	<b>\$60,432.7</b>	<b>\$72,609.9</b>	<b>\$78,888.5</b>	<b>\$91,275.0</b>
<b>Total Liabilities</b>	<b>\$312,587.0</b>	<b>\$467,831.8</b>	<b>\$543,208.9</b>	<b>\$575,775.5</b>	<b>\$669,538.2</b>
<b>Total Shareholders' Equity</b>	<b>\$211,318.7</b>	<b>\$304,435.1</b>	<b>\$383,863.1</b>	<b>\$428,758.0</b>	<b>\$429,459.0</b>
Ordinary Share Capital	15,850.9	23,276.3	28,683.7	29,249.0	28,361.3
Priority Shares	0.9	1.2	1.5	1.5	1.4
Share Premium Account	91,567.8	155,909.4	193,588.2	197,553.5	194,442.9
Revaluation Reserve	17,478.3	24,405.3	31,921.2	33,843.0	43,663.7
Statutory Reserves	8,559.6	23,559.2	41,777.3	3,963.5	3,432.1
Other Reserves	77,861.1	77,283.7	87,891.1	164,147.5	159,557.5
<b>Outside Shareholders' Interest</b>	<b>\$11,621.4</b>	<b>\$1,876.7</b>	<b>\$2,582.3</b>	<b>\$1,280.0</b>	<b>\$2,123.6</b>
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$535,527.1</b>	<b>\$774,143.7</b>	<b>\$929,654.2</b>	<b>\$1,005,813.5</b>	<b>\$1,101,120.8</b>



Table 4 (Continued)  
 Comprehensive Financial Statement  
 Fiscal Year Ending November  
 (Thousands of US Dollars, except Per Share Data) (Continued)

Income Statement	1985	1986	1987	1988	1989
Revenue	\$591,997.0	\$772,072.7	\$900,381.8	\$934,123.0	\$1,005,952.4
Sales	380,901.5	468,642.0	514,390.6	516,789.5	556,028.3
Rentals and Service	211,095.5	303,430.6	385,991.1	417,333.5	449,924.1
Cost of Sales	\$196,847.3	\$224,678.8	\$234,860.6	\$235,522.0	\$253,591.5
Cost of Rentals and Service	\$114,734.3	\$167,533.9	\$213,338.9	\$236,226.0	\$267,560.8
R&D Expense	\$25,350.0	\$37,623.3	\$44,566.0	\$56,303.5	\$66,752.4
SG&A Expense	\$211,183.4	\$282,010.6	\$341,795.1	\$344,603.5	\$349,740.1
Capital Expense	\$29,518.1	\$48,571.4	\$62,069.0	\$60,820.5	\$52,358.5
Pretax Income	\$31,453.3	\$45,970.2	\$35,715.8	\$52,452.5	\$57,003.3
Pretax Margin (%)	5.31	5.95	3.97	5.62	5.67
Net Income	\$23,306.0	\$34,321.2	\$36,988.7	\$38,056.5	\$39,959.0
Shares Outstanding, Thousands	2,631.2	2,851.3	2,911.4	2,924.9	3,006.3
<i>Per Share Data</i>					
Earnings	NA	NA	NA	NA	NA
Dividend	NA	NA	NA	\$5.00	\$4.72
Book Value	\$80.31	\$106.77	\$131.85	\$146.59	\$142.85
Exchange Rate (US\$1=F)	F 3.32	F 2.45	F 2.03	F 2.00	F 2.12

NA = Not available

Source: Océ-van der Grinten N.V.  
 Annual Reports  
 Dataquest (1990)

**Table 5**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending November**  
**(Thousands of Guilders, except Per Share Data)**

Balance Sheet	1985	1986	1987	1988	1989
Total Current Assets	F 915,147.0	F 971,023.0	F 945,206.0	F 975,585.0	F 1,147,725.0
Stocks and WIP	386,785.0	411,760.0	341,686.0	333,097.0	359,789.0
Debtors	493,679.0	503,011.0	550,204.0	583,964.0	674,293.0
Receivables from Nonconsolidated Holdings	876.0	878.0	1,227.0	1,819.0	1,422.0
Payments in Advance	8,274.0	10,230.0	12,328.0	16,193.0	29,123.0
Liquid Assets	25,533.0	45,144.0	39,761.0	40,512.0	83,098.0
Tangible Fixed Assets	F 801,403.0	F 821,206.0	F 824,620.0	F 873,884.0	F 974,867.0
Net Property, Plants	459,503.0	473,289.0	444,830.0	486,738.0	557,753.0
Rented Copiers	416,865.0	424,130.0	462,555.0	468,075.0	482,112.0
Investment Grants	(74,965.0)	(76,213.0)	(82,765.0)	(80,929.0)	(64,998.0)
Financial Fixed Assets	F 61,400.0	F 104,423.0	F 117,372.0	F 162,158.0	F 211,784.0
Nonconsolidated Holdings	7,475.0	8,138.0	13,612.0	16,223.0	30,805.0
Other Financial Assets	53,925.0	96,285.0	103,760.0	145,935.0	180,979.0
Total Assets	F 1,777,950.0	F 1,896,652.0	F 1,887,198.0	F 2,011,627.0	F 2,334,376.0
Total Current Liabilities	F 557,991.0	F 757,280.0	F 762,634.0	F 705,624.0	F 834,938.0
Long-Term Debt	F 335,959.0	F 240,848.0	F 192,682.0	F 288,150.0	F 390,980.0
Other Liabilities	F 143,839.0	F 148,060.0	F 147,398.0	F 157,777.0	F 193,503.0
Total Liabilities	F 1,037,789.0	F 1,146,188.0	F 1,102,714.0	F 1,151,551.0	F 1,419,421.0
Total Shareholders' Equity	F 701,578.0	F 745,866.0	F 779,242.0	F 857,516.0	F 910,453.0
Ordinary Share Capital	52,625.0	57,027.0	58,228.0	58,498.0	60,126.0
Priority Shares	3.0	3.0	3.0	3.0	3.0
Share Premium Account	304,005.0	381,978.0	392,984.0	395,107.0	412,219.0
Revaluation Reserve	58,028.0	59,793.0	64,800.0	67,686.0	92,567.0
Statutory Reserves	28,418.0	57,720.0	84,808.0	7,927.0	7,276.0
Other Reserves	258,499.0	189,345.0	178,419.0	328,295.0	338,262.0
Outside Shareholders' Interest	F 38,583.0	F 4,598.0	F 5,242.0	F 2,560.0	F 4,502.0
Total Liabilities and Shareholders' Equity	F 1,777,950.0	F 1,896,652.0	F 1,887,198.0	F 2,011,627.0	F 2,334,376.0

**Table 5 (Continued)**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending November**  
**(Thousands of Guilders, except Per Share Data)**

<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Revenue	F 1,965,430.0	F 1,891,578.0	F 1,827,775.0	F 1,868,246.0	F 2,132,619.0
Sales	1,264,593.0	1,148,173.0	1,044,213.0	1,033,579.0	1,178,780.0
Rentals and Service	700,837.0	743,405.0	783,562.0	834,667.0	953,839.0
Cost of Sales	F 653,533.0	F 550,463.0	F 476,767.0	F 471,044.0	F 537,614.0
Cost of Rentals and Service	F 380,918.0	F 410,458.0	F 433,078.0	F 472,452.0	F 567,229.0
R&D Expense	F 84,162.0	F 92,177.0	F 90,469.0	F 112,607.0	F 141,515.0
SG&A Expense	F 701,129.0	F 690,926.0	F 693,844.0	F 689,207.0	F 741,449.0
Capital Expense	F 98,000.0	F 119,000.0	F 126,000.0	F 121,641.0	F 111,000.0
Pretax Income	F 104,425.0	F 112,627.0	F 72,503.0	F 104,905.0	F 120,847.0
Pretax Margin (%)	5.31	5.95	3.97	5.62	5.67
Net Income	F 77,376.0	F 84,087.0	F 75,087.0	F 76,113.0	F 84,713.0
Shares Outstanding, Thousands	2,631.2	2,851.3	2,911.4	2,924.9	3,006.3
<i>Per Share Data</i>					
Earnings	NA	NA	NA	NA	NA
Dividend	NA	NA	NA	F 10.00	F 10.00
Book Value	F 266.64	F 261.59	F 267.65	F 293.18	F 302.85
Exchange Rate (US\$1=F)	F 3.32	F 2.45	F 2.03	F 2.00	F 2.12

NA = Not available

Source: Océ-van der Grinten N.V.  
 Annual Reports  
 Dataquest (1990)

## Océ-van der Grinten N.V.

P.O. Box 101, 5900 MA Venlo  
St. Urbanusweg 43, 5914 CC Venlo, The Netherlands

Telephone: 077-592222

Fax: 077-544700

Dun's Number: 40-200-6928

*Date Founded: 1877*

---

### CORPORATE STRATEGIC DIRECTION

Océ-van der Grinten N.V. is the parent company of an international group of companies called the Océ Group. The Océ Group product line consists of a range of copiers and copying supplies for both commercial and design engineering offices. It includes office automation products such as word processors and laser printers.

In 1988, office systems accounted for 56 percent of the Company's total sales; design engineering accounted for 44 percent. However, design engineering had the largest growth rate, 9 percent, as opposed to the office systems growth rate of 6 percent. Both product groups are very important to Océ-van der Grinten's continued success and future growth.

Océ's total revenue increased 4 percent to \$934 million\* in fiscal 1988 from \$900 million in fiscal 1987. Its net income increased 3 percent to \$38 million from \$37 million in fiscal 1987. Océ-van der Grinten employs more than 10,000 people worldwide.

The European sales contribution to the Company's total revenue grew to \$728 million in fiscal 1988, accounting for 78 percent of total sales and up from 75 percent in fiscal 1987. Most of the Company's sales offices are in Europe.

Research and development expenditures totaled \$56.3 million in fiscal 1988 representing 6.0 percent of revenue. Capital expenditures totaled \$60.8 million, or 6.5 percent of revenue.

---

\*All dollar amounts are in U.S. dollars.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region and distribution channel. Table 4, a comprehensive financial statement, is at the end of this profile. Due to the Company's accounting methods, a financial ratio analysis is not available.

---

### BUSINESS SEGMENT STRATEGIC DIRECTION

#### Office Systems

Office systems accounted for 56 percent of the Company's fiscal 1988 revenue. In the office copier market, Océ has previously concentrated mainly on the medium- and high-volume segments, in which between 10,000 and 100,000 copies are produced per machine per month. In March 1989, the Company introduced a completely new copier for the high- to very high-volume segment: the Océ 2500. Océ's long-term strategy is to use this machine as an entry into this large market, a new segment for Océ, in which large-scale users produce many more than 100,000 copies per machine per month. To improve overall service to its customers, Océ is devoting extra attention to the sale of paper and other materials on which copies can be made. Dataquest estimates that Océ captured less than 1 percent of the U.S. 1988 market share. In the medium- and high-volume segment, it ranked among the top 10 U.S. vendors, but it still has not captured a large market share percentage.

In early 1980, Océ-van der Grinten became active in the office automation market word processing

segment. Since then, the Company has included desktop publishing systems and a laser page printer in its product line. The laser printer, currently marketed in Europe, is intended for applications in the medium- and high-volume segments and is compatible with most computer systems and networks currently in use. The large-volume user market for these systems is still in its initial stages and is more of a test market.

### **Design Engineering**

Diazo products for copying large-format originals are the most important revenue contributors of the design

engineering group. These products provided most of the 44 percent of revenue that Océ's design engineering group contributes to the Company. In addition, the sales of plain paper copiers also are progressing well, both for copying large-format originals and for making copies from microfilms.

### **Further Information**

For more information about the Company's business segments, please contact the appropriate industry service.

**Table 1**  
**Five-Year Corporate Highlights (Millions of U.S. Dollars)**

	1984	1985	1986	1987	1988
Five-Year Revenue	\$569.7	\$592.0	\$772.1	\$900.4	\$934.1
Percent Change	-	3.91	30.42	16.62	3.75
Capital Expenditure	\$29.0	\$29.5	\$48.6	\$62.1	\$60.8
Percent of Revenue	5.09	4.99	6.29	6.89	6.51
R&D Expenditure	\$20.9	\$25.4	\$37.6	\$44.6	\$56.3
Percent of Revenue	3.67	4.28	4.87	4.95	6.03
Number of Employees	11,253	11,231	11,717	11,492	10,258
Revenue (\$K)/Employee	\$50.63	\$52.71	\$65.89	\$78.35	\$91.06
Net Income	\$20.1	\$23.3	\$34.3	\$37.0	\$38.1
Percent Change	-	15.81	47.26	7.77	2.89
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	
Quarterly Revenue	N/A	N/A	N/A	N/A	
Quarterly Profit	N/A	N/A	N/A	N/A	

N/A = Not Available

Source: Océ-van der Grinten  
 Annual Reports  
 Dataquest  
 January 1990

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1984	1985	1986	1987	1988
Europe	67.00	68.00	74.00	75.00	78.00
International	33.00	32.00	26.00	25.00	22.00
North and South America	14.00	16.00	14.00	14.00	14.00
Asia/Pacific and ROW	19.00	16.00	12.00	11.00	8.00

Source: Océ-van der Grinten  
 Annual Reports

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1987	1988
Direct Sales	80.00	80.00
Indirect Sales	20.00	20.00
Distributors	20.00	20.00

Source: Dataquest  
 January 1990

---

## 1989 SALES OFFICE LOCATIONS

North America—Not available  
Japan—Not available  
Europe—Not available  
Asia/Pacific—Not available  
ROW—Not available

---

## MANUFACTURING LOCATIONS

### *North America*

Abso Blue Prints Ltd. (Canada)  
Copiers  
Access Corporation (United States)  
Copiers  
Arkwright Inc. (United States)  
Copiers  
Océ Industries Inc. (United States)  
Copiers

### *Europe*

Ciap S.A. (France)  
Copiers  
Ficut S.p.A. (Italy)  
Copiers  
Océ-France S.A. (France)  
Copiers  
Océ-Italia S.p.A. (Italy)  
Copiers  
Océ-Nederland B.V. (Netherlands)  
Copiers  
Océ Svenska AB (Sweden)  
Copiers  
Ozalid (U.K.) Limited (England)  
Copiers

### *Asia/Pacific*

Océ-Australia Limited (Australia)  
Copiers  
Océ-New Zealand Limited (New Zealand)  
Copiers

### *ROW*

Océ-Copirama Comercio e Industrias Ltda. (Brazil)  
Copiers

---

## SUBSIDIARIES (Wholly Owned except Where Indicated)

### *North America*

Abso Blue Prints Ltd. (10 percent) (Canada)  
Access Corporation (32 percent) (United States)  
Arkwright Inc. (United States)  
Océ Credit Corporation (United States)  
Océ Industries Inc. (United States)  
Océ-USA Inc. (United States)

### *Europe*

A. Messerli A.G. (20 percent) (Switzerland)  
BSO-Beheer B.V. (25 percent) (Netherlands)  
Ciap S.A. (France)  
Ficut S.p.A. (Italy)  
Océ-Belgium S.A./N.V. (Belgium)  
Océ Copiers (U.K.) Limited (England)  
Océ-Denmark AS (Denmark)  
Océ-Deutschland GmbH (Germany)  
Océ-Espana S.A. (Spain)  
Océ-France S.A. (France)  
Océ -Herverzekekeringsmaatschappij B.V.  
(Netherlands)  
Océ-Interholdings B.V. (Netherlands)  
Océ-Interlux S.A. (Luxembourg)  
Océ-International B.V. (Netherlands)  
Océ-Italia S.p.A. (Italy)  
Océ-Nederland B.V. (Netherlands)  
Océ Nederlandse Verkoopmaatschappij B.V.  
(Netherlands)  
Océ-Norge A.S. (Norway)  
Océ-Osterreich Ges m.b.H. (Austria)  
Océ Svenska AB (Sweden)  
Océ (U.K.) Limited (England)  
Océ (U.K.) Office Automation Limited (England)  
Océ-Wissenschaftliches Forschungsinstitut A.G.  
(Switzerland)  
Ozalid Group Export Limited (England)  
Ozalid (U.K.) Limited (England)

### *Asia/Pacific*

Océ-Asia Limited  
Océ-Australia Limited (Australia)  
Océ-Hagemeyer (Hong Kong) Ltd. (51 percent)  
(Hong Kong)  
Océ-Hagemeyer (Singapore) Pte. Ltd. (51 percent)  
(Singapore)  
Océ-New Zealand Limited (New Zealand)

**ROW**

Heliozid Océ Reprographic Ltd. (25 percent)  
(Cyprus)  
Jati Océ Sendirian Berhat (Brunei)  
Lemac Empreendimentos S.A. (49 percent) (Brazil)  
Océ-Copirama Comercio e Industrias Ltda. (Brazil)

---

**KEY OFFICERS**

**H. Bodt**  
Chairman of the board of executive directors

**Chr. O. van der Grinten**  
Member of the board of executive directors

**J. V. H. Pennings**  
Member of the board of executive directors

**E. J. J. C. van Groeningen**  
Staff director and secretary

**N. J. Raaijmakers**  
Director and general manager, Business Unit  
Office Systems

**E. C. de la Houssaye**  
Director and general manager, Business Unit  
Design

**H. J. Weersuik**  
Director and general manager, Business Unit  
Automation

**P. Louwler**  
Director, Corporate Personnel and Organization

**H. J. A. F. Meerteus**  
Director, Finance and Administration



**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending November**  
**(Millions of U.S. Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
Total Current Assets	\$281.1	\$275.6	\$396.3	\$465.6	\$487.8
Stocks and Work in Progress	124.7	116.5	168.1	168.3	166.5
Debtors	140.6	148.7	205.3	271.0	292.0
Receivables from Nonconsolidated Holdings	0.4	0.3	0.4	0.6	0.9
Payments in Advance	6.0	2.5	4.2	6.1	8.1
Liquid Assets	9.4	7.7	18.4	19.6	20.3
Tangible Fixed Assets	\$239.6	\$241.4	\$335.2	\$406.2	\$436.9
Net Property, Plants	143.1	138.4	193.2	219.1	243.4
Rented Copiers	116.2	125.6	173.1	227.9	234.0
Investment Grants	(19.7)	(22.6)	(31.1)	(40.8)	(40.5)
Financial Fixed Assets	\$8.5	\$18.5	\$42.6	\$57.8	\$81.1
Nonconsolidated Holdings	1.6	2.3	3.3	6.7	8.1
Other Financial Assets	6.9	16.2	39.3	51.1	73.0
<b>Total Assets</b>	<b>\$529.1</b>	<b>\$535.5</b>	<b>\$774.1</b>	<b>\$929.7</b>	<b>\$1,005.8</b>
Total Current Liabilities	\$173.1	\$168.1	\$309.1	\$375.7	\$352.8
Long-Term Debt	\$95.9	\$101.2	\$98.3	\$94.9	\$144.1
Other Liabilities	\$39.3	\$43.3	\$60.4	\$72.6	\$78.9
<b>Total Liabilities</b>	<b>\$308.2</b>	<b>\$312.6</b>	<b>\$467.8</b>	<b>\$543.2</b>	<b>\$575.8</b>
Total Shareholders' Equity	\$213.7	\$211.3	\$304.4	\$383.9	\$428.8
Ordinary Share Capital	15.5	15.9	23.3	28.7	29.2
Priority Shares	0	0	0	0	0
Share Premium Account	86.0	91.6	155.9	193.6	197.6
Revaluation Reserve	18.0	17.5	24.4	31.9	33.8
Statutory Reserves	0	8.6	23.6	41.8	4.0
Other Reserves	94.3	77.9	77.3	87.9	164.1
Outside Shareholders' Interest	\$7.2	\$11.6	\$1.9	\$2.6	\$1.3
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$529.1</b>	<b>\$535.5</b>	<b>\$774.1</b>	<b>\$929.7</b>	<b>\$1,005.8</b>
<b>Income Statement</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
Revenue	\$569.7	\$592.0	\$772.1	\$900.4	\$934.1
Sales	389.8	380.9	468.6	514.4	516.8
Rentals and Service	179.9	211.1	303.4	386.0	417.3
Cost of Sales	\$206.8	\$196.8	\$224.7	\$234.9	\$235.5
Cost of Rentals and Service	\$99.7	\$114.7	\$167.5	\$213.3	\$236.2
R&D Expense	\$20.9	\$25.4	\$37.6	\$44.6	\$56.3
SG&A Expense	\$198.3	\$211.2	\$282.0	\$341.8	\$344.6
Capital Expense	\$29.0	\$29.5	\$48.6	\$62.1	\$60.8
Pretax Income	\$30.0	\$31.5	\$46.0	\$35.7	\$52.5
Pretax Margin (%)	5.27	5.31	5.95	3.97	5.62
Net Income	\$20.1	\$23.3	\$34.3	\$37.0	\$38.1
Shares Outstanding, Millions	2,492.6	2,631.2	2,851.3	2,911.4	2,924.9

**Table 4 (Continued)**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending November**  
**(Millions of U.S. Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
<i>Per Share Data</i>					
Earnings	N/A	N/A	N/A	N/A	N/A
Dividends	N/A	N/A	N/A	N/A	N/A
Book Value	\$0.09	\$0.08	\$0.11	\$0.13	\$0.15
Exchange Rate: US\$1/F	F 3.21	F 3.32	F 2.45	F 2.03	F 2.00

N/A = Not Available

Source: Océ-van der Grinten  
 Annual Reports  
 Dataquest  
 January 1990

## Octel Communications Corporation

890 Tasman Drive  
Milpitas, California 95035  
Telephone: (408) 942-6500  
Fax: (408) 2-6599  
Dun's Number: Not Available

*Date Founded: 1982*

---

### CORPORATE STRATEGIC DIRECTION

Octel Communications Corporation designs, manufactures, and markets voice processing systems that are sold primarily to large corporate customers and providers of voice information services (VIS), which include telephone companies, cellular service providers, and service bureaus. The Company also sells to smaller businesses and selected vertical markets. Octel offers a broad range of features, PBX integrations, and networking capabilities. As of 1989, Octel had sold and installed over 3,000 systems.

Octel was founded in 1982 by Robert Cohn and Peter D. Olson. The Company went public in 1988. In August 1989, a second public offering of 1.725 million shares of common stock was made and completed, raising approximately \$37.9 million.\*

Octel's principal existing competitors are AT&T, ROLM, and VMX Inc. Octel expects to encounter substantial additional direct competition from these and other established companies, as well as from new market entrants. To date, Octel has competed principally on the merits of its product features and has not encountered significant price competition. Octel believes its ability to integrate its systems with many different PBX and Centrex systems is an important competitive advantage.

Octel sells its products in the United States through distributors, direct sales offices, and an OEM agreement with EXECUTONE Information Systems. In Canada, Australia, New Zealand, and Singapore, it sells through distributors, and in Western Europe through an OEM agreement with Hewlett-Packard.

Total revenue increased 81.6 percent to \$87 million in fiscal 1989 from \$48 million in fiscal 1988. Net

income increased 70.7 percent to \$11.8 million in fiscal 1989 from \$6.9 million in fiscal 1988. Octel employs more than 793 people worldwide.

R&D expenditure totaled \$11.0 million in fiscal 1989, representing 12.6 percent of revenue.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region and distribution channel. Table 4, a comprehensive financial statement, is at the end of this profile.

---

### BUSINESS SEGMENT STRATEGIC DIRECTION

#### Voice Processing Systems

Octel shipped its first product, the Aspen (4 to 24 ports serving up to 2,000 users), in March 1984. It introduced the Aspen Branch (4 or 8 ports, up to 275 users) in May 1985, the Aspen Maxum (16 to 72 ports, up to 15,000 users in VIS applications) in September 1986, and the Aspen Branch XP (4 to 16 ports, up to 275 users) in September 1987. These four products make up the Aspen customer premises equipment (CPE) product line and are designed for medium- to large-size customers with single sites or multiple sites with branch offices. The VPC 100, designed for smaller, single-site customers (2 to 8 ports, up to 100 users), was announced in June 1988. In 1990, Octel entered into the single-platform, multiple-applications voice processing arena with the introduction of the Octel Sierra voice information system (40 to 2,304 ports, up to 500,000 users). Also in 1990, Octel introduced a 216-port Aspen Maxum Super-System with 912 hours of message storage capable of supporting up to 30,000 users for the CPE market.

\*All dollar amounts are in US dollars.

The Company also has released a wide range of software products to enhance the features of the Aspen product line. In 1990, Octel introduced software release 10 and new applications packages that use software segmentation to segment a single voice processing system for use by multiple divisions of a corporation or multiple independent companies.

Each of the Company's products can be purchased with voice mail, enabling any user to send a message to any other user 24 hours per day without calling the user directly. Voice mail also provides telephone answering, which answers any busy or unanswered telephone in a company 24 hours per day and takes a detailed voice message; automated attendant, which answers incoming calls and allows callers to direct calls to telephone extensions without use of a human operator, information center mailboxes, which add a voice bulletin board to the system where multiple callers can directly or indirectly access recorded announcements; and Enhanced Call Processing (ECP), which uses an interactive customized menu function to provide sophisticated call routing.

Octel has developed a flexible system architecture specifically designed to handle the requirements of voice processing applications. Octel's proprietary, modular architecture uses distributed processors, each of which handles a particular part of the total processing task, rather than one large central processor. This gives Octel significant flexibility to configure systems with larger or smaller numbers of ports and hours of message storage to meet a specific customer's capacity and price requirements. A Maxum system can have over 60 distributed processors. This architecture has also facilitated Octel's development of additional product capabilities including PBX and Centrex integrations, networking, and connectivity to computer systems.

Octel has developed integrations that permit its systems to be compatible with, and to communicate directly with, virtually all major brands of PBX telephone systems and certain Centrex systems. Integration allows the customers' voice processing systems to exchange data with PBXs and Centrex systems from different manufacturers. Integration is necessary to permit several important voice processing features. It allows a caller to reach a subscriber's mailbox directly without dialing the subscriber's extension or mailbox number and allows message notification at the subscriber's telephone.

In fiscal 1989, Octel completed and began shipping its eighth and ninth major software releases. Also, the Company announced AspenForms, which collects detailed information from callers, and AspenAnalyst,

designed to help Octel's customers analyze usage statistics from their systems.

In May 1989, Octel made a technological upgrade by moving the 8088 microprocessor to the newer and more powerful 80386 microprocessor on the central processing unit (CPU) of both the Aspen and Maxum systems.

### Networking

AspenNet networking is a software feature that can link a large number of Octel's systems over standard telephone lines. The systems are usually remote and can be of any Octel model. With networking, an Octel user can record a voice message on a local system and request that it be sent to one or more users on other Octel systems included in the network. The message is automatically routed between systems over analog telephone lines, taking advantage of the PBX's low-cost routing alternatives. In addition, normal-priority interlocation messages can be transmitted overnight at lower long distance rates. Urgent messages can be given priority and transmitted immediately. The subscriber sending the message specifies its priority, and the system manager sets transmission schedules and can designate which subscribers have higher priority in sending messages sooner. To maintain ease of use, AspenNet's numbering plan for designating remote mailbox numbers can match a variety of types of telephone system numbering plans that large customers may have already established as part of their private networks. Octel provides network access security using a proprietary encryption system. Networked systems have been installed by customers throughout the United States and in Canada and Australia.

Octel's AspenLink software enables the Company's products to communicate with external computer systems. Using a touch-tone telephone as a terminal, callers can interact with a database on a host computer. With AspenLink and customized application software on an external computer, the Octel system prompts the caller for the commands required to access or update a database. Currently, Octel is pursuing a focused effort to sell this capability in selected vertical markets.

### Further Information

For more information about the Company's business segments, please contact the Dataquest Telecommunications Industry Service (TCIS).

**Table 1**  
**Corporate Highlights (Thousands of US Dollars)\***

	1987	1988	1989	
Three-Year Revenue	\$19,241.0	\$48,006.0	\$87,179.0	
Percent Change	94.00	149.50	81.60	
Capital Expenditure	-	-	-	
Percent of Revenue	0	0	0	
R&D Expenditure	\$2,569.0	\$5,599.0	\$10,966.0	
Percent of Revenue	13.35	11.66	12.58	
Number of Employees	244	488	793	
Revenue (\$K)/Employee	\$78.86	\$98.37	\$109.94	
Net Income	\$1,452.0	\$6,910.0	\$11,798.0	
Percent Change	130.50	375.90	70.74	
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>
Quarterly Revenue	\$17,961.00	\$20,435.00	\$22,867.00	\$25,916.00
Quarterly Profit	\$2,618.00	\$2,852.00	\$3,022.00	\$3,306.00

\*Only three years of reported financials were available.

Source: Octel Communications Corporation  
 Annual Reports and Forms 10-K  
 Dataquest (1990)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1987	1988	1989
North America	NA	88.16	89.66
International	NA	11.84	10.34

NA = Not available

Source: Octel Communications Corporation  
 Annual Reports and Forms 10-K  
 Dataquest (1990)

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1988	1989
Direct Sales	40.00	50.00
Indirect Sales	60.00	50.00
Distributors	60.00	50.00

Source: Dataquest (1990)

---

## 1989 SALES OFFICE LOCATIONS

North America—12

---

## MANUFACTURING LOCATIONS

*North America*

Milpitas, California

---

## SUBSIDIARIES

Octel has no subsidiaries.

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

1990

### NEC America

Octel and NEC America signed a distribution agreement under which NEC America will market Octel's entire Aspen line of voice processing systems in the United States under the Octel label. Under terms of the agreement, NEC America will promote Octel systems as its preferred choice of voice processing equipment for use with NEC's entire line of PBX systems.

1989

### RCA Business Telephone Systems

Octel and RCA Business Telephone Systems announced a two-year extension of their distribution agreement. RCA will continue to distribute Octel's entire Aspen line of voice-processing systems in the United States.

1988

### Hewlett-Packard (HP)

Octel and HP entered into an OEM agreement and strategic alliance. Under the agreement, HP will distribute Octel's full product line in Western Europe and to its US subsidiaries operating in Europe. HP will market Octel's products under both the HP and Octel labels. The agreement gives

HP exclusive distribution rights in Western Europe, with one exception: Octel has reserved the right to sell its products through one additional OEM/PBX supplier. In addition, HP is restricted from selling any voice processing equipment other than Octel's.

### EXECUTONE Information Systems

Octel and EXECUTONE Information Systems entered into an OEM agreement to sell Octel's VPC 100 system in the United States under a private label. Under the agreement, the VPC 100 will be sold through all of EXECUTONE's sales channels and direct and independent dealers. This agreement gives EXECUTONE exclusive rights to jointly develop integration of VPC 100 with EXECUTONE's ISOTEC and EXECUTONE products.

### Contel Material Management

Octel and Contel Material Management entered into a two-year distribution agreement to sell Octel's voice processing products. Contel will carry Octel's full product line. This agreement enables Octel to penetrate the Midwestern market.

### Bell Atlanticom Systems (BAS) Inc.

Octel and BAS entered a three-year distribution agreement. BAS will continue to sell and service Octel's voice processing systems in New Jersey, Pennsylvania, Delaware, West Virginia, Virginia, Maryland, and the District of Columbia.

---

## MERGERS AND ACQUISITIONS

Information is not available

---

## KEY OFFICERS

**Douglas C. Chance**

President, chief executive officer

**Peter D. Olson**

Executive vice president

**Stephen J. Ciesinski**

Executive vice president

**Michael West**

Executive vice president

**Derek S. Daley**

Vice president and general counsel

**James J. Jennings**  
Vice president

**Robert G. Sweifach**  
Vice president, chief financial officer, secretary,  
and treasurer

**David M. Torrey**  
Vice president

---

---

**FOUNDERS**

**Robert Cohn**  
**Peter D. Olson**

---

**PRINCIPAL INVESTORS**

Hewlett-Packard Company—8.5 percent

**Table 4**  
**Comprehensive Financial Statement\***  
**Fiscal Year Ending June**  
**(Thousands of US Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Total Current Assets	\$17,500.0	\$38,479.0	\$66,600.0
Cash	10,258.0	10,282.0	6,964.0
Receivables	3,893.0	8,016.0	14,614.0
Marketable Securities	-	13,742.0	33,405.0
Inventory	2,812.0	5,688.0	9,401.0
Other Current Assets	537.0	751.0	2,216.0
Net Property, Plants	\$1,936.0	\$5,375.0	\$11,221.0
Other Assets	\$129.0	\$708.0	\$1,858.0
<b>Total Assets</b>	<b>\$19,565.0</b>	<b>\$44,562.0</b>	<b>\$79,679.0</b>
Total Current Liabilities	\$4,810.0	\$10,187.0	\$17,548.0
Long-Term Debt	\$355.0	\$11.0	\$39.0
Other Liabilities	-	\$266.0	\$286.0
<b>Total Liabilities</b>	<b>\$5,165.0</b>	<b>\$10,464.0</b>	<b>\$17,873.0</b>
Total Shareholders' Equity	\$14,400.0	\$34,098.0	\$61,806.0
Common Stock	20,318.0	33,064.0	48,952.0
Other Equity	(355.0)	(313.0)	(291.0)
Retained Earnings	(5,563.0)	1,347.0	13,145.0
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$19,565.0</b>	<b>\$44,562.0</b>	<b>\$79,679.0</b>
<b>Income Statement</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Revenue	\$19,241.0	\$48,006.0	\$87,179.0
US Revenue	-	42,321.0	78,162.0
Non-US Revenue	-	5,685.0	9,017.0
Cost of Sales	\$6,314.0	\$15,644.0	\$25,738.0
R&D Expense	\$2,569.0	\$5,599.0	\$10,966.0
SG&A Expense	\$9,126.0	\$19,022.0	\$34,427.0
Capital Expense	-	-	-
Pretax Income	\$1,511.0	\$8,777.0	\$18,701.0
Pretax Margin (%)	7.85	18.28	21.45
Effective Tax Rate (%)	37.50	37.50	36.90
Net Income	\$1,452.0	\$6,910.0	\$11,798.0
Shares Outstanding, Thousands	12,168.0	12,907.0	15,142.0
<b>Per Share Data</b>			
Earnings	\$0.12	\$0.54	\$0.78
Dividend	-	-	-
Book Value <sup>1</sup>	\$1.18	\$2.64	\$4.08



**Table 4 (Continued)**  
**Comprehensive Financial Statement\***  
**Fiscal Year Ending June**  
**(Thousands of US Dollars, except Per Share Data)**

<b>Key Financial Ratios</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<i>Liquidity</i>			
Current (Times)	3.64	3.78	3.80
Quick (Times)	3.05	3.22	3.26
Fixed Assets/Equity (%)	13.44	15.76	18.16
Current Liabilities/Equity (%)	33.40	29.88	28.39
Total Liabilities/Equity (%)	35.87	30.69	28.92
<i>Profitability (%)</i>			
Return on Assets	-	21.55	18.99
Return on Equity	-	28.50	24.60
Profit Margin	7.55	14.39	13.53
<i>Other Key Ratios</i>			
R&D Spending % of Revenue	13.35	11.66	12.58
Capital Spending % of Revenue	0	0	0
Employees	244	488	793
Revenue (\$K)/Employee	\$78.86	\$98.37	\$109.94
Capital Spending % of Assets	0	0	0

\*Only three years of reported financials were available.

Source: Octel Communications Corporation  
 Annual Reports and Forms 10-K  
 Dataquest (1990)

X

# Oki Electric Industry Company, Ltd.

7-12 Toranomom 1-chome, Minato-ku

Tokyo, 105 Japan

Telephone: (03) 501-3111

Fax: (03) 508-9465

Dun's Number: 10-678-8169

*Date Founded: 1881*

---

## CORPORATE STRATEGIC DIRECTION

Oki Electric Industry Company, Ltd., was established in 1881 as a pioneering Japanese telephone manufacturing company by Kibataro Oki, formerly a maker of traditional Japanese swords and armor. In 1916, the Company began quantity production of radio communications equipment. Today, Oki is a producer of advanced telecommunications systems, data processing systems, and electronic devices, including semiconductors. Oki began manufacturing semiconductors in the early 1960s, and was the first Japanese company to manufacture green light-emitting diodes (LEDs).

Oki's business is broken down into four product groups: telecommunications systems, information processing systems, electronic devices, and other products. The Company's total sales broken down by product group are 26.9, 43.6, 25.2, and 4.3 percent, respectively.

Oki reported total consolidated revenue of ¥556 million (US\$4 billion) for the year ended March 31, 1989, a 16.6 percent increase over 1988. (Percentage changes refer only to ¥ amounts; US\$ percentage changes will differ because of fluctuations in Dataquest exchange rates.) According to Oki, this growth resulted from increased orders in all product groups, a combination of successful product development and marketing efforts, and relatively stable exchange rates. Net income increased over 300 percent in the year ended March 31, 1989, from ¥3 million (US\$25 million) in 1988 to ¥15 million (US\$119 million) in 1989. International sales accounted for 27 percent of Oki's total consolidated revenue in 1989.

Oki has a Central Research laboratory for general research, a Systems Research lab for basic R&D, and a Digital Communication lab for telecommunication

and digital signal processing (DSP) R&D. Also, there are two semiconductor labs and R&D labs within each product group. Oki emphasizes R&D efforts in all four of its product groups. The Company targets advanced digital switching and multiplexers in its telecommunications group, artificial intelligence (AI) in its information processing group, advanced integrated circuit (IC) and DRAM developments in its electronic group, and operation-specific robots in its other products group. R&D expenditure constituted 23.3 percent of gross profit in 1989, a 55.4 percent increase over the previous year's levels.

Oki expanded its facilities during the past year. This includes expanding R&D facilities in Japan for computer system products, semiconductors, and software; constructing a manufacturing plant in Japan; and establishing two R&D centers in the United States. Consolidated capital expenditure totaled ¥60 million (US\$453 million) in 1989, or 10.8 percent of revenue.

Oki has 12 overseas subsidiaries and affiliates, including 4 in the United States, 2 each in Germany and Singapore, and 1 each in Hong Kong, England, Scotland, and Taiwan. The Company's international semiconductor operations are handled by Oki Semiconductor Group in Santa Clara, California, and Oki Electric Europe in Dusseldorf, Germany. New Jersey-based Okidata markets peripherals for personal and business computers in the United States. Okidata, Oki Telecom, and Oki Semiconductor are divisions of US-based Oki America, Inc. Oki employs more than 18,000 people worldwide.

More detailed information is available in Tables 1 and 2, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region. Information on revenue by distribution channel is not available. Tables 3 and 4, comprehensive financial statements, are at the end of this profile.

## BUSINESS SEGMENT STRATEGIC DIRECTION

### Telecommunications Systems

Making up 26.9 percent of Oki's year ended March 1989 revenue, telecommunications systems include products such as PBX, telex, central office exchanges, cellular mobile and push-button telephones, radio equipment, modems, TV converters, optical fiber communications systems, facsimiles, local area networks (LANs), IC cards, and teleconferencing systems.

This group experienced increases in sales due to strong demand from companies preparing for Integrated Services Digital Network (ISDN). As a result, Oki's D70 digital central office switching system and IOX and IX series of PBXs fared well. Additionally, Oki won a contract with the leading UK telecommunications equipment company to export systems to the United Kingdom. Equipment, facsimiles, cellular phones, and building management systems sales increased during the year as well.

### Information Processing Systems

Oki's information processing products include laptop PCs, point-of-sale (POS) terminals and systems, minicomputers, ATM banking systems, medical electronics systems, data printers and other peripherals, text communications terminals, water resource control systems, intelligence-building systems, seismometric and disaster-prevention systems, radar and sonar systems, and underwater acoustic systems. This division accounts for the largest portion of Oki's revenue, more than 40 percent.

Sales of systems to Japan's financial industry is Oki's main area of strength in its information systems segment. Oki expects to ship at least 10,000 units of its high-speed ATM systems in 1990. In addition, through an original equipment manufacturer (OEM) agreement with Sun Microsystems, signed in May 1989, Oki plans to expand its offerings in financial software that can be customized for its financial clients.

### Printers

Oki experienced strong dot matrix sales during business year 1989 and expanded its product line. Oki introduced two 9-pin printers, the Microline 320 and 321. Additionally, introductions of 24-pin printers included the Microline 390 and 391 models, which are manufactured in Europe by Oki (UK) Ltd.

Okidata, Oki's US printer arm, markets peripherals for personal and business computers, including dot matrix, laser, and thermal transfer printers and PC modems. Dataquest estimates that in 1989, Okidata ranked as one of the top five vendors in the serial printer market, along with Apple, Epson, IBM, and Panasonic.

### Electronic Devices

Products in the electronic devices group include semiconductors, printed circuit boards, plasma display panel units, reed relays, and switches. This division accounts for approximately 25 percent of Oki's sales.

### Semiconductors

Oki has more than 20 years of experience in all phases of semiconductor design and manufacturing. The Company manufactures devices encompassing a broad range of integrated circuits, discrete devices, and optoelectronics. It uses the following processes: CMOS, PMOS, NMOS, TTL, I<sup>2</sup>L, and ECL. Oki also manufactures specialty products that include sensor arrays, optical couplers, and LED lamps. New specialty products include speech recognition and synthesis chips.

For the year ended December 31, 1989, Dataquest estimates Oki's semiconductor sales to be ¥153.6 billion (US\$1.2 billion), ranking the Company 17th in worldwide semiconductor market share. This represents an increase of 22 percent over Oki's semiconductor sales for 1988. Oki derives an estimated 89 percent of its semiconductor sales, ¥128 billion (US\$1 billion), from its MOS digital products. Dataquest estimates Oki's ranking by product as 6th in MOS logic, 9th in MOS memory, and 14th in MOS microdevices. The balance of Oki's semiconductor revenue comes from its bipolar digital, discrete, and optoelectronic device sales.

Oki's strategy is to expand its memory IC and ASIC capabilities and product lines. In the past year, Oki completed construction of its Miyagi Plant and began production of 1MB and 4MB DRAMs. In addition to the Miyagi plant, Oki announced two new ASIC design centers, one in Detroit, Michigan, the other in Sunnyvale, California. The Company is also building a new semiconductor fab in Oregon.

#### Further Information

For further information about the Company's business segments, please contact the appropriate Dataquest industry service.

**Table 1**  
**Five-Year Corporate Highlights (Millions of US Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$1,704.0	\$1,777.0	\$2,546.0	\$3,271.0	\$4,340.0
Percent Change	-	4.28	43.28	28.48	32.68
Capital Expenditure	\$278.0	\$158.0	\$181.0	\$181.0	\$468.0
Percent of Revenue	16.31	8.89	7.11	5.53	10.78
R&D Expenditure	\$69.0	\$72.0	\$112.0	\$167.0	\$281.0
Percent of Revenue	4.05	4.05	4.40	5.11	6.47
Number of Employees	18,134	18,649	19,375	18,659	18,440
Revenue (\$K)/Employee	\$93.97	\$95.29	\$131.41	\$175.30	\$235.36
Net Income	\$37.0	(\$4.0)	\$14.0	\$25.0	\$119.0
Percent Change	-	(110.81)	(450.00)	78.57	376.00
Exchange Rate (US\$1=¥)	¥245	¥221	¥160	¥138	¥128
1989 Calendar Year	Q1	Q2	Q3	Q4	
Quarterly Revenue	NA	NA	NA	NA	
Quarterly Profit	NA	NA	NA	NA	

NA = Not available

Source: Oki Electric Industry Company, Ltd.  
 Annual Reports  
 Dataquest (1990)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1985	1986	1987	1988	1989
Japan	69.00	74.00	75.00	75.00	73.00
International	31.00	26.00	25.00	25.00	27.00

Source: Oki Electric Industry Company, Ltd.  
 Annual Reports  
 Dataquest (1990)

---

## 1989 SALES OFFICE LOCATIONS

Asia Pacific  
 Japan—58  
 International—11

---

## MANUFACTURING LOCATIONS

### North America

Oki America (United States)  
 Telecommunications equipment, data processing equipment  
 Okidata Group (United States)  
 Data processing equipment

### Europe

Oki (UK) Ltd. (United Kingdom)  
 Dot-matrix printers

### Asia/Pacific

Far Eastern Electric Industry Co., Ltd. (Taiwan)  
 Telecommunications equipment  
 Kinseki, Ltd. (Japan)  
 Quartz crystals, crystal filters, crystal oscillators, ultrasonic glass delay lines, synthetic quartz  
 Kuwano Electrical Instruments (Japan)  
 Measuring instruments  
 Miyagi Oki Electric (Japan)  
 256K DRAMs  
 Miyazaki Oki Electric (Japan)  
 LSIs, VLSIs  
 Nagano Oki Electric (Japan)  
 Computers, remote terminals, assembly of printed circuit boards  
 Niigata Oki Electric (Japan)  
 Printed circuit boards  
 Nikko Denki Seisakusho (Japan)  
 Switchboards, terminal blocks, distribution boxes, exchange parts  
 OF Engineering (Japan)  
 Sensors  
 Oki Ceramic Industry (Japan)  
 Tantalum electrolytic capacitors, hybrid integrated circuits, ceramic parts  
 Oki Electric Cable (Japan)  
 Printed circuit boards, connectors  
 Oki Seatec (Japan)  
 Research, consulting, and measurement for underwater acoustics

Oki Transmission Engineering (Japan)  
 Telecommunications equipment/systems  
 Oki Unisys (Japan)  
 Computers  
 Shizuoka Oki Electric (Japan)  
 Telecommunications equipment, control equipment, measuring equipment, acoustic equipment  
 Taiko Electric Works (Japan)  
 PBX and key telephone systems  
 Toho Electronics (Japan)  
 Transmission equipment and parts  
 Tohoku Oki Electric (Japan)  
 Data communications equipment

---

## SUBSIDIARIES

### North America

Oki America, Inc. (United States)  
 Oki Semiconductor Group (United States)  
 Oki Telecom Group (United States)  
 Okidata Group (United States)

### Europe

Oki Electric Europe GmbH (Germany)  
 Oki Europe Ltd. (England)  
 Oki (UK) Ltd. (Scotland)  
 Okidata GmbH (Germany)

### Asia/Pacific

Digiphonic Systems Pte. Ltd.  
 Far Eastern Electric Industry Co., Ltd. (Taiwan)  
 Kinseki, Ltd. (Japan)  
 Kuwano Electrical Instruments Co., Ltd. (Japan)  
 Mikuni Industry Co., Ltd. (Japan)  
 Miyagi Oki Electric Co., Ltd. (Japan)  
 Miyazaki Oki Electric Co., Ltd. (Japan)  
 Nagano Oki Electric Co., Ltd. (Japan)  
 Niigata Oki Electric Co., Ltd. (Japan)  
 Nikko Denki Seisakusho Co., Ltd. (Japan)  
 OF Engineering Co., Ltd. (Japan)  
 Oki Ceramic Industry Co., Ltd. (Japan)  
 Oki Electric Cable Co., Ltd. (Japan)  
 Oki Electronics (Hong Kong), Ltd. (Hong Kong)  
 Oki Electronics (Singapore) Pte. Ltd. (Singapore)  
 Oki FCS Systems Co., Ltd. (Japan)  
 Oki Firmware System Co., Ltd. (Japan)  
 Oki Hokuriku Systems Development Co., Ltd. (Japan)  
 Oki Information Systems Co., Ltd. (Japan)

Oki Medical Systems Co., Ltd. (Japan)  
Oki Micro Design Miyazaki Co., Ltd. (Japan)  
Oki Seatec Co., Ltd. (Japan)  
Oki Software Co., Ltd. (Japan)  
Oki Software Kansai Co., Ltd. (Japan)  
Oki Software Kyushu Co., Ltd. (Japan)  
Oki Software Okayama Co., Ltd. (Japan)  
Oki Software Systems Hokkaido Co., Ltd. (Japan)  
Oki Systek Co., Ltd. (Japan)  
Oki System Development Niigata Co., Ltd. (Japan)  
Oki Techno Systems Laboratory, Inc. (Japan)  
Oki Telecommunications System Co., Ltd. (Japan)  
Oki Thailand Co., Ltd. (Thailand)  
Oki Transmission Engineering Co., Ltd. (Japan)  
Oki Unisys Kaisha, Ltd. (Japan)  
Shizuoka Oki Electric Co., Ltd. (Japan)  
Taiko Electric Works, Ltd. (Japan)  
Toho Electronics Co., Ltd. (Japan)  
Tohoku Oki Electric Co., Ltd. (Japan)  
Waratoku Steel Co., Ltd. (Japan)  
Yamako Electric Manufacture Co., Ltd. (Japan)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

1989

### Hewlett-Packard

Oki and HP entered into a joint venture to build printed circuit boards (PCBs) at a plant to be built in Puerto Rico.

### Vitelc

Oki and Vitelic exchanged semiconductor production technology and marketing rights for ASIC memory products.

### SGS-Thomson

Oki and SGS-Thomson expanded their DRAM agreement (see 1988 listing) to include 4MB DRAM chips.

### Rockwell International

Oki signed an agreement to market Rockwell's Galaxy ISS-3000 PBX system in Japan.

### Sun Microsystems

Oki signed an agreement with Sun Microsystems covering financial software products.

1988

### Intel Corp.

Oki licensed the 80C51 8-bit MCU from Intel and added it to its macrocell library. In exchange, Intel gets royalties from Oki.

### iLSi Yamaha

iLSi Yamaha signed a technology purchasing and licensing agreement with Oki, under which Oki will manufacture and sell gate arrays based on iLSi technology and provide foundry services.

### Marshall Industries

Oki Semiconductor designated Marshall Industries to carry its entire line of standard CMOS ICs at Marshall's US and Canadian locations.

### SGS-Thomson

The two companies made a cross-licensing agreement for the manufacture of DRAMs. SGS will assemble 256K and 1Mb DRAM modules; the products will be sold in Europe as Oki products.

### Seattle Silicon

The companies agreed to promote joint development of designing tools for SRAMs.

1987

### AT&T

Oki agreed to supply AT&T with GaAs multiplexer and demultiplexer devices for the development of optical transmission equipment.

### Catalyst Semiconductor Inc.

The two companies entered into a long-term R&D agreement for NVRAMS, using CMOS EPROMs and EEPROMs.

### *Cross-Licensing Partners, Patents, and Contract Terms*

### AT&T

Carrier equipment, radio communications equipment, data processing equipment (expired 1/80)  
Semiconductors, devices, film devices (expired 1/83)

### Hewlett-Packard

Computers, terminals, semiconductors (expired 9/83)

### IBM

Data processing systems (expired 1/86)

### Intel

Semiconductor materials, ICs (8/80 through 7/90)

### National Semiconductors

Semiconductors (7/84 through 7/94)

### Phillips

Semiconductor devices (expired 10/83)

### Texas Instruments

Semiconductors (4/87 through 11/90)



---

## MERGERS AND ACQUISITIONS

1988

Far Eastern Electric Industry Co., Ltd. (FEE)  
Oki Electric acquired the majority share of its Taiwanese subsidiary, FEE, which will become one of its manufacturing arms.

---

## KEY OFFICERS

Namio Hashimoto  
Chairman of the board

Nobumitsu Kosugi  
President, chief executive officer

Yoshio Masuda  
Executive vice president

Chikatomo Mitsuyasu  
Executive vice president

---

## PRINCIPAL INVESTORS

Yasuda Life—7.8 percent  
Meiji Life—6.0 percent  
Dai Ichi Life—5.6 percent  
Fuji Bank—4.3 percent  
Yasuda Trust—3.8 percent  
Mitsubishi Trust—3.6 percent  
Japan Securities Finance—3.3 percent  
Yasuda F&M Insurance—2.4 percent  
Sumitomo Trust—2.4 percent

---

## FOUNDER

Kibaturo Oki

**Table 3**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending March 31**  
**(Millions of US Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Total Current Assets</b>	\$1,122.0	\$1,264.0	\$2,104.0	\$2,525.0	\$3,003.0
Cash, Time Deposits	256.0	323.0	623.0	835.0	988.0
Receivables	388.0	471.0	779.0	862.0	1,090.0
Inventory	460.0	447.0	665.0	792.0	889.0
Other Current Assets	18.0	23.0	37.0	36.0	36.0
Long-Term Receivables	96.0	114.0	165.0	227.0	264.0
<b>Net Property, Plants</b>	\$464.0	\$502.0	\$654.0	\$762.0	\$1,079.0
<b>Other Assets</b>	\$40.0	\$75.0	\$308.0	\$202.0	\$200.0
<b>Total Assets</b>	\$1,722.0	\$1,955.0	\$3,231.0	\$3,716.0	\$4,546.0
<b>Total Current Liabilities</b>	\$2,423.0	\$2,908.0	\$4,706.0	\$5,838.0	\$2,266.0
<b>Long-Term Debt</b>	\$450.0	\$546.0	\$721.0	\$715.0	\$1,072.0
<b>Other Liabilities</b>	\$57.1	\$32.1	\$112.9	\$87.4	\$139.7
<b>Total Liabilities</b>	\$2,930.1	\$3,486.1	\$5,539.9	\$6,640.4	\$3,477.7
<b>Total Shareholders' Equity</b>	\$301.5	\$489.8	\$711.5	\$950.4	\$1,121.8
Common Stock	111.6	178.7	264.2	348.2	394.5
Other Equity	119.5	253.7	360.9	460.8	505.4
Retained Earnings	70.4	57.4	86.4	141.4	221.9
<b>Total Liabilities and Shareholders' Equity</b>	\$3,231.6	\$3,975.9	\$6,251.4	\$7,590.8	\$4,599.5
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Revenue</b>	\$1,704.0	\$1,777.0	\$2,546.0	\$3,271.0	\$4,340.0
Japanese Revenue	1,176.0	1,314.0	1,909.4	2,436.0	3,172.0
International Revenue	528.0	463.0	637.0	835.0	1,168.0
<b>Cost of Sales</b>	\$1,183.8	\$1,632.6	\$2,174.4	\$2,652.7	\$3,131.0
<b>R&amp;D Expense</b>	\$66.5	\$90.3	\$120.8	\$185.5	\$281.0
<b>SG&amp;A Expense</b>	\$361.6	\$479.8	\$611.0	\$784.5	\$646.0
<b>Capital Expense</b>	\$270.8	\$192.4	\$159.2	\$197.5	\$468.0
<b>Pretax Income</b>	\$81.8	\$12.2	\$27.8	\$83.8	\$195.3
<b>Pretax Margin (%)</b>	4.90	0.56	0.99	2.32	4.50
<b>Effective Tax Rate (%)</b>	58.00	58.00	58.00	56.00	56.00
<b>Net Income</b>	\$36.6	(\$5.4)	\$15.3	\$27.9	\$119.0
<b>Shares Outstanding, Millions</b>	459.6	480.4	500.9	519.5	572.5
<b>Per Share Data</b>					
Earnings	\$0.08	(\$0.01)	\$0.03	\$0.05	\$0.21
Dividend	\$0.02	\$0.03	\$0.02	\$0.04	\$0.04
Book Value	\$0.66	\$1.02	\$1.42	\$1.83	\$1.96
<b>Exchange Rate (US\$1=¥)</b>	¥245	¥221	¥160	¥138	¥128

Source: Oki Electric Industry Company, Ltd.  
Annual Reports  
Dataquest (1990)

**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending March 31**  
**(Billions of Yen, except Per Share Data)**

<b>Balance Sheet</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Total Current Assets</b>	¥275.0	¥279.0	¥337.0	¥348.0	¥385.0
Cash, Time Deposits	63.0	71.0	100.0	115.0	127.0
Receivables	95.0	104.0	125.0	119.0	140.0
Inventory	113.0	99.0	106.0	109.0	114.0
Other Current Assets	5.0	5.0	6.0	5.0	5.0
Long-Term Receivables	¥23.0	¥25.0	¥26.0	¥31.0	¥34.0
Net Property, Plants	¥114.0	¥111.0	¥105.0	¥105.0	¥138.0
Other Assets	¥10.0	¥17.0	¥23.0	¥29.0	¥26.0
<b>Total Assets</b>	<b>¥422.0</b>	<b>¥432.0</b>	<b>¥491.0</b>	<b>¥513.0</b>	<b>¥583.0</b>
<b>Total Current Liabilities</b>	¥234.0	¥217.0	¥267.0	¥295.0	¥291.0
Long-Term Debt	¥112.0	¥121.0	¥115.0	¥99.0	¥137.0
Other Liabilities	¥1.0	¥6.0	¥6.0	0	¥7.0
<b>Total Liabilities</b>	<b>¥347.0</b>	<b>¥344.0</b>	<b>¥388.0</b>	<b>¥394.0</b>	<b>¥435.0</b>
<b>Total Shareholders' Equity</b>	¥75.0	¥88.0	¥103.0	¥119.0	¥148.0
Common Stock	28.0	32.0	38.0	44.0	52.0
Other Equity	30.0	46.0	52.0	58.0	67.0
Retained Earnings	18.0	10.0	13.0	18.0	29.0
<b>Total Liabilities and Shareholders' Equity</b>	<b>¥422.0</b>	<b>¥432.0</b>	<b>¥491.0</b>	<b>¥513.0</b>	<b>¥583.0</b>
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Revenue</b>	¥418.0	¥393.0	¥407.0	¥451.0	¥556.0
Japanese Revenue	288.0	291.0	307.0	336.0	407.0
International Revenue	130.0	102.0	100.0	115.0	149.0
Cost of Sales	¥296.0	¥294.0	¥315.0	¥332.0	¥401.0
R&D Expense	¥17.0	¥16.0	¥18.0	¥23.0	¥36.0
SG&A Expense	¥90.0	¥86.0	¥89.0	¥98.0	¥83.0
Capital Expense	¥68.0	¥35.0	¥29.0	¥25.0	¥60.0
Pretax Income	¥20.0	¥2.0	¥4.0	¥10.0	¥25.0
Pretax Margin (%)	4.78	0.51	0.98	2.22	0.59
Effective Tax Rate (%)	58.00	58.00	58.00	56.00	56.00
Net Income	¥9.0	(¥1.0)	¥2.0	¥3.0	¥15.0
Shares Outstanding, Millions	459.6	480.4	500.9	519.5	572.5
<b>Per Share Data</b>					
Earnings	¥20.20	(¥2.10)	¥4.50	¥6.80	¥28.00
Dividend	¥6.00	¥6.00	¥3.00	¥6.00	¥6.00
Book Value	¥0.16	¥0.18	¥0.21	¥0.23	¥0.26

Table 4 (Continued)  
 Comprehensive Financial Statement  
 Fiscal Year Ending March 31  
 (Billions of Yen, except Per Share Data)

Key Financial Ratios	1985	1986	1987	1988	1989
<i>Liquidity</i>					
Current (Times)	0.18	1.29	1.26	1.18	1.32
Quick (Times)	0.69	0.83	0.87	0.81	0.93
Fixed Assets/Equity (%)	152.00	126.14	101.94	88.24	93.24
Current Liabilities/Equity (%)	312.00	246.59	259.22	247.90	196.62
Total Liabilities/Equity (%)	462.67	390.91	376.70	331.09	293.92
<i>Profitability (%)</i>					
Return on Assets	-	(0.23)	0.43	0.60	2.74
Return on Equity	-	(1.23)	2.09	2.70	11.24
Profit Margin	2.15	(0.25)	0.49	0.67	0.36
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	4.07	4.07	4.42	5.10	0.86
Capital Spending % of Revenue	16.27	8.91	7.13	5.54	1.43
Employees	18,134	18,649	19,375	18,659	18,440
Revenue (¥M)/Employee	¥23.05	¥21.07	¥21.01	¥24.17	¥30.15
Capital Spending % of Assets	16.11	8.10	5.91	4.87	10.29
Exchange Rate (US\$1=¥)	¥245	¥221	¥160	¥138	¥128

Source: Oki Electric Industry Company, Ltd.  
 Annual Reports  
 Dataquest (1990)

# Oki Electric Industry Company, Ltd.

7-12 Toranomom 1-chome, Minato-ku

Tokyo, 105 Japan

Telephone: (03) 501-3111

Fax: (03) 508-9465

Dun's Number: 10-678-8169

*Date Founded: 1881*

---

## CORPORATE STRATEGIC DIRECTION

Oki Electric Industry Company, Ltd., was established in 1881 as a pioneering Japanese telephone manufacturing company by Kibaturo Oki, formerly a maker of traditional Japanese swords and armor. In 1916, the Company began quantity production of radio communications equipment. Today, Oki is a leading producer of advanced telecommunications systems, data processing systems, and electronic devices, including semiconductors. Oki began manufacturing semiconductors in the early 1960s, and was the first Japanese company to manufacture green light-emitting diodes (LEDs).

Oki's business is broken down into four product groups: telecommunications systems, information processing systems, electronic devices, and other products. The Company's total sales broken down by product group are 26.9, 43.6, 25.2, and 4.3 percent, respectively.

Oki reported total consolidated revenue of \$4.2 billion\* in 1989, a 16.6 percent increase over 1988. According to Oki, this growth resulted from increased orders in all four product groups, a combination of successful product development and marketing efforts, and relatively stable exchange rates. Net income increased an outstanding 316.1 percent in 1989, from \$27.9 million in 1988 to \$116.1 million in 1989.

Oki has a Central Research laboratory for general research, a Systems Research lab for basic R&D, and a Digital Communication lab for telecommunication and digital signal processing (DSP) R&D. Also, there are two semiconductor labs and R&D labs within

each product group. Oki emphasizes R&D efforts in all four of its product groups. The Company targets advanced digital switching and multiplexers in its telecommunications group, artificial intelligence (AI) in its information processing group, advanced integrated circuit (IC) and DRAM developments in its electronic group, and operation-specific robots in its other products group. R&D expenditures for 1989 totaled \$272.9 million, or 6.5 percent of revenue.

Oki expanded its facilities during the past year. This includes expanding R&D facilities in Japan for computer system products, semiconductors, and software; constructing a manufacturing plant in Japan; and establishing two R&D centers in the United States. Consolidated capital expenditures totaled \$452.5 million in 1989, or 10.8 percent of revenue.

International sales accounted for 27 percent of Oki's total consolidated revenue in 1989.

Oki has 12 overseas subsidiaries and affiliates, including 4 in the United States, 2 each in West Germany and Singapore, and 1 each in Hong Kong, England, Scotland, and Taiwan. The Company's international semiconductor operations overseas are handled by Oki Semiconductor Group in Santa Clara, California, and Oki Electric Europe in Dusseldorf, West Germany. New Jersey-based Okidata markets peripherals for personal and business computers in the United States. Okidata, Oki Telecom, and Oki Semiconductor are divisions of United States-based Oki America, Inc. Oki employs more than 18,000 people worldwide.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights

---

\*All dollar amounts are in U.S. dollars.

and revenue by region and distribution channel. Table 4, a comprehensive financial statement, is at the end of this profile.

---

## BUSINESS SEGMENT STRATEGIC DIRECTION

### Telecommunications Systems

Making up 26.9 percent of Oki's total fiscal 1988 revenue, telecommunications systems include products such as PBX, telex, central office exchanges, cellular mobile and push-button telephones, radio equipment, modems, TV converters, optical fiber communications systems, facsimile, local area networks (LANs), IC cards, and teleconferencing systems.

This group experienced increases in sales due to strong demand from companies preparing for Integrated Services Digital Network (ISDN). As a result, Oki's D70 digital central office switching system and IOX and IX series of PBXs fared well. Additionally, Oki won a contract with the leading U.K. telecommunications equipment company to export systems to the United Kingdom. Equipment, facsimiles, cellular phones, and building management systems sales increased during the year as well.

Dataquest estimates that Oki held 18.0 percent of the Japanese PBX market for 1988, up from 16.6 percent in 1987. In the Japanese facsimile market, Oki held 12.5 percent in 1988.

### Information Processing Systems

Oki's information processing products include PCs, point-of-sale (POS) terminals and systems, minicomputers, banking systems, medical electronics systems, data printers and other peripherals, text communications terminals, water resource control systems, intelligence-building systems, seismometric and disaster-prevention systems, radar and sonar systems, and underwater acoustic systems. This division represented the largest portion of Oki's 1988 sales, 43.6 percent.

### Personal Computers

During fiscal 1988, Oki introduced a 32-bit laptop PC, called the if386 AX, which can be used as a terminal for communications among PCs and in value-added networks. Compatible with the IBM PC AT, it allows access to international networks.

### Printers

Oki experienced strong dot-matrix sales during business year 1989 and expanded its product line. Oki introduced two 9-pin printers, the Microline 320 and 321. Additionally, introductions of 24-pin printers included the Microline 390 and 391 models. These products are manufactured in Europe by Oki (UK) Ltd.

Okidata, Oki's U.S. printer arm, markets peripherals for personal and business computers, including dot matrix, laser, and thermal transfer printers and PC modems. Dataquest estimates that in 1988, Okidata ranked as one of the five serial printer companies that captured 57 percent of the market, along with IBM, Epson, Apple, and Hewlett-Packard.

### Electronic Devices

Products in the electronic devices group include semiconductors, printed circuit boards, plasma display panel units, reed relays, and switches. This division made up 25.2 percent of Oki's 1988 sales.

### Semiconductors

Oki has more than 20 years of experience in all phases of semiconductor design and manufacturing. The Company manufactures devices encompassing a broad range of integrated circuits, discrete devices, and optoelectronics. It uses the following processes: CMOS, PMOS, NMOS, TTL, I<sup>2</sup>L, and ECL. Oki also manufactures specialty products that include sensor arrays, optical couplers, and LED lamps. New specialty products include speech recognition and synthesis chips.

Dataquest ranks Oki as the number seven 1988 worldwide semiconductor vendor based on revenue of \$947 million. Oki also ranked tenth in MOS digital, sixteenth in bipolar digital and optoelectronics, forty-third in discrete devices, and fiftieth in analog.

The majority of Oki's semiconductor revenue comes from the MOS digital market, \$841 million or 89 percent in 1988. Within this segment, Dataquest

ranks Oki sixth in MOS logic, ninth in MOS memory, and twelfth in MOS microdevices.

#### Office Automation

The office automation product group contributes less than 5 percent of the Company's total revenue.

#### Further Information

For further information about the Company's business segments, please contact the appropriate industry service.

**Table 1**  
**Five-Year Corporate Highlights (Millions of U.S. Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$1,670.1	\$2,181.2	\$2,809.8	\$3,610.8	\$4,208.5
Percent Change	-	30.60	28.82	28.51	16.55
Capital Expenditure	\$270.8	\$192.4	\$159.2	\$197.5	\$452.5
Percent of Revenue	16.21	8.82	5.67	5.47	10.75
R&D Expenditure	\$66.5	\$90.3	\$120.8	\$185.5	\$272.9
Percent of Revenue	3.98	4.14	4.30	5.14	6.48
Number of Employees	18,134	18,649	19,375	18,659	18,440
Revenue (\$K)/Employee	\$92.10	\$116.96	\$145.02	\$193.52	\$228.23
Net Income	\$36.6	(\$5.4)	\$15.3	\$27.9	\$116.1
Percent Change	-	(114.75)	(383.33)	82.35	316.13
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	
Quarterly Revenue	N/A	N/A	N/A	N/A	
Quarterly Profit	N/A	N/A	N/A	N/A	

N/A = Not Available

Source: Oki Electric  
 Annual Reports  
 Dataquest  
 January 1990

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1985	1986	1987	1988	1989
Japan	69.00	74.00	75.00	75.00	73.00
All Others	31.00	26.00	25.00	25.00	27.00

Source: Oki Electric  
 Annual Reports  
 Dataquest  
 January 1990

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1987	1988
Direct Sales	N/A	N/A
Indirect Sales	N/A	N/A

N/A = Not Available

Source: Oki Electric  
 Annual Reports



---

## 1988 SALES OFFICE LOCATIONS

Japan—58  
All others—10

---

## MANUFACTURING LOCATIONS

### Japan

**Kinseki, Ltd.**  
Quartz crystals, crystal filters, crystal oscillators, ultrasonic glass delay lines, synthetic quartz

**Kuwano Electrical Instruments**  
Measuring instruments

**Miyagi Oki Electric**  
256K DRAMs

**Miyazaki Oki Electric**  
LSIs, VLSIs

**Nagano Oki Electric**  
Computers, remote terminals, assembly of printed circuit boards

**Niigata Oki Electric**  
Printed circuit boards

**Nikko Dinky Seisakusho**  
Switchboards, terminal blocks, distribution boxes, exchange parts

**OF Engineering**  
Sensors

**Oki Ceramic Industry**  
Tantalum electrolytic capacitors, hybrid integrated circuits, ceramic parts

**Oki Electric Cable**  
Printed circuit boards, connectors

**Oki Seatec**  
Research, consulting, and measurement for underwater acoustics

**Oki Transmission Engineering**  
Telecommunications equipment/systems

**Oki Unisys**  
Computers

**Shizuoka Oki Electric**  
Telecommunications equipment, control equipment, measuring equipment, acoustic equipment

**Taiko Electric Works**  
PBX and key telephone systems

**Toho Electronics**  
Transmission equipment and parts

**Tohoku Oki Electric**  
Data communications equipment

### North America

**Oki America (United States)**  
Telecommunications equipment, data processing equipment

**Okidata Group (United States)**  
Data processing equipment

### Europe

**Oki (UK) Ltd. (United Kingdom)**  
Dot-matrix printers

### Asia/Pacific

**Far Eastern Electric Industry Co., Ltd. (Taiwan)**  
Telecommunications equipment

---

## SUBSIDIARIES

### Japan

**Kinseki, Ltd.**

**Kuwano Electrical Instruments Co., Ltd.**

**Mikuni Industry Co., Ltd.**

**Miyagi Oki Electric Co., Ltd.**

**Miyazaki Oki Electric Co., Ltd.**

**Nagano Oki Electric Co., Ltd.**

**Niigata Oki Electric Co., Ltd.**

**Nikko Denki Seisakusho Co., Ltd.**

**OF Engineering Co., Ltd.**

**Oki Ceramic Industry Co., Ltd.**

**Oki Electric Cable Co., Ltd.**

**Oki FCS Systems Co., Ltd.**

**Oki Firmware System Co., Ltd.**

**Oki Hokuriku Systems Development Co., Ltd.**

**Oki Information Systems, Co., Ltd.**

**Oki Medical Systems Co., Ltd.**

**Oki Micro Design Miyazaki Co., Ltd.**

**Oki Seatec Co., Ltd.**

**Oki Software Co., Ltd.**

**Oki Software Kansai Co., Ltd.**

**Oki Software Kyushu Co., Ltd.**

**Oki Software Okayama Co., Ltd.**

**Oki Software Systems Hokkaido Co., Ltd.**

**Oki Systek Co., Ltd.**

Oki System Development Niigata Co., Ltd.  
Oki Techno Systems Laboratory, Inc.  
Oki Telecommunications System Co., Ltd.  
Oki Transmission Engineering Co., Ltd.  
Oki Unisys Kaisha, Ltd.  
Shizuoka Oki Electric Co., Ltd.  
Taiko Electric Works, Ltd.  
Toho Electronics Co., Ltd.  
Tohoku Oki Electric Co., Ltd.  
Waratoku Steel Co., Ltd.  
Yamako Electric Manufacture Co., Ltd.

*North America*

Oki America, Inc. (United States)  
Oki Semiconductor Group (United States)  
Oki Telecom Group (United States)  
Okidata Group (United States)

*Europe*

Oki Electric Europe GmbH (West Germany)  
Oki (UK) Ltd. (Scotland)  
Okidata GmbH (West Germany)

*Asia/Pacific*

Digiphonic Systems Pte. Ltd.  
Far Eastern Electric Industry Co., Ltd. (Taiwan)  
Oki Electronics (Hong Kong) Ltd. (Hong Kong)  
Oki Electronics (Singapore) Pte. Ltd. (Singapore)

---

**ALLIANCES, JOINT VENTURES, AND  
LICENSING AGREEMENTS**

1988

**Intel Corp.**

Oki licensed the 80C51 8-bit MCU from Intel and has added it to its macrocell library. In exchange, Intel gets royalties from Oki.

**iLSi Yamaha**

iLSi Yamaha signed a technology purchasing and licensing agreement with Oki, under which Oki will manufacture and sell gate arrays based on iLSi technology and provide foundry services.

**Marshall Industries**

Oki Semiconductor designated Marshall Industries to carry its entire line of standard CMOS ICs at Marshall's U.S. and Canadian locations.

**SGS-Thomson**

The two companies made a cross-licensing agreement for the manufacture of DRAMs. SGS will assemble 256K and 1Mb DRAM modules; the products will be sold in Europe as Oki products.

**Seattle Silicon**

The companies agreed to promote joint development of designing tools for SRAMs.

1987

**AT&T**

Oki agreed to supply AT&T with GaAs multiplexer and demultiplexer devices for the development of optical transmission equipment.

**Catalyst Semiconductor Inc.**

The two companies entered into a long-term R&D agreement for NVRAMS, using CMOS EPROMs and EEPROMs.

*Cross-Licensing Partners, Patents, and Contract Terms*

**AT&T**

Carrier equipment, radio communications equipment, data processing equipment (expires 1/80)  
Semiconductors, devices, film devices (expires 1/83)

**Intel**

Semiconductor materials, ICs (8/80 through 7/90)

**Hewlett-Packard**

Computers, terminals, semiconductors (expires 9/83)

**Philips**

Semiconductor devices (expires 10/83)

**National Semiconductors**

Semiconductors (7/84 through 7/94)

**IBM**

Data processing systems (expires 1/86)

**Texas Instruments**

Semiconductors (4/87 through 11/90)

---

## MERGERS AND ACQUISITIONS

1988

Far Eastern Electric Industry Co., Ltd. (FEE)  
Oki Electric acquired the majority share of its Taiwanese subsidiary, FEE, which will become one of its manufacturing arms.

---

## KEY OFFICERS

Namio Hashimoto  
Chairman of the board

Nobumitsu Kosugi  
President, chief executive officer

Yoshio Masuda  
Executive vice president

Chikamoto Mitsuyasu  
Executive vice president

---

## PRINCIPAL INVESTORS

Yasuda Life—7.8 percent  
Meiji Life—6.0 percent  
Dai Ichi Life—5.6 percent  
Fuji Bank—4.3 percent  
Yasuda Trust—3.8 percent  
Mitsubishi Trust—3.6 percent  
Japan Securities Finance—3.3 percent  
Yasuda F&M Insurance—2.4 percent  
Sumitomo Trust—2.4 percent

---

## FOUNDERS

Kibaturo Oki

**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending March 31**  
(Millions of U.S. Dollars, except Per Share Data)

Balance Sheet	1985	1986	1987	1988	1989
Total Current Assets	\$1,099.7	\$1,551.0	\$2,321.0	\$2,787.1	\$2,918.7
Cash, Time Deposits	204.0	320.4	395.6	700.2	641.1
Receivables	380.3	578.8	859.5	951.3	1,059.5
Marketable Securities	46.2	75.5	291.5	221.1	318.9
Inventory	451.2	548.4	733.9	874.7	863.9
Other Current Assets	18.0	27.9	40.5	39.8	35.3
Investments, Long-Term Receivables	\$94.5	\$140.1	\$182.2	\$251.0	\$256.0
Net Property, Plants	\$454.5	\$616.3	\$721.4	\$841.4	\$1,048.7
Other Assets	\$39.0	\$91.9	\$163.1	\$223.0	\$193.9
Total Assets	\$1,687.7	\$2,399.3	\$3,387.7	\$4,102.5	\$4,417.3
Total Current Liabilities	\$939.7	\$1,207.0	\$1,840.9	\$2,360.9	\$2,201.6
Long-Term Debt	\$389.5	\$670.5	\$722.3	\$703.9	\$954.3
Other Liabilities	\$57.1	\$32.1	\$112.9	\$87.4	\$139.7
Total Liabilities	\$1,386.3	\$1,909.6	\$2,676.1	\$3,152.2	\$3,295.6
Total Shareholders' Equity	\$301.5	\$489.8	\$711.5	\$950.4	\$1,121.8
Common Stock	111.6	178.7	264.2	348.2	394.5
Other Equity	119.5	253.7	360.9	460.8	505.4
Retained Earnings	70.4	57.4	86.4	141.4	221.9
Total Liabilities and Shareholders' Equity	\$1,687.8	\$2,399.4	\$3,387.6	\$4,102.6	\$4,417.4
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Revenue	\$1,670.1	\$2,181.2	\$2,809.8	\$3,610.8	\$4,208.5
Japanese Revenue	1,150.1	1,614.2	2,119.8	2,693.8	3,085.0
Non-Japanese Revenue	520.0	567.0	690.0	917.0	1,123.5
Cost of Sales	\$1,183.8	\$1,632.6	\$2,174.4	\$2,652.7	\$3,036.1
R&D Expense	\$66.5	\$90.3	\$120.8	\$185.5	\$272.9
SG&A Expense	\$361.6	\$479.8	\$611.0	\$784.5	\$899.3
Capital Expense	\$270.8	\$192.4	\$159.2	\$197.5	\$452.5
Pretax Income	\$81.8	\$12.2	\$27.8	\$83.8	\$190.7
Pretax Margin (%)	4.90	0.56	0.99	2.32	4.53
Effective Tax Rate (%)	58.00	58.00	58.00	56.00	56.00
Net Income	\$36.6	(\$5.4)	\$15.3	\$27.9	\$116.1
Shares Outstanding, Millions	459.6	480.4	500.9	519.5	572.5
<i>Per Share Data</i>					
Earnings	\$0.08	(\$0.01)	\$0.03	\$0.05	\$0.21
Dividends	\$0.02	\$0.03	\$0.02	\$0.04	\$0.04
Book Value	\$0.66	\$1.02	\$1.42	\$1.83	\$1.96

**Table 4 (Continued)**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending March 31**  
**(Millions of U.S. Dollars, except Per Share Data)**

Key Financial Ratios	1985	1986	1987	1988	1989
<i>Liquidity</i>					
Current (Times)	1.17	1.29	1.26	1.18	1.33
Quick (Times)	0.69	0.83	0.86	0.81	0.93
Fixed Assets/Equity (%)	150.75	125.83	101.39	88.53	93.48
Current Liabilities/Equity (%)	311.67	246.43	258.74	248.41	196.26
Total Liabilities/Equity (%)	459.80	389.87	376.12	331.67	293.78
<i>Profitability (%)</i>					
Return on Assets	-	(0.26)	0.53	0.74	2.73
Return on Equity	-	(1.36)	2.55	3.36	11.21
Profit Margin	2.19	(0.25)	0.54	0.77	2.76
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	3.98	4.14	4.30	5.14	6.48
Capital Spending % of Revenue	16.21	8.82	5.67	5.47	10.75
Employees	18,134	18,649	19,375	18,659	18,440
Revenue (\$K)/Employee	\$92.10	\$116.96	\$145.02	\$193.52	\$228.23
Capital Spending % of Assets	16.05	8.02	4.70	4.81	10.24

Source: Ok! Electric  
Annual Reports  
Dataquest  
January 1990

# Oki Electric Industry Co., Ltd.

Oki Electric Industry Co., Ltd.  
7-12, Toranaman 1-chome  
Minato-ku, Tokyo 105, Japan  
(03) 501-3111

Established 1881  
No. of Employees: 18,649

## **BACKGROUND**

Oki Electric Industry Co., Ltd. (Oki), was founded in 1881 as a telephone manufacturing company by Kibataro, a maker of traditional Japanese swords and armor. In 1916, the Company began quantity production of radio communications equipment. Oki first manufactured semiconductors in the early 1960s; it was the first Japanese company to produce green LEDs. Today, the Company is a leading supplier of telecommunications systems, EDP systems, and electronic devices, including semiconductors.

Oki views GaAs and other new materials as instrumental in achieving major advances in semiconductor technology. One of its overall strategies is to advance ICs based on GaAs technology to mass production. Its R&D effort has included development of an 8 x 8 GaAs multiplier using W-Al gates for yield enhancement. Oki has done work on HEMTs for operation at liquid nitrogen temperatures with recorded propagation delays of 27ps per gate.

## **COMPANY EXECUTIVES (GaAs ACTIVITY)**

- President--Nobumitsa Kosagi
- Executive Vice President/General Manager, Electronic Devices Group--Masao Nogami
- Director/General Manager, Marketing Division--Yoji Tanaka

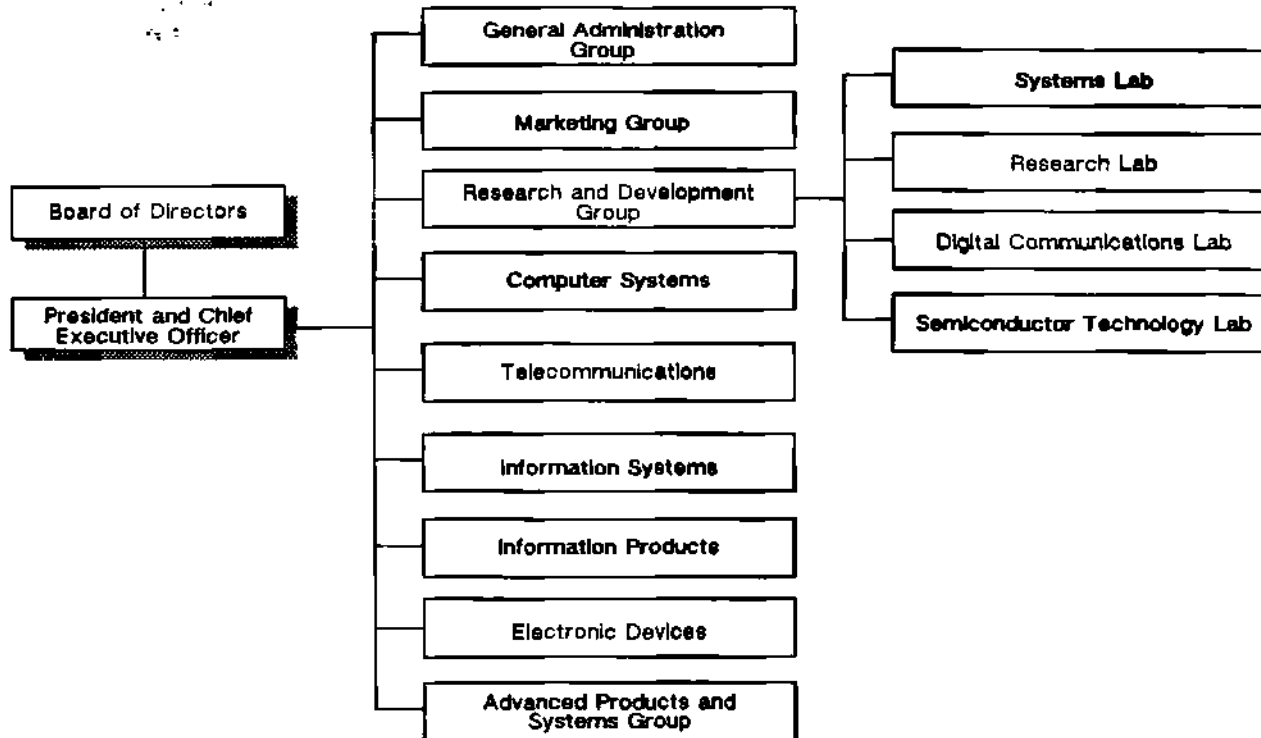
## **COMPANY ORGANIZATION**

Figure 1 shows Oki Electric Industry's organization.

# Oki Electric Industry Co., Ltd.

Figure 1

## Oki Electric Industry Co., Ltd. Company Organization



0005363-1

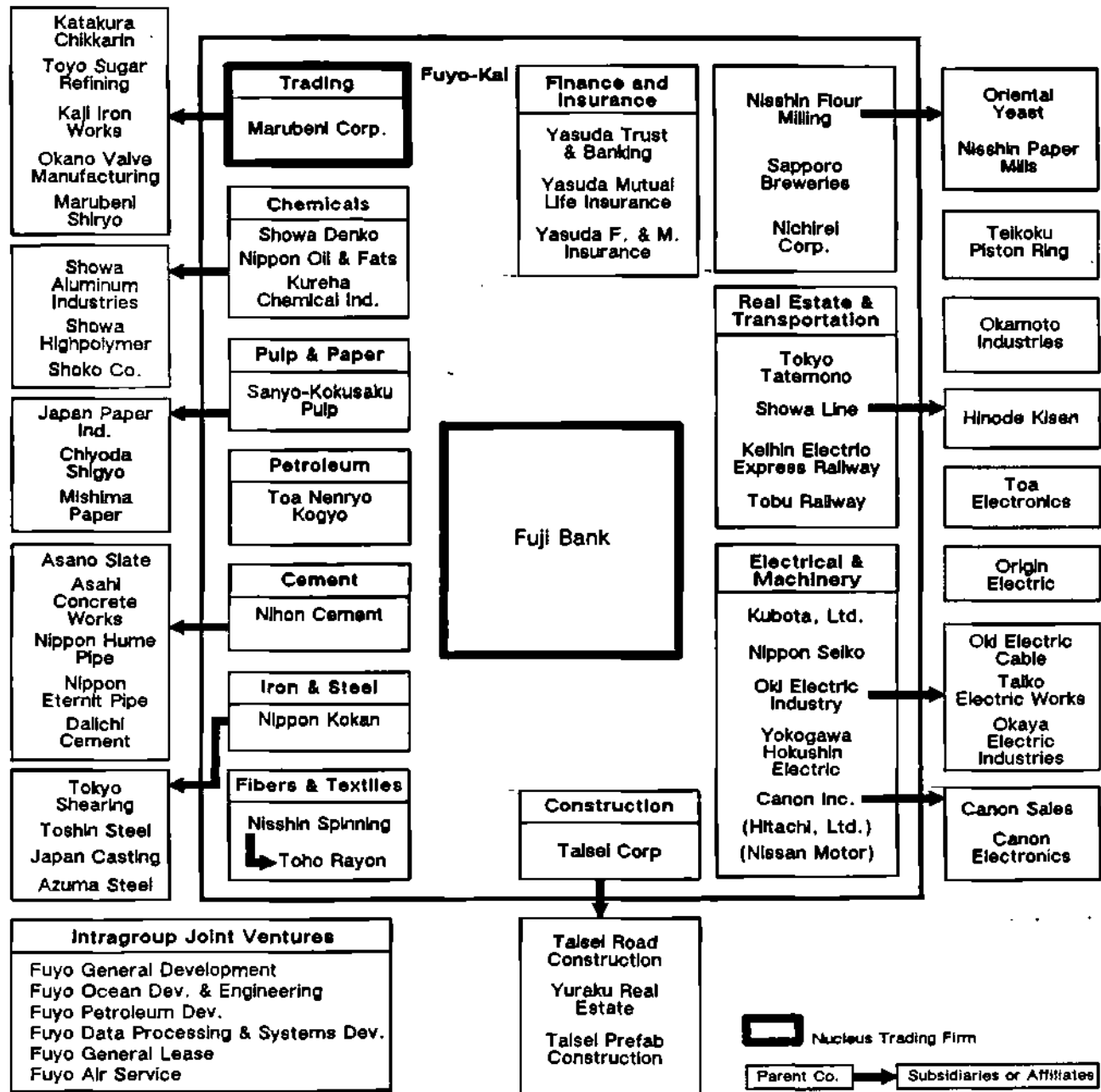
Source: Oki Electric Industry Company, Ltd.

## FINANCIAL BACKING AND STRATEGIC ALLIANCES

Oki is a member of the Fuyo Group (see Figure 2), started after World War II and composed of companies having close financial relations with Fuji Bank. The group's policy-making council (Fuyo-Kai) is made up of the presidents of the 29 group companies. Marubeni is the Fuyo Group's central trading company.

# Oki Electric Industry Co., Ltd.

Figure 2  
The Fuyo Group



0005363-2

Source: Dodwell Marketing Consultants, Industrial Groupings in Japan



# Oki Electric Industry Co., Ltd.

Major shareholders of Oki are Yasuda Mutual Life Insurance (7.8 percent), Meiji Mutual Life Insurance (6.0 percent), Dai-Ichi Mutual Life Insurance (5.6 percent), Fuji Bank (4.3 percent), and Yasuda Trust and Banking (3.8 percent). Foreign ownership is less than 1.5 percent.

Oki has technology-sharing and licensing agreements with AT&T (GaAs ICs), Catalyst Semiconductor, Intel, Silicon Systems, Thomson-CSF, Voest Alpine AG (Austria), and others.

## **PROCESS TECHNOLOGY**

Oki uses III-V compound processing including GaAs, GaAlAs, GaAsP, and others.

## **PRODUCTS**

- Optoelectronic devices including LEDs
- GaAs ICs including multiplexers and demultiplexers

## **Applications**

- Fiber-optic communications
- High-speed instrumentation
- Military/aerospace
- EDP/peripherals
- Automotive and consumer electronics

## **FACILITIES**

- Hachioji—Includes GaAs fab, assembly, and test capabilities
- Chichibu (Tokyo)—Optoelectronics, other

# Oki Electric Industry Company, Limited

Oki Electric Industry Company, Ltd.  
7-12 Toranomon 1-chome, Minato-ku  
Tokyo, 105 Japan  
Phone: (03) 501-3111  
Fax: (03) 508-9465  
(Billions of Yen)

Balance Sheet (March 31)	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
Total Current Assets	¥234	¥275	¥279	¥337	¥348
Cash	¥ 63	¥ 63	¥ 71	¥100	¥115
Receivables	¥ 84	¥ 95	¥104	¥125	¥119
Inventory	¥ 84	¥113	¥ 99	¥106	¥109
Other Current Assets	¥ 4	¥ 5	¥ 5	¥ 6	¥ 5
Net Property, Plant, and Equipment	¥ 78	¥114	¥111	¥105	¥105
Depreciation	¥ 85	¥109	¥140	¥162	¥178
Other Assets	¥ 29	¥ 33	¥ 42	¥ 50	¥ 59
Total Assets	¥341	¥422	¥432	¥491	¥513
Total Current Liabilities	¥214	¥235	¥217	¥267	¥295
Long-Term Debt	¥ 62	¥110	¥121	¥115	¥ 99
Other Liabilities	¥ 1	¥ 1	¥ 6	¥ 6	¥ 0
Total Liabilities	¥277	¥347	¥344	¥388	¥394
Total Shareholders' Equity	¥ 64	¥ 75	¥ 88	¥103	¥119
Common Stock	¥ 26	¥ 28	¥ 32	¥ 38	¥ 44
Other Equity	¥ 25	¥ 30	¥ 46	¥ 52	¥ 58
Retained Earnings	¥ 12	¥ 18	¥ 10	¥ 13	¥ 18
Total Liability and Total Equity	¥341	¥422	¥432	¥491	¥513
 Income Statement (March 31)	 <u>1984</u>	 <u>1985</u>	 <u>1986</u>	 <u>1987</u>	 <u>1988</u>
Revenue	¥345	¥418	¥393	¥407	¥451
Domestic Sales	¥244	¥288	¥291	¥307	¥336
Overseas Sales	¥102	¥130	¥102	¥100	¥115
Other income	0	0	0	0	0
Cost of Sales	¥243	¥296	¥294	¥315	¥332
Gross Margin (%)	30	29	25	23	27
R&D Expense	¥ 15	¥ 17	¥ 16	¥ 18	¥ 23
SG&A Expense	¥ 59	¥ 74	¥ 70	¥ 71	¥ 75
Other Operating Expenses	¥ 3	¥ 3	¥ 1	(¥ 9)	¥ 3
Total Operating Expenses	¥320	¥389	¥381	¥395	¥433
Operating Income (Loss)	¥ 26	¥ 29	¥ 12	¥ 13	¥ 18
Interest, Net	(¥ 8)	(¥ 8)	(¥ 9)	(¥ 9)	(¥ 8)
Pretax Income	¥ 18	¥ 20	¥ 2	¥ 4	¥ 10
Provision for Taxes (Credit)	¥ 9	¥ 11	¥ 3	¥ 2	¥ 8
Effective Tax Rate (%)	48	54	41	43	73
Extraordinary Items	0	0	0	0	¥ 1
Net Income	¥ 9	¥ 9	(¥ 1)	¥ 2	¥ 3
 Avg. Shares Outstanding (Millions)	 427	 454	 470	 491	 510
Employees	17,027	18,134	18,649	19,375	18,659
Capital Spending	¥ 38	¥ 68	¥ 35	¥ 23	¥ 25
 Exchange Rate (Yen per US\$1)	 236	 245	 221	 160	 138

Source: Dataquest  
November 1989

# Oki Electric Industry Company, Limited

Oki Electric Industry Company, Ltd.  
7-12 Toranomom 1-chome, Minato-ku  
Tokyo, 105 Japan  
Phone: (03) 501-3111  
Fax: (03) 508-9465  
(Millions of Dollars)

Income Statement (March 31)	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
Total Current Assets	\$ 990	\$1,122	\$1,263	\$2,103	\$2,525
Cash	\$ 265	\$ 256	\$ 323	\$ 623	\$ 835
Receivables	\$ 357	\$ 388	\$ 471	\$ 779	\$ 862
Inventory	\$ 354	\$ 460	\$ 447	\$ 665	\$ 792
Other Current Assets	\$ 15	\$ 18	\$ 23	\$ 37	\$ 36
Net Property, Plant, & Equipment	\$ 330	\$ 464	\$ 502	\$ 654	\$ 762
Depreciation	\$ 358	\$ 445	\$ 631	\$1,013	\$1,287
Other Assets	\$ 123	\$ 136	\$ 189	\$ 313	\$ 429
Total Assets	\$1,443	\$1,722	\$1,954	\$3,070	\$3,716
Total Current Liabilities	\$2,066	\$2,423	\$2,908	\$4,706	\$5,838
Long-Term Debt	\$ 264	\$ 450	\$ 546	\$ 721	\$ 715
Other Liabilities	\$ 5	\$ 6	\$ 26	\$ 36	\$ 1
Total Liabilities	\$1,173	\$1,415	\$1,556	\$2,425	\$2,855
Total Shareholders' Equity	\$ 271	\$ 308	\$ 399	\$ 644	\$ 823
Common Stock	\$ 111	\$ 114	\$ 146	\$ 239	\$ 278
Other Equity	\$ 107	\$ 122	\$ 207	\$ 327	\$ 417
Retained Earnings	\$ 53	\$ 72	\$ 47	\$ 78	\$ 128
Total Liability and Total Equity	\$1,444	\$1,722	\$1,955	\$3,069	\$3,678
Income Statement (March 31)	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
Revenue	\$1,464	\$1,704	\$1,776	\$2,546	\$3,270
Domestic Sales	\$1,033	\$1,173	\$1,315	\$1,921	\$2,435
Overseas Sales	\$ 431	\$ 531	\$ 462	\$ 625	\$ 836
Other income	0	0	0	0	0
Cost of Sales	\$1,031	\$1,208	\$1,330	\$1,971	\$2,403
Gross Margin (%)	30	29	25	23	27
R&D Expense	\$ 62	\$ 68	\$ 73	\$ 109	\$ 168
SG&A Expense	\$ 250	\$ 301	\$ 317	\$ 444	\$ 543
Other Operating Expenses	\$ 13	\$ 10	\$ 4	(\$ 58)	\$ 24
Total Operating Expenses	\$1,293	\$1,520	\$1,651	\$2,357	\$2,970
Operating Income (Loss)	\$ 170	\$ 184	\$ 126	\$ 189	\$ 301
Interest, Net	(\$ 32)	(\$ 33)	(\$ 43)	(\$ 55)	(\$ 57)
Pretax Income	\$ 139	\$ 151	\$ 83	\$ 134	\$ 243
Provision for Taxes (Credit)	\$ 37	\$ 45	\$ 14	\$ 11	\$ 55
Effective Tax Rate (%)	27	30	17	8	23
Extraordinary Items	0	\$ 1	0	\$ 1	\$ 4
Net Income	\$ 101	\$ 105	\$ 69	\$ 123	\$ 193
Avg. Shares Outstanding (Millions)	427	454	470	491	510
Employees	17,027	18,134	18,649	19,375	18,659
Capital Spending	\$ 159	\$ 276	\$ 157	\$ 144	\$ 181
Exchange Rate (Yen per US\$1)	236	245	221	160	138

Source: Dataquest  
November 1989

# Oki Electric Industry Company, Limited

The following tables are included in this section:

Table 1—Sales by Product Segment (Billions of Yen)

Table 2—Estimated Worldwide Semiconductor Revenue by Calendar Year  
(Billions of Yen)

Table 3—Estimated Worldwide Semiconductor Revenue by Calendar Year  
(Millions of Dollars)

Table 4—1988 Percent Change in Worldwide Semiconductor Revenue  
(Millions of Dollars)

Table 5—1988 Estimated Semiconductor Revenue Percent by Region  
(Millions of Dollars)

Table 1

## Sales by Product Segment (Billions of Yen)

	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
Telecommunications	¥ 76.4	¥ 94.1	¥ 99.3	¥112.0	¥135.1
Information Processing	178.4	203.6	196.7	194.3	202.5
Electronic Devices	74.8	100.0	80.1	84.8	94.7
Other Products	<u>15.8</u>	<u>19.8</u>	<u>16.5</u>	<u>16.3</u>	<u>19.1</u>
Total	¥345.4	¥417.5	¥392.6	¥407.4	¥451.4
Exchange Rate	236	245	221	160	138

Source: Oki Annual Report  
Dataquest  
November 1989

# Oki Electric Industry Company, Limited

**Table 2**

**Estimated Worldwide Semiconductor Revenue  
by Calendar Year  
(Billions of Yen)**

	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
Total Semiconductor	21.6	31.9	53.9	85.6	73.2	71.5	93.7	123.0
Total IC	19.4	29.9	50.9	81.2	68.9	67.5	89.1	117.2
Bipolar Digital (Technology)	2.0	3.5	4.0	5.8	5.3	3.2	4.5	4.9
MOS (Technology)	17.0	26.2	46.4	74.7	62.9	62.0	81.6	109.3
NMOS	6.6	10.4	18.4	33.6	26.2	22.9	28.7	39.5
PMOS	1.1	1.2	1.2	0.2	0	0	0	0
CMOS	9.3	14.6	26.8	40.9	36.7	39.1	52.9	69.8
BiCMOS	0	0	0	0	0	0	0	0
MOS (Function)	17.0	26.2	46.4	74.7	62.9	62.0	81.6	109.6
MOS Memory	6.9	14.5	23.7	35.3	21.7	15.1	27.9	46.1
MOS Microdevices	0.4	1.5	4.5	10.9	10.7	11.3	14.5	17.3
MOS Logic	9.7	10.2	18.2	28.5	30.5	35.6	39.2	46.2
Analog	0.4	0.2	0.5	0.7	0.7	2.3	3.0	3.0
Total Discrete	1.1	1.0	0.7	0.9	1.0	1.0	1.0	1.2
Total Optoelectronic	1.1	1.0	2.3	3.5	3.3	3.0	3.6	4.6
Exchange Rate (Yen per US\$1)	221	249	237	237	238	168	144	130

Source: Dataquest  
November 1989

# Oki Electric Industry Company, Limited

**Table 3**

**Estimated 1988 Worldwide Semiconductor Revenue  
by Calendar Year  
(Millions of Dollars)**

	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
Total Semiconductor	98	129	229	362	307	428	651	947
Total IC	88	121	216	343	289	404	619	902
Bipolar Digital (Technology)	9	14	17	25	22	19	32	38
MOS (Technology)	77	106	197	315	264	371	566	841
NMOS	30	42	78	141	110	137	199	304
PMOS	5	5	5	1	0	0	0	0
CMOS	42	59	114	173	154	234	367	537
BiCMOS	0	0	0	0	0	0	0	0
MOS (Function)	77	106	197	315	264	371	566	841
MOS Memory	31	59	101	149	91	90	193	353
MOS Microdevices	2	6	19	46	45	68	101	134
MOS Logic	44	41	77	120	128	213	272	354
Analog	2	1	2	3	3	14	21	23
Total Discrete	5	4	3	4	4	6	7	9
Total Optoelectronic	5	4	10	15	14	18	25	36
Exchange Rate (Yen per US\$1)	221	249	237	237	238	168	144	130

Source: Dataquest  
November 1989

# Ok Electric Industry Company, Limited

**Table 4**

**1988 Percent Change in Worldwide Semiconductor Revenue  
(Millions of Dollars)**

	<u>1987</u>	<u>1988</u>	<u>% Change</u>	<u>World Market % Change</u>
Semiconductor	\$651	\$947	45.5%	33.0%
IC	\$619	\$902	45.7%	37.4%
Bipolar Digital	32	38	18.8%	9.2%
MOS (Technology)	566	841	48.6%	54.5%
MOS Memory	193	353	82.9%	93.1%
MOS Micro	101	134	32.7%	39.9%
MOS Logic	272	354	30.1%	29.2%
Analog	21	23	9.5%	16.0%
Discrete	\$ 7	\$ 9	28.6%	14.4%
Optoelectronics	\$ 25	\$ 36	44.0%	27.5%
Exchange rate (Yen per US\$1)	144	130		

Source: Dataquest  
November 1989

**Table 5**

**1988 Estimated Semiconductor Revenue Percent by Region  
(Millions of Dollars)**

<u>Product</u>	<u>United States</u>	<u>Japan</u>	<u>Europe</u>	<u>ROW</u>
Semiconductor	30%	56%	6%	8%
IC	32%	54%	6%	8%
Bipolar Digital	0	0	0	0
MOS (Technology)	34%	50%	7%	9%
MOS Memory	52%	31%	11%	6%
MOS Micro	13%	52%	12%	22%
MOS Logic	23%	69%	1%	7%
Analog	0	100%	0	0
Discrete	0	100%	0	0
Optoelectronics	0	94%	3%	3%
Exchange Rate (Yen per US\$1)				130

Source: Dataquest  
November 1989

# Oki Electric Industry Company, Limited

Oki Electric Industry Company, Ltd.  
7-12, Toranomom 1-chome, Minato-ku  
Tokyo, 105, Japan  
Telephone: (03) 501-3111  
(Billions of Yen)

Balance Sheet (March 31)	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
Total Current Assets	¥195.5	¥233.7	¥274.9	¥279.2	¥336.5
Cash	¥ 54.4	¥ 62.5	¥ 62.6	¥ 71.3	¥ 99.6
Receivables	¥ 70.7	¥ 84.2	¥ 95.1	¥104.2	¥124.6
Inventory	¥ 67.5	¥ 83.5	¥112.8	¥ 98.7	¥106.4
Other Current Assets	¥ 2.8	¥ 3.5	¥ 4.5	¥ 5.0	¥ 5.9
Net Property, Plant, and Eqp.	¥ 60.2	¥ 77.8	¥113.6	¥110.9	¥104.6
Depreciation	¥ 72.4	¥ 84.5	¥109.1	¥139.5	¥162.1
Other Assets	¥ 25.9	¥ 29.1	¥ 33.4	¥ 41.8	¥ 50.1
Total Assets	¥281.5	¥340.6	¥421.9	¥431.9	¥491.2
Total Current Liabilities	¥166.6	¥213.5	¥234.9	¥217.3	¥266.9
Long-Term Debt	¥ 73.6	¥ 62.2	¥110.3	¥120.7	¥115.4
Other Liabilities	¥ 0.6	¥ 1.1	¥ 1.4	¥ 5.0	¥ 5.7
Total Liabilities	¥240.8	¥276.7	¥346.6	¥343.7	¥388.0
Total Shareholders' Equity	¥ 40.7	¥ 63.9	¥ 75.4	¥ 88.2	¥103.2
Conv. Preferred Stock	0	0	0	0	0
Common Stock	¥ 20.2	¥ 26.2	¥ 27.9	¥ 32.2	¥ 38.3
Other Equity	¥ 13.3	¥ 25.3	¥ 29.9	¥ 45.7	¥ 52.3
Retained Earnings	¥ 7.1	¥ 12.4	¥ 17.6	¥ 10.3	¥ 12.5
Total Liability and Equity	¥281.5	¥340.7	¥422.0	¥431.9	¥491.2
Income Statement (March 31)	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
Revenue	¥279.7	¥345.4	¥417.5	¥392.6	¥407.4
Domestic Sales	¥207.3	¥243.7	¥287.5	¥290.6	¥307.4
Overseas Sales	¥ 72.4	¥101.7	¥130.0	¥102.0	¥100.0
Cost of Sales	¥ 03.9	¥243.2	¥296.0	¥293.9	¥315.3
Gross Margin (%)	27	30	29	25	23
R&D Expense	¥ 11.5	¥ 14.6	¥ 16.6	¥ 16.2	¥ 17.5
SG&A Expense	¥ 47.2	¥ 58.9	¥ 73.8	¥ 70.1	¥ 71.1
Other Operating Expenses	¥ 0.8	¥ 3.1	¥ 2.5	¥ 0.8	¥ 9.3
Total Operating Expenses	¥263.4	¥319.8	¥388.9	¥381.0	¥394.6
Operating Income (Loss)	¥ 16.2	¥ 25.5	¥ 28.7	¥ 11.6	¥ 12.8
Interest, Net	(¥ 7.8)	(¥ 7.5)	(¥ 8.2)	(¥ 9.4)	(¥ 8.8)
Pretax Income	¥ 8.5	¥ 18.0	¥ 20.4	¥ 2.2	¥ 4.0
Income Taxes	¥ 6.3	¥ 8.7	¥ 11.1	¥ 3.1	¥ 1.7
Effective Tax Rate (%)	74	48	54	140	43
Extraordinary Items, Net	¥ 0.4	(¥ 0.1)	(¥ 0.2)	(¥ 0.1)	(¥ 0.2)
Net Income	¥ 2.5	¥ 9.2	¥ 9.2	(¥ 1.0)	¥ 2.2
Average Shares Outstanding (Millions)	392	427	454	470	491
Employees	15,658	17,027	18,134	18,649	19,375
Capital Spending	¥ 27.7	¥ 37.5	¥ 67.7	¥ 34.6	¥ 23.1
Exchange Rate (Yen per US\$)	249	236	245	221	160

Source: Oki Electric Industry Company, Ltd.  
Annual Reports  
Dataquest  
February 1988



# Oki Electric Industry Company, Limited

Oki Electric Industry Company, Ltd.  
7-12, Toranomon 1-chome, Minato-ku  
Tokyo, 105, Japan  
Telephone  
Twx: 501-3111  
(Millions of Dollars)

Balance Sheet (March 31)	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
Total Current Assets	\$1,352	\$ 990	\$1,122	\$1,263	\$2,103
Cash	\$ 400	\$ 265	\$ 255	\$ 322	\$ 623
Receivables	\$ 501	\$ 357	\$ 388	\$ 471	\$ 779
Inventory	\$ 427	\$ 354	\$ 460	\$ 447	\$ 665
Other Current Assets	\$ 24	\$ 15	\$ 18	\$ 23	\$ 37
Net Property, Plant, and Eqp.	\$ 420	\$ 330	\$ 464	\$ 502	\$ 654
Depreciation	\$ 651	\$ 358	\$ 446	\$ 631	\$1,013
Other Assets	\$ 201	\$ 123	\$ 136	\$ 189	\$ 313
Total Assets	\$1,973	\$1,443	\$1,722	\$1,954	\$3,070
Total Current Liabilities	\$1,072	\$ 905	\$ 959	\$ 983	\$1,668
Long-Term Debt	\$ 463	\$ 263	\$ 450	\$ 546	\$ 721
Other Liabilities	\$ 23	\$ 5	\$ 6	\$ 26	\$ 36
Total Liabilities	\$1,558	\$1,173	\$1,415	\$1,555	\$2,425
Total Shareholders' Equity	\$ 414	\$ 271	\$ 308	\$ 399	\$ 644
Conv. Preferred Stock	0	0	0	0	0
Common Stock	\$ 154	\$ 111	\$ 114	\$ 146	\$ 239
Other Equity	\$ 210	\$ 107	\$ 122	\$ 207	\$ 327
Retained Earnings	\$ 50	\$ 53	\$ 72	\$ 47	\$ 78
Total Liability and Equity	\$1,973	\$1,444	\$1,722	\$1,954	\$3,070
Income Statement (March 31)	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
Revenue	\$1,123	\$1,464	\$1,704	\$1,777	\$2,546
Domestic Sales	\$ 833	\$1,033	\$1,174	\$1,315	\$1,921
Overseas Sales	\$ 291	\$ 431	\$ 531	\$ 462	\$ 625
Cost of Sales	\$ 819	\$1,030	\$1,208	\$1,330	\$1,971
Gross Margin (%)	27	30	29	25	23
R&D Expense	\$ 46	\$ 62	\$ 68	\$ 74	\$ 109
SG&A Expense	\$ 189	\$ 250	\$ 301	\$ 317	\$ 444
Other Operating Expenses	\$ 3	\$ 13	\$ 10	\$ 4	(\$ 58)
Total Operating Expenses	\$1,058	\$1,355	\$1,587	\$1,724	\$2,466
Operating Income (Loss)	\$ 65	\$ 108	\$ 117	\$ 53	\$ 60
Interest, Net	(\$ 31)	(\$ 32)	(\$ 34)	(\$ 43)	(\$ 55)
Pretax Income	\$ 34	\$ 76	\$ 83	\$ 10	\$ 25
Income Tax	\$ 25	\$ 37	\$ 45	\$ 14	\$ 11
Effective Tax Rate (%)	74	48	54	140	43
Extraordinary Items, Net	\$ 1	0	(\$ 1)	0	(\$ 1)
Net Income	\$ 10	\$ 39	\$ 37	(\$ 4)	\$ 14
Average Shares Outstanding (Millions)	392	427	454	470	491
Employees	15,658	17,027	18,134	18,649	19,375
Capital Spending	\$ 111	\$ 159	\$ 276	\$ 157	\$ 144
Exchange Rate (Yen per US\$)	248	236	245	221	160

Source: Oki Electric Industry Company, Ltd.  
Annual Reports  
Dataquest  
February 1988

# Oki Electric Industry Company, Limited

## THE COMPANY

### Overview

Oki Electric Industry Company, Limited, was established in 1881 as a pioneering Japanese telephone manufacturing company by Kibataro Oki, formerly a maker of traditional Japanese swords and armor. In 1916, the Company began quantity production of radio communications equipment. Today, Oki is a leading producer of advanced telecommunications systems, data processing systems, and electronic devices, including semiconductors. Oki began manufacturing semiconductors in the early 1960s, and was the first Japanese company to manufacture green LEDs.

Oki is a member company of the Fuyo Group, a relatively young industrial group formed after World War II. (Fuyo is another name for Mount Fuji.) The Fuyo Group is composed of companies that have close financial relations with Fuji Bank. The presidents of the 29 group companies constitute the group's policy-making council, or "Fuyo-Kai." In addition, there are group councils consisting of vice presidents and planning department managers. Hitachi, Ltd., and Nissan Motor Company are members of the Fuyo-Kai, but both companies have also formed their own groups. The Fuyo Group member companies tend to be more independent of the group than companies in such large industrial groups as Mitsubishi and Sumitomo. Marubeni is the Fuyo Group's central trading firm.

### Company Organization

In fiscal 1987, Oki created the Research and Development Group. This new group coordinates the activities of the newly formed Digital Communications and Semiconductor Technologies Laboratories.

In fiscal 1986, the Advanced Products and Systems Group was established to focus on strengthening the Company's capabilities in the market for integrated electronic systems. This group oversees the activities of the newly created Integrated Systems and Electroacoustics Systems Division.

In 1986, the Company upgraded its office automation (OA) strategic business unit to division status. The unit will supervise the development, production, and marketing of Oki's OA products. The OA division will also cooperate with the Company's other divisions to combine their products into multifunctional OA systems. This is essentially the same philosophy practiced by NEC, with its "C&C" (Computer and Communication) approach.

In addition to the above-mentioned groups, Oki is organized by Electronic Devices Industry Group (including semiconductors), the Telecommunications Systems Industry Group, and the Information Processing Systems Industry Group.

# Oki Electric Industry Company, Limited

## Management and Employees

Oki employs 19,375 people under the leadership of its president and chief executive officer, Namio Hashimoto, and executive vice president, Nobumitsu Kosugi.

## Financial Information

### Major Shareholders

Oki's major shareholders are listed in Table 1.

Major short- and long-term borrowings are from Fuyo Group financial institutions (Fuji Bank, Yasuda Trust and Banking, Yasuda Mutual Life Insurance, and Yasuda Fire and Marine Insurance).

In its fiscal 1987, Oki reported a consolidated net income of ¥2.2 billion compared with a ¥1.0 billion loss in fiscal 1986. Sales were ¥407.4 billion in the period, increasing 4 percent from ¥392.6 billion.

Table 1

### Oki Electric Industry Company, Limited Major Shareholders

<u>Shareholders</u>	<u>Percentage of Shares</u>
Yasuda Mutual Life Insurance Company	8.5%
Meiji Mutual Life Insurance Company	6.5%
Dai-Ichi Mutual Life Insurance Company	5.8%
Fuji Bank	4.5%
Yasuda Trust and Banking Company	3.7%
Yasuda Fire and Marine Insurance Company	2.6%

Source: Oki Electric Industry Company, Limited  
Annual Reports  
Dataquest  
February 1988

# Oki Electric Industry Company, Limited

## Revenue by Lines of Business

Revenue by line of business is shown in Table 2. The Telecommunications Systems and Electronic Devices Groups have both increased their shares of business. The Office Automation Industry Group is not yet broken out in the Company's financial reporting.

Table 2

### Oki Electric Industry Company, Limited Revenue by Major Line of Business (Billions of Yen)

	<u>Fiscal Year Ending March 31</u>				
	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
Telecommunications Systems	¥ 79.8	¥ 76.4	¥ 94.1	¥ 99.3	¥112.0
Information Processing Systems	139.4	178.4	203.6	196.7	194.3
Electronic Devices	46.8	74.8	100.0	80.1	84.8
Other	<u>13.7</u>	<u>15.8</u>	<u>19.8</u>	<u>16.5</u>	<u>16.3</u>
Total Sales	¥279.7	¥345.4	¥417.5	¥392.6	¥407.4
Exchange Rate (¥ per US\$)	249	236	245	221	160

Source: Oki Electric Industry Company, Limited  
Annual Reports  
Dataquest  
February 1988

# Oki Electric Industry Company, Limited

## **International Activities**

Overseas sales accounted for 25 percent of Oki's total consolidated revenue in fiscal 1987. The compound annual growth rate (CAGR) for overseas sales was 7 percent from 1983 to 1987, while domestic sales grew at a CAGR of only 8 percent.

Oki has 10 overseas subsidiaries and affiliates, including four in the United States, two in Singapore, two in West Germany, one in Taiwan, and one in Hong Kong. The Company's semiconductor operations overseas are handled by Oki Semiconductor Group in Santa Clara, California, and Oki Electric Europe GmbH in Dusseldorf, West Germany. Oki also maintains nine overseas liaison and sales offices, including one in Beijing, China.

Oki Semiconductor Group, the United States-based semiconductor division of Oki Electric, is an important part of Oki's operations. Oki Semiconductor was established in 1978 as a division of Oki Electric Overseas Corp., a wholly owned subsidiary of Oki Electric. In 1980, Oki Semiconductor became an autonomous company and a direct subsidiary of Oki Electric. Oki Semiconductor has built a factory in Sunnyvale, California, for assembly and test. Oki Semiconductor originally subcontracted wafer fabrication and assembly to several U.S. companies, but subsequently ended this arrangement. The Company has reorganized its U.S. organization so that Oki Semiconductor Group is now a division of Oki America, Inc.

## **Facilities**

Oki has six semiconductor manufacturing facilities in Japan, in addition to a U.S. assembly and test facility. These are listed in Table 3. Oki has added a GaAs production line at its Hachioji factory, and plans to start production of GaAs devices for car telephones, other telecommunications, and measuring equipment by the end of this year. Oki has acquired a site near Sendai, Miyagi prefecture, for a new VLSI factory. The new factory is scheduled to begin operation in 1987 and will be a 6-inch wafer fab.

# Oki Electric Industry Company, Limited

Table 3

## Oki Electric Industry Company, Limited Semiconductor Manufacturing Facilities

<u>Location</u>	<u>Function and Products</u>
Chichibu Factory Saitama Prefecture (Est. 1975)	Assembly--ICs and discretes
Hachioji LSI Factory, Tokyo Metropolis (Est. 1961) (GaAs line added 1986)	Fab and test--ICs and discretes; GaAs
Miyazaki Oki Denki Miyazaki Prefecture (Est. 1981; 2nd line added 1984)	Fab and test--MOS memory, microdevices, logic
VLSI Pilot Production Plant Tokyo Metropolis (Est. 1983)	R&D--VLSI Fab and test--MOS ICs
Honjyo Factory Saitama Prefecture (Est. 1984)	Assembly and test--linear ICs
Yoshikawa Semiconductor Miyazaki Prefecture (Est. 1985)	Assembly and test--ICs
Sendai Factory Miyagi Prefecture (Est. 1987)	Fab--VLSI (6-inch wafers)
Sunnyvale Factory California (Est. 1984)	Assembly and test--ICs

Source: Dataquest  
February 1988

# Oki Electric Industry Company, Limited

## Capital and R&D Spending

Oki's capital spending for its fiscal 1987 was ¥23.1 billion, a decrease of 33 percent, as shown in Table 4. Table 5 shows Oki's corporate capital and R&D spending in dollars. Dataquest estimates that Oki made semiconductor capital investments of \$60 million in calendar 1986 (see Table 6).

Table 4

**Oki Electric Industry Company, Limited  
Capital and R&D Spending  
(Billions of Yen)**

	<u>Fiscal Year Ending March 31</u>				
	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
Revenue	¥279.7	¥345.4	¥417.5	¥392.6	¥407.4
Capital Spending (Billions)	¥ 27.7	¥ 37.5	¥ 67.7	¥ 34.6	¥ 23.1
Percentage of Revenue	10%	11%	16%	9%	6%
R&D Expense	¥ 11.5	¥ 14.6	¥ 16.6	¥ 16.2	¥ 17.5
Percentage of Revenue	4%	4%	4%	4%	4%
Combined Capital and R&D Revenue	¥ 39.2	¥ 52.1	¥ 84.3	¥ 50.8	¥ 40.6
Percentage of Revenue	14%	15%	11%	11%	10%
Exchange Rate (¥ per US\$)	249	236	245	221	160

Source: Oki Electric Industry Company, Limited  
Annual Reports  
Dataquest  
February 1988

# Oki Electric Industry Company, Limited

**Table 5**

**Oki Electric Industry Company, Limited  
Capital and R&D Spending  
(Millions of Dollars)**

	<u>Fiscal Year Ending March 31</u>				
	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
Revenue	\$1,123.1	\$1,463.5	\$1,704.2	\$1,776.2	\$2,546.3
Capital Spending (Millions)	\$ 111.2	\$ 158.9	\$ 276.3	\$ 156.6	\$ 144.2
Percentage of Revenue	10%	11%	16%	9%	6%
R&D Expense	\$ 11.5	\$ 14.6	\$ 16.6	\$ 16.2	\$ 17.5
Percentage of Revenue	4%	4%	4%	4%	4%
Combined Capital and R&D Revenue	\$ 39.2	\$ 52.1	\$ 84.3	\$ 50.8	\$ 40.6
Percentage of Revenue	14%	15%	11%	11%	10%
Exchange Rate (¥ per US\$)	249	236	245	221	160

Source: Oki Electric Industry Company, Limited  
Annual Reports  
Dataquest  
February 1988

**Table 6**

**Oki Electric Industry Company, Limited  
Semiconductor Capital Spending**

	<u>Calendar Year</u>				
	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Billions of Yen	¥ 11	¥ 11	¥ 26	¥ 26	¥ 10
Millions of Dollars	\$ 44	\$ 47	\$110	\$109	\$ 60
Exchange Rate (¥ per US\$)	248	235	237	238	167

Source: Dataquest  
February 1988



# Oki Electric Industry Company, Limited

## **Research and Development**

Oki's total research and development (R&D) expenditure for fiscal 1986 was ¥17.5 billion, or 4 percent of revenue.

In fiscal 1987, Oki boosted its R&D effort by increasing its number of laboratories from two to four. The new Semiconductor Technology Laboratory conducts research on 16-megabit DRAMs.

Oki operates a research facility at its Hachioji plant. One of the top priorities is development of prototype 4Mb and 16Mb DRAMs. In fiscal 1986, the Company established a ULSI Research Center on this site to conduct R&D on submicron technologies.

Recent R&D results include the refinement of technologies for mass production of GaAs ICs, the development of a series of multipurpose DSPs for use in ISDN systems, and the refinement of high-power semiconductor laser technologies for fiber-optic transmission systems.

## **PRODUCTS AND MARKETS**

### **Semiconductor Product Markets**

Oki has more than 20 years of experience in all phases of semiconductor design and manufacturing. Oki's semiconductor organization is part of the Electronic Devices Industry Group.

The Company manufactures devices encompassing a broad range of integrated circuits, discrete devices, and optoelectronics. The Company makes devices with the following processes: CMOS, PMOS, NMOS, TTL, I<sup>2</sup>L, and ECL; and specialty products that include sensor arrays, optical couplers, and LED lamps. New specialty products include speech recognition and synthesis chips.

Oki has more than 19 years of experience in CMOS integrated circuit manufacturing, including digital logic devices, digital watch and clock circuits, linear CMOS devices (including audio and radio phase-lock receivers), frequency synthesizers, and random-access memories.

Oki's semiconductor sales increased by 42 percent in 1986, to \$437 million, as shown in Table 7. The bulk of Oki's semiconductors are MOS devices (85 percent), about 54 percent of which are CMOS. The Company also produces a small number of bipolar digital logic and linear ICs. Discrete and optoelectronic devices make up 5 percent of Oki's output.

Dataquest believes that Oki shipped approximately 19 million 256K DRAMs and 15,000 1Mb DRAMs in 1986.

# Oki Electric Industry Company, Limited

**Table 7**  
**Oki Electric Industry Company, Ltd.**  
**Estimated Worldwide Semiconductor Revenue**  
**(Millions of Dollars)**

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
<b>Total Semiconductor</b>	<b>129</b>	<b>229</b>	<b>362</b>	<b>307</b>	<b>437</b>
<b>Total Integrated Circuit</b>	<b>121</b>	<b>216</b>	<b>343</b>	<b>289</b>	<b>413</b>
<b>Bipolar Digital (Technology)</b>	<b>14</b>	<b>17</b>	<b>25</b>	<b>22</b>	<b>29</b>
TTL	-	-	20	-	-
ECL	-	-	5	5	1
Other Bipolar Digital	-	-	-	17	28
<b>Bipolar Digital (Function)</b>	<b>14</b>	<b>17</b>	<b>25</b>	<b>22</b>	<b>29</b>
Bipolar Digital Logic	14	17	25	22	29
<b>MOS (Technology)</b>	<b>106</b>	<b>197</b>	<b>315</b>	<b>264</b>	<b>371</b>
NMOS	42	78	141	110	137
PMOS	5	5	1	-	-
CMOS	59	114	173	154	234
<b>MOS (Function)</b>	<b>106</b>	<b>197</b>	<b>315</b>	<b>264</b>	<b>371</b>
MOS Memory	59	101	149	91	89
MOS Micro Devices	6	19	46	45	69
MOS Logic	41	77	120	128	213
<b>Linear</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>14</b>
<b>Total Discrete</b>	<b>4</b>	<b>3</b>	<b>4</b>	<b>4</b>	<b>6</b>
Transistor	4	1	-	-	-
Other Discrete	-	2	4	4	6
<b>Total Optoelectronic</b>	<b>4</b>	<b>10</b>	<b>15</b>	<b>14</b>	<b>18</b>
LED Lamps	-	-	4	4	3
Optical Couplers	-	-	-	-	1
Other Optoelectronics	-	-	11	10	14
<b>Exchange Rate (¥ per US\$)</b>	<b>248</b>	<b>235</b>	<b>237</b>	<b>238</b>	<b>167</b>

Source: Dataquest  
February 1988

# Oki Electric Industry Company, Limited

As shown in Table 8, Oki's growth has been much higher than the industry average in all products except linear ICs and discretets. However, the Company has chosen to focus its R&D, manufacturing, and sales efforts on products with high growth potential, i.e., MOS and bipolar digital ICs, and optoelectronics.

**Table 8**  
**Oki Electric Industry Company, Limited**  
**Semiconductor Growth by Product Markets**  
**(Millions of Dollars)**

	1985	1986	Sales % Change	Industry % Change
	<u>Sales</u>	<u>Sales</u>	<u>1985-1986</u>	<u>1985-1986</u>
<b>Total Semiconductor</b>	\$307	\$438	42%	25%
<b>Total IC</b>	289	414	43%	24%
<b>Bipolar Digital</b>	22	29	32%	14%
<b>MOS Digital</b>	264	371	41%	25%
<b>Linear</b>	3	14	367%	30%
<b>Total Discrete</b>	4	6	23%	25%
<b>Total Optoelectronics</b>	14	18	29%	37%

Source: Dataquest  
February 1988

Table 9 shows Oki's estimated 1986 semiconductor revenue by geographic region. Dataquest estimates that approximately 40 percent of Oki's semiconductor sales are overseas, with about 23 percent, or \$101 million, in the United States; 8 percent in Europe; and 9 percent in Rest of World (ROW). Approximately 60 percent of semiconductor revenue is from Japan.

# Oki Electric Industry Company, Limited

Table 9

Oki Electric Industry Company, Ltd.  
Semiconductor Revenue by Region—1986  
(Millions of Dollars)

	<u>United States</u>	<u>Japan</u>	<u>Europe</u>	<u>ROW</u>	<u>World</u>
Total Semiconductor	\$101	\$264	\$ 34	\$ 39	\$438
Total Integrated Circuit	101	241	34	38	414
Bipolar Digital Devices	-	28	-	1	29
MOS Devices	101	199	34	37	371
Linear	-	14	-	-	14
Total Discrete	-	6	-	-	6
Total Optoelectronic	-	17	-	1	18

Source: Dataquest  
February 1988

## Application Markets

Oki is a major supplier of CMOS logic to the automotive and watch markets. The Company supplies approximately 30 percent of the world watch chip market.

Other end markets of Oki's semiconductors include home computers (for games), factory automation, and smart cards.

## Channels of Distribution

Oki has two major semiconductor distributors in Japan: Nihon Denso Industry Co., Ltd., and Ashitate Electric. Dataquest believes that more than 40 percent of Oki's Japanese semiconductor sales are made through distribution. In the United States, sales are made mainly through Oki Semiconductor Group; less than 2 percent of U.S. sales are made through distribution. Approximately 17 percent of Oki's semiconductor sales are captive.

# Oki Electric Industry Company, Limited

## Semiconductor Products and Technologies

In MOS memory, Oki makes DRAMS, mask ROMs, and SRAMs (in order of sales volume). The Company ships approximately equal amounts of 4- and 8-bit MCUs. The 4-bit MCUs are used mainly in compact disk players. The 8-bit MCU applications include telecommunications, keyboard controllers, and instrumentation.

Recently announced new Oki products and technologies include the following:

- **Memory**
  - A CMOS 1Mb EPROM with 120ns access time and 1.5-micron line width
  - A CMOS 1K EEPROM, 2.5mA in operation and 100uA at standby, 64x16 or 128x8 configuration, developed with Catalyst Semiconductor, Inc.
  - A 16K CMOS EEPROM, MSM28C16A, 150ns, floating-gate memory cell
  - A 64K CMOS EEPROM, MSM28C64A, 8Kx8, 64K SRAM/64K EPROM-compatible, 120/150ns
  - Two 1Mb DRAMs using a proprietary buried stack capacitor cell technology, 100/120ns, 1Mbx1 page and nibble mode or 256Kx4 page mode
  - A pseudovirtual 4Mb CMOS DRAM, 512Kx8, 160/95ns read times
  - A general-purpose 4Mb DRAM, 4Mbx1 or 1Mbx4, 65ns read time
  - Three CMOS 256K SRAMs, SRM20256LC/LS/LM, 100/120ns 32Kx8, TTL-compatible
  - A 1Mb CMOS ROM with 15mA active operating current and 100A standby current (Access time is 250ns; the part is TTL-compatible and interfaces easily with the 80C86/88 CMOS MPUs.)
  - A CMOS 4Mb mask ROM with 200ns access time, 1.5-micron line width; available in 260Kx16 or 520Kx8 structure

# Oki Electric Industry Company, Limited

- **Microcomponents**
  - A CMOS single-chip MCU with a 16-bit CPU as a core and an 8-bit external interface
  - A single-chip 8-bit CMOS MCU with EEPROM, MSM61580, 5.5 x 4.5mm chip, 8-Kbyte program ROM, 512-byte ROM; for IC cards
  - A single-chip 4-bit CMOS MCU, MSC6458, with built-in 24-output optical display driver for audio equipment
- **Gallium Arsenide**
  - A superhigh-speed optoelectronic IC (GaAs/GaAlAs heterojunction OEIC) for parallel processing of optical computers; 1ns switching speed
  - A "reverse HEMT" with AlGaAs and GaAs layers on an AlGaAs substrate; 0.7-micron geometries
- **ASICs**
  - Four 1.5ns CMOS gate arrays with 3,100, 4,400, 6,000, and 8,000 gates
  - A standard cell library containing 84 logic cells, RAMs, ROMs, and PLAs in variable bit lengths, using a 2-micron CMOS process (gate delay time is 1.7ns; RAM access time is 30ns)

In early 1987, Oki announced that it is expanding its design facility located in Sunnyvale, California, with \$2.5 million in CAD equipment including an Amdahl 5840 mainframe and DEC VAX 11-785. The center is also adding workstations including those made by Calma, Daisy, Futurenet, Mentor, and Valid Logic.

The expanded design hardware is capable of schematic capture, logic and timing simulation, automatic layout for both gate arrays and standard cells, design and electrical rule checking, automatic test program generation, and full-custom design.

## **Emerging Areas**

A primary focus of Oki's strategies for long-term growth is the development of leading-edge products, such as 4Mb and 16Mb DRAMs. The Company also views GaAs and other new materials as key to achieving dramatic advances in semiconductor technology. Currently, the Company is refining technologies that allow mass production of GaAs devices. At the 1986 ISSCC, Oki presented a paper on an analog front-end LSI for 2,400-baud, split-band, full-duplex modems, using a pulsed digital-to-analog conversion technique.

# Oki Electric Industry Company, Limited

## Licensing and Joint Ventures

Oki is involved in the following semiconductor licensing and joint venture agreements:

- **Casio, Hitachi, NEC**—In January 1985, Casio agreed to design custom ICs that will be produced by Hitachi, NEC, and Oki.
- **Catalyst Semiconductor**—In cooperation with Catalyst Semiconductor of the United States, Oki has developed a CMOS 8-bit MCU with built-in EEPROM—chip size is 5.0mm x 4.5mm, and is adaptable to an IC card.
- **Exel Microelectronics**—In March 1985, Exel and Oki Electric reached an agreement whereby Oki will be a second source for Exel's 16K NMOS EEPROM.
- **Intel Corporation**—In March 1984, Intel and Oki signed a licensing agreement allowing Oki to manufacture and sell the 8086, 8088, 8051, 8085, and peripheral chips in CMOS for captive use.
- **National Semiconductor**—In late 1983, Oki Electric supplied its 64K dynamic RAM technology to National Semiconductor. National allocated about half its 64K DRAM output to Oki. National planned to market the Oki DRAM, using a National label and part number. (This agreement is no longer in effect.)
- **NEC Corporation**—In February 1986, NEC and Oki announced a jointly developed CMOS version of an NMOS high-performance signal processor currently produced by NEC, with one-fifth the power consumption of the MuPD7720.
- **Silicon Systems**—In October 1986, Oki established a partnership with Silicon Systems of the United States whereby Oki will produce and market single-chip modem ICs developed by Silicon Systems.
- **Standard Microsystems**—In June 1984, Standard Microsystems and Oki agreed to a cross-license of all patents and patent applications.
- **Thomson-CSF**—In October 1984, Thomson and Oki signed an alternate-source agreement covering gate arrays and high-density MOS memory. (All the gate array devices will use the same or compatible software and will be marketed by Oki and Thomson worldwide.)
- **Voest Alpine AG**—Oki and Voest agreed to a joint venture to produce 256K DRAMs, MPUs, and gate arrays. The venture is 49 percent capitalized by Oki—the overall deal is estimated to be worth approximately \$285 million. (This agreement is no longer in effect.)

# Oki Electric Industry Company, Limited

## **Nonsemiconductor Products**

### **Electronic Devices Industry Group**

Sales of electronic devices were ¥85 billion in fiscal 1987, a 6 percent increase from fiscal 1986. This represents about 21 percent of total sales. In addition to semiconductors, products include printed circuit boards, plasma display panel units, and reed relays and switches.

In fiscal 1987, Oki introduced the MSC2304, a large-capacity, IBM-compatible memory module that features high processing speed.

### **Telecommunications Systems Industry Group**

Sales of telecommunications systems were ¥112 billion in fiscal 1987, a 13 percent increase from fiscal 1986. This accounted for 28 percent of total sales. Products include switching systems, facsimile equipment, telephone sets, modems, and transmission systems.

In fiscal 1987, Japan deregulated its telecommunications industry. Oki capitalized on the opportunity and increased sales of its D70, a digital switching system, and the iM2000, a digital multiplexer used in private branch exchanges. In fiscal 1988, Oki will concentrate on upgrading its Oki Digital Information Network in preparation for its eventual connection to Japan's ISDN and to other countries' telecommunications networks.

In August 1986, Oki shifted production of cellular mobile telephones to Atlanta, Georgia, using locally procured parts.

### **Information Processing Systems Industry Group**

Fiscal 1987 sales of the Information Processing Systems Division were ¥194 billion, a 1 percent decrease from fiscal 1986. Sales accounted for 48 percent of total company sales. Information processing products include computers and peripherals, banking systems, medical electronics systems, teleprinters, telemetry and telecontrol systems, and point-of-sale systems.

In fiscal 1987, Oki introduced several products that meet the needs of domestic banks and other financial institutions preparing for the eventual introduction of 24-hour banking services in Japan. Oki's if100, introduced in fiscal 1986, achieved strong sales. The if100 is a 32-bit workstation featuring multiuser, multitask operation and computer-aided design and multimedia card with multiple modems. The if100 will play a central role in Oki's development of expert systems and other artificial intelligence applications.

Oki announced that it will manufacture dot-matrix printers for the European market at a new plant near Glasgow, Scotland, starting December 1987. A substantial proportion of the parts will be procured in the United Kingdom, with local content to be increased steadily in the years ahead.



# Oki Electric Industry Company, Limited

Oki Electric Industry Company, Limited  
7-12, Toranomon 1-chome, Minato-ku  
Tokyo 105, Japan  
Telephone: (03) 501-3111  
(Billions of Yen Except per Share Data)

## Balance Sheet (March 31)

	<u>1982*</u>	<u>1983*</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Working Capital	¥ 18.2	¥ 28.9	¥ 20.2	¥ 40.0	¥ 61.9
Long-Term Debt**	¥ 50.5	¥ 62.8	¥ 50.3	¥ 97.4	¥108.9
Shareholders' Equity	¥ 35.3	¥ 40.7	¥ 64.0	¥ 75.4	¥ 88.2
After-Tax Return on Average Equity (%)	10.5	6.2	17.7	13.1	(1.2)

## Operating Performance (Fiscal Year Ending March 31)

	<u>1982*</u>	<u>1983*</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Revenue	¥242.8	¥ 279.7	¥345.4	¥417.5	¥392.6
Japanese Revenue	¥201.0	¥ 207.3	¥243.7	¥287.5	¥290.6
Non-Japanese Revenue	¥ 41.8	¥ 72.4	¥101.7	¥130.0	¥102.0
Cost of Revenue**	¥157.1	¥ 203.9	¥243.2	¥296.0	¥293.9
R&D Expense**	¥ 10.1	¥ 11.5	¥ 14.6	¥ 16.6	¥ 16.2
SG&A Expense**	¥ 41.5	¥ 58.7	¥ 73.5	¥ 90.4	¥ 86.4
Pretax Income	¥ 6.8	¥ 8.5	¥ 18.0	¥ 20.4	¥ 2.2
Pretax Margin (%)	2.8	3.0	5.2	4.9	0.6
Effective Tax Rate (%)	45.6	70.3	48.4	54.3	139.7
Net Income	¥ 3.7	¥ 2.5	¥ 9.2	¥ 9.2	(¥ 1.0)
Average Shares Outstanding (Millions)	387	392	427	454	470
Per Share					
Earnings	¥ 9.56	¥ 6.38	¥21.55	¥20.26	(¥ 2.06)
Dividends**	¥ 5.00	¥ 4.75	¥ 4.93	¥ 5.45	¥ 5.89
Book Value	¥91.21	¥103.83	¥149.9	¥166.1	¥187.6
Price Range	N/A	N/A	N/A	N/A	N/A
Total Employees	15,093	15,658	17,027	18,134	18,649
Capital Expenditures**	¥ 25.1	¥ 27.7	¥ 37.5	¥ 67.7	¥ 34.6
Exchange Rate (¥ per US\$)	229	249	236	245	221

N/A = Not Available

\*For 1982 and 1983 balance sheet and income statements were restated.

\*\*For 1982 restated values are not available.

Source: Oki Electric Industry Co., Ltd.  
Annual Reports  
Dataquest  
December 1986

# Oki Electric Industry Company, Limited

Oki Electric Industry Company, Limited  
 7-12, Toranomon 1-chome, Minato-ku  
 Tokyo 105, Japan  
 Telephone: (03) 501-3111  
 (Millions of Dollars Except per Share Data)

## Balance Sheet (March 31)

	<u>1982*</u>	<u>1983*</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Working Capital	\$ 79.5	\$ 116.1	\$ 85.6	\$ 163.3	\$ 280.1
Long-Term Debt**	\$ 220.5	\$ 252.2	\$ 213.1	\$ 397.6	\$ 492.8
Shareholders' Equity	\$ 154.2	\$ 163.5	\$ 271.2	\$ 307.8	\$ 399.1
After-Tax Return on Average Equity (%)	10.5	6.2	17.7	13.1	(1.2)

## Operating Performance (Fiscal Year Ending March 31)

	<u>1982*</u>	<u>1983*</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Revenue	\$1,060.3	\$1,123.3	\$1,463.6	\$1,704.1	\$1,776.5
Japanese Revenue	\$ 877.7	\$ 832.5	\$1,032.6	\$1,173.5	\$1,314.9
Non-Japanese Revenue	\$ 182.6	\$ 290.8	\$ 431.0	\$ 530.6	\$ 461.6
Cost of Revenue**	\$ 686.0	\$ 818.9	\$1,030.5	\$1,208.2	\$1,329.9
R&D Expense**	\$ 44.1	\$ 46.2	\$ 61.9	\$ 67.8	\$ 73.3
SG&A Expense**	\$ 181.2	\$ 235.7	\$ 311.4	\$ 369.0	\$ 391.0
Pretax Income	\$ 29.7	\$ 34.1	\$ 76.3	\$ 83.3	\$ 10.0
Pretax Margin (%)	2.8	3.0	5.2	4.9	0.6
Effective Tax Rate (%)	45.6	70.3	48.4	54.3	139.7
Net Income	\$ 16.2	\$ 10.0	\$ 39.0	\$ 37.6	(\$ 4.5)
Average Shares Outstanding (Millions)	387	392	427	454	470
Per Share					
Earnings	\$ 0.04	\$ 0.03	\$ 0.09	\$ 0.08	(\$ 0.01)
Dividends**	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.03
Book Value	\$ 0.40	\$ 0.42	\$ 0.62	\$ 0.61	\$ 0.85
Price Range	N/A	N/A	N/A	N/A	N/A
Total Employees	15,093	15,658	17,027	18,134	18,649
Capital Expenditures**	\$ 109.6	\$ 111.2	\$ 158.9	\$ 276.3	\$ 156.6
Exchange Rate (¥ per US\$)	229	249	236	245	221

N/A = Not Available

\*For 1982 and 1983 balance sheet and income statements were restated.

\*\*For 1982 restated values are not available.

Source: Oki Electric Industry Co., Ltd.  
 Annual Reports  
 Dataquest  
 December 1986

# Oki Electric Industry Company, Limited

## THE COMPANY

### Background

Oki Electric Industry Company, Limited, was established in 1881 as a pioneering Japanese telephone manufacturing company by Kibataro Oki, formerly a maker of traditional Japanese swords and armor. In 1916, the Company began quantity production of radio communications equipment. Today, Oki is a leading producer of advanced telecommunications systems, data processing systems, and electronic devices, including semiconductors. Oki began manufacturing semiconductors in the early 1960s, and was the first Japanese company to manufacture green LEDs.

### Company Organization

Oki is a member company of the Fuyo Group (shown in Figure 1), a relatively young industrial group formed after World War II. (Fuyo is another name for Mount Fuji.) The Fuyo Group is composed of companies that have close financial relations with Fuji Bank. The presidents of the 29 group companies constitute the group's policy-making council, or "Fuyo-Kai." In addition, there are group councils consisting of vice presidents and planning department managers. Hitachi, Ltd., and Nissan Motor Company are members of the Fuyo-Kai, but both companies have also formed their own groups. The Fuyo Group member companies tend to be more independent of the group than companies in such large industrial groups as Mitsubishi and Sumitomo. Marubeni is the Fuyo Group's central trading firm.

Oki employs 18,649 people under the leadership of its president and chief executive officer, Namio Hashimoto, and executive vice president, Nobumitsu Kosugi. Figure 2 is a diagram of Oki's company organization.

### Investment in the Company

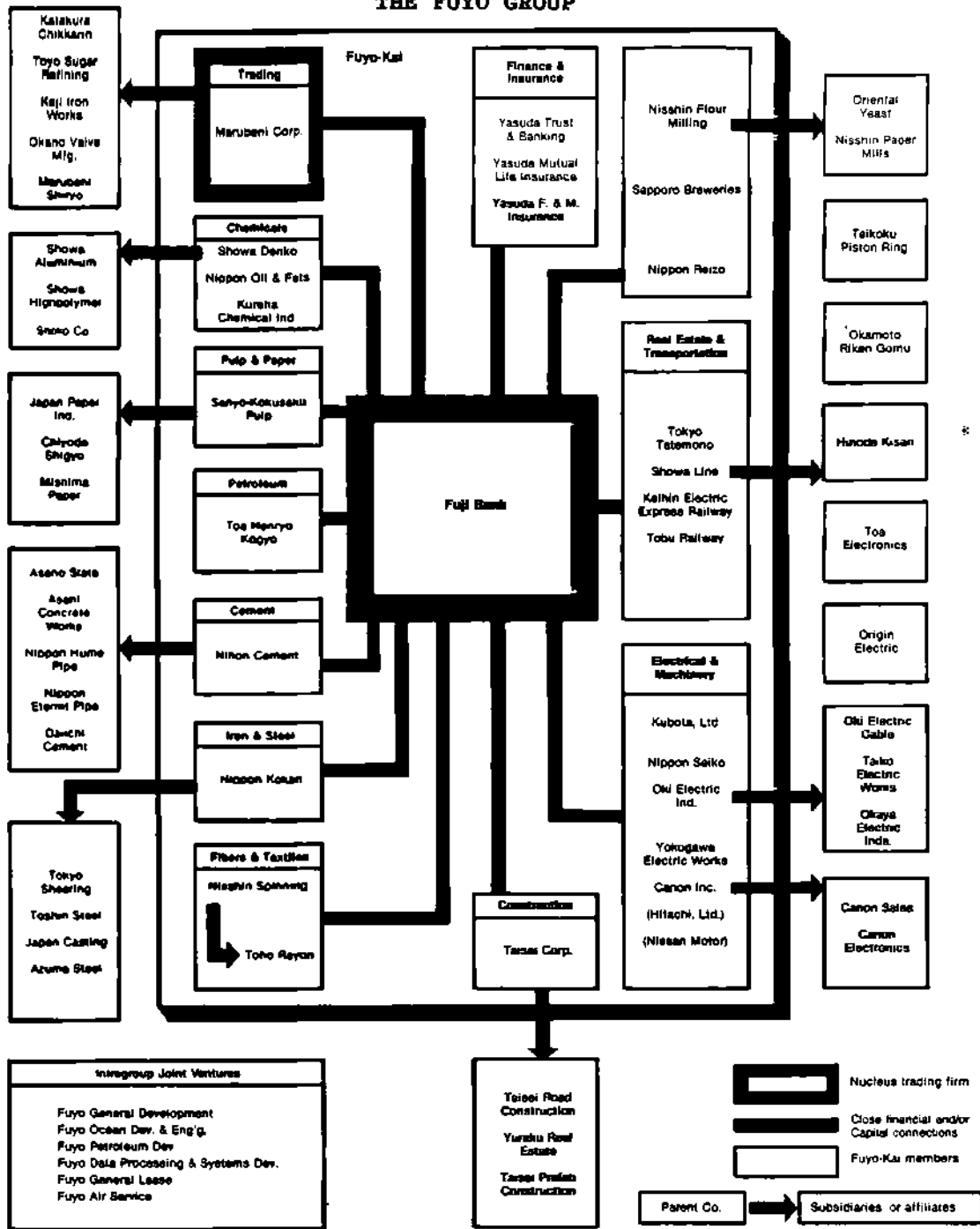
Oki's major shareholders are Yasuda Mutual Life Insurance (8.9 percent), Meiji Mutual Life Insurance (6.7 percent), Dai-Ichi Mutual Life Insurance (6.0 percent), Fuji Bank (4.7 percent), Yasuda Trust and Banking (4.2 percent), and Yasuda Fire and Marine Insurance (2.8 percent). Total foreign ownership is 1.4 percent.

Major short- and long-term borrowings are from Fuyo Group financial institutions (Fuji Bank, Yasuda Trust and Banking, Yasuda Mutual Life Insurance, and Yasuda Fire and Marine Insurance).

# Oki Electric Industry Company, Limited

Figure 1

## Oki Electric Industry Company, Limited THE FUYO GROUP

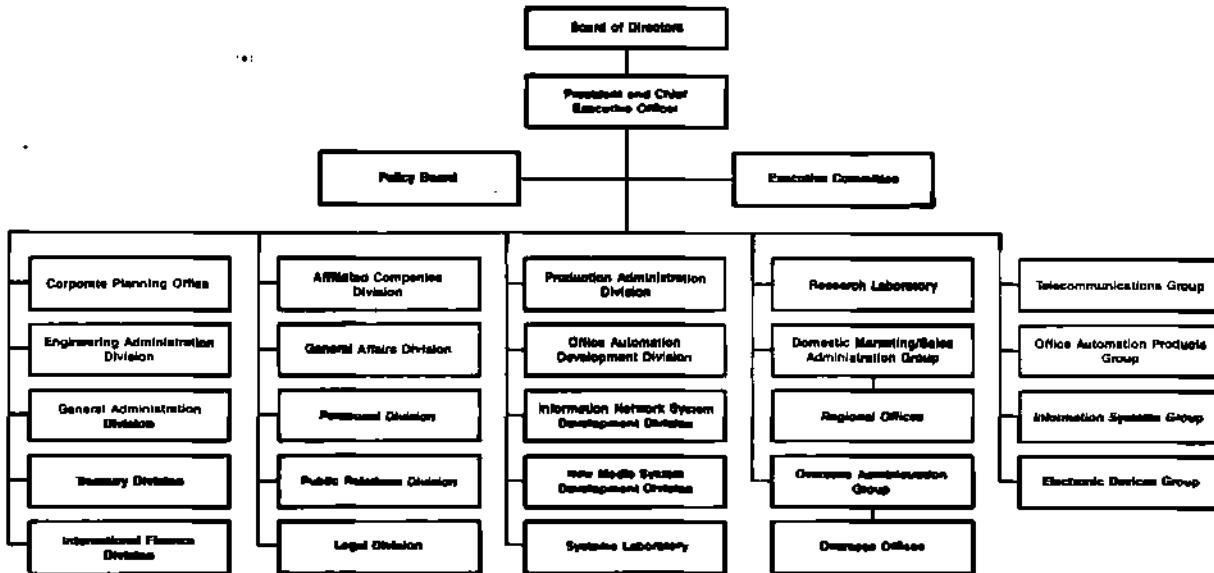


Source: Dodwell Marketing Consultants, Industrial Groupings in Japan 1984/85, Tokyo: 1984

# Oki Electric Industry Company, Limited

Figure 2

## Oki Electric Industry Company, Limited ORGANIZATION CHART



Source: Oki Electric Industry Company Ltd.  
Dataquest  
February 1986

### OPERATIONS

Oki reported a consolidated net loss of ¥967 million on sales of ¥392.6 billion for the fiscal year ended March 31, 1986. Earnings were down 111 percent from fiscal 1985, while sales were down 6 percent. From fiscal 1982 to fiscal 1986, revenue increased 62 percent, however, the Company was not able to maintain profitability.

Currently, Oki's business is broken down into four divisions: the Electronic Devices Industry Group (including semiconductors), the Telecommunications Systems Industry Group, the Information Processing Systems Industry Group, and the Office Automation Industry Group.

Revenue by line of business is shown in Table 1. Figure 3 graphically shows the changes in share of total Company revenue experienced by each division. Information Processing Systems and Electronic Devices have both increased their shares of business, at the expense of Telecommunications Systems. The Office Automation Industry Group is not yet broken out in the Company's financial reporting.

# Oki Electric Industry Company, Limited

Oki recently upgraded its office automation (OA) strategic business unit to division status. This new division was fully established in fiscal 1986, and it will supervise the development, production, and marketing of Oki's OA products. The OA division will also cooperate with the Company's other divisions to combine their products into multi-functional OA systems. This is essentially the same philosophy practiced by NEC, with its "C&C" (Computer and Communication) approach.

In March 1985, 11 product divisions were established, each of which conducts its own development, manufacturing, and marketing activities.

Table 1

**Oki Electric Industry Company, Limited**  
**REVENUE BY MAJOR LINE OF BUSINESS**  
 (Billions of Yen)

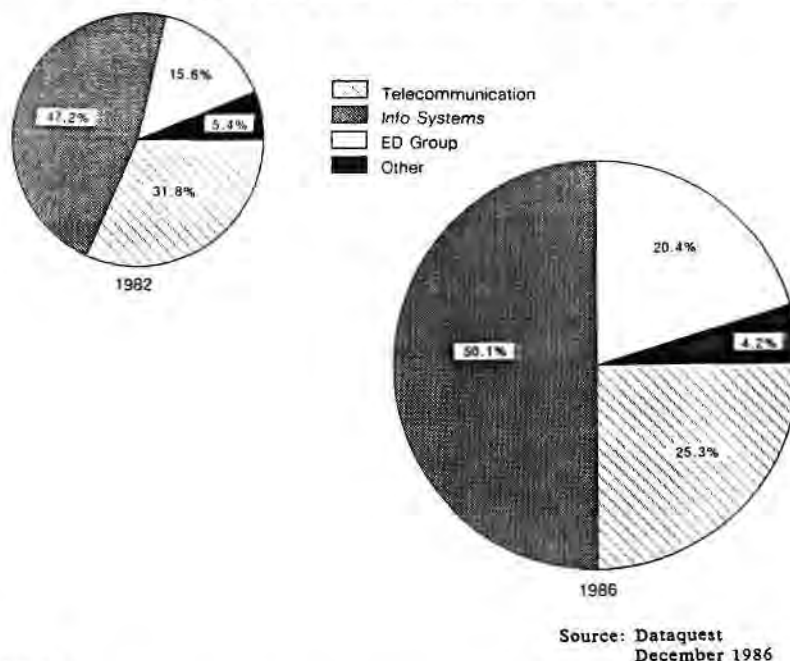
	<u>Fiscal Year Ending March 31</u>				
	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Telecommunications Systems	¥ 77.1	¥ 79.8	¥ 76.4	¥ 94.1	¥ 99.3
Information Processing Systems	114.7	139.4	178.4	203.6	196.7
Electronic Devices	37.8	46.8	74.8	100.0	80.1
Other	<u>13.2</u>	<u>13.7</u>	<u>15.8</u>	<u>19.8</u>	<u>16.5</u>
<b>Total Sales</b>	<b>¥242.8</b>	<b>¥279.7</b>	<b>¥345.4</b>	<b>¥417.5</b>	<b>¥392.6</b>
Exchange Rate (¥ per US\$)	229	249	236	245	221

Source: Oki Electric Industry Co., Ltd.  
 Annual Reports  
 Dataquest  
 December 1986

# Oki Electric Industry Company, Limited

Figure 3

## Oki Electric Industry Company, Limited REVENUE BY PRODUCT LINE--1982 AND 1986



### Semiconductors

Oki's semiconductor sales were down 15 percent in 1985, to \$307 million, as shown in Table 2. This decline was primarily due to the severely depressed MOS memory market. MOS logic sales actually increased, from \$120 million in 1984 to \$131 million in 1985.

Dataquest estimates that Oki made semiconductor capital investments of \$108 million in 1985, and we believe that 1986 capital spending will be about the same.

The bulk of Oki's semiconductors are MOS devices, about 61 percent of which are CMOS. The Company also produces a small number of bipolar digital logic and linear ICs. Discrete and optoelectronic devices make up 6 percent of Oki's output. MOS revenue decreased 16 percent in 1985, after spectacular gains of 86 percent and 60 percent in 1983 and 1984, respectively.

Table 3 shows Oki's estimated 1985 semiconductor revenue by geographic region. Dataquest estimates that approximately 33 percent of Oki's semiconductor sales are overseas, with about 19 percent, or \$58 million, in the United States; 8 percent in Europe; and 6 percent in Rest of World. Approximately 67 percent of semiconductor revenue is from Japan.

# Oki Electric Industry Company, Limited

Table 2

**Oki Electric Industry Company, Limited**  
**ESTIMATED SEMICONDUCTOR REVENUE**  
(Millions of Dollars)

	1979	1980	1981	1982	1983	1984	1985
Total Semiconductor			98	129	229	362	307
Total Integrated Circuit			88	121	216	343	289
Bipolar Digital (Technology)			9	14	17	25	22
TTL							
ECL							
Other Bipolar Digital							
Bipolar Digital (Function)			9	14	17	25	22
Bipolar Digital Memory							
Bipolar Digital Logic			9	14	17	25	22
MOS (Technology)			77	106	197	315	264
NMOS			30	42	78	141	104
PMOS			5	5	5	1	
CMOS			42	59	114	173	160
MOS (Function)			77	106	197	315	264
MOS Memory			31	59	101	149	90
MOS Micro Devices			2	6	19	46	43
MOS Logic			44	41	77	120	131
Linear			2	1	2	3	3
Total Discrete			5	4	3	4	4
Transistor			5	4	1		
Small Signal Transistor							
Power Transistor							
Diode							
Small Signal Diode							
Power Diode							
Zener Diode							
Thyristor							
Other Discrete					2	4	4
Total Optoelectronic			5	4	10	15	14
LED Lamps							
LED Displays							
Optical Couplers							
Other Optoelectronics							
Exchange Rate (Yen/US\$)	219	227	221	248	235	237	238

Source: Dataquest  
February 1986



# Oki Electric Industry Company, Limited

Table 3

Oki Electric Industry Company, Limited  
ESTIMATED CALENDAR YEAR 1985 SEMICONDUCTOR REVENUE  
BY GEOGRAPHIC REGION  
(Millions of Dollars)

	<u>Japan</u>	<u>U.S.</u>	<u>Europe</u>	<u>ROW</u>	<u>Total</u>
Total Semiconductor	\$207	\$58	\$22	\$20	\$307
Total Integrated Circuit	\$193	\$58	\$22	\$16	\$289
BPD	19	0	0	3	22
MOS	171	58	22	13	264
Linear	3	0	0	0	3
Total Discrete	\$ 4	0	0	0	\$ 4
Total Optoelectronic	\$ 10	0	0	\$ 4	\$ 14

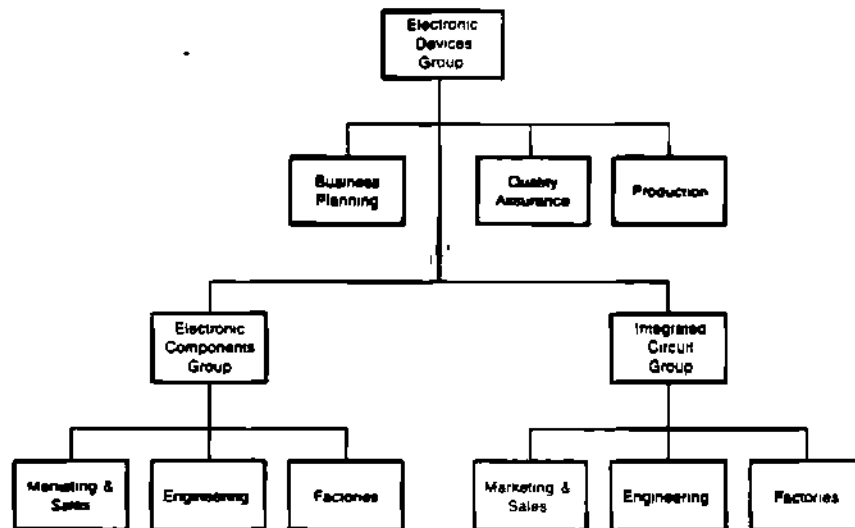
Source: Dataquest  
December 1986

Oki's semiconductor organization is part of the Electronic Devices Group. The organization of this group is shown in Figure 4.

# Oki Electric Industry Company, Limited

Figure 4

## Oki Electric Industry Company, Limited ELECTRONIC DEVICES INDUSTRY GROUP ORGANIZATION



Source: Oki Electric Industry Company Ltd.  
Dataquest  
February 1986

### Semiconductor Products and Technologies

Oki has more than 20 years of experience in all phases of semiconductor design and manufacturing. The Company manufactures devices encompassing a broad range of integrated circuits, discrete devices, and opto-electronics. It makes devices with the following processes: CMOS, PMOS, NMOS, TTL, ECL, I<sup>2</sup>L; and specialty products that include sensor arrays, optical couplers, and LED lamps. New specialty products include speech recognition and synthesis chips.

Oki has more than 18 years of experience in CMOS integrated circuit manufacturing, including digital logic devices, digital watch and clock circuits, linear CMOS devices (including audio and radio phase-lock receivers), frequency synthesizers, and random-access memories.

In MOS memory, Oki makes DRAMS, mask ROMs, and SRAMs (in order of sales volume). The Company ships approximately equal amounts of 4- and 8-bit MCUs. The 4-bit MCUs are used mainly in compact disk players. The 8-bit MCU applications include telecommunications, keyboard controllers, and instrumentation.

Oki is a major supplier of CMOS logic to the automotive and watch markets. The Company supplies approximately 30 percent of the world watch chip market.

## Oki Electric Industry Company, Limited

Other end markets of Oki's semiconductors include home computers (for games), factory automation, and smart cards.

Dataquest believes that Oki shipped approximately 4.6 million 256K DRAMs in 1985. We estimate that 1986 shipments will be 10 million units and that 1987 production will be approximately 100 million units. Oki will be sampling its 1Mb DRAM this year.

Recently announced new Oki products and technologies include the following:

- A CMOS 4Mb mask ROM with 200ns access time, 15 $\mu$  line width; available in 260K x 16 or 520K x 8 structure
- A CMOS 1Mb EPROM with 120ns access time and 1.5 $\mu$  line width
- A 4Mb DRAM with 0.8 $\mu$  line width, which will be sample shipped in late 1987
- A CMOS floppy disk controller with a built-in data separator circuit
- A 1Mb CMOS ROM with 15mA active operating current and 100 $\mu$ A standby current (Access time is 250ns; the part is TTL compatible and interfaces easily with the 80C86/88 CMOS MPUs)
- A 120ns CMOS 256K DRAM--fully decoded, page-mode type (Power consumption is 385mW during operation and 28mW at standby)
- Four 1.5ns CMOS gate arrays with 3,100, 4,400, 6,000, and 8,000 gates
- A "reverse HEMT" with AlGaAs and GaAs layers on an AlGaAs substrate; 0.7 micron geometries
- Two single in-line memory DRAM modules organized 256Kx9 or x8 (Row address speed is 120ns to 150ns)
- CMOS versions of the 8059 MCU and the 8085/86/88 MPUs
- A standard cell library containing 84 logic cells, RAMs, ROMs, and PLAs in variable bit lengths, using a 2-micron CMOS process (Gate delay times is 1.7ns; RAM access time is 30ns)
- A laser diode with 2.1-watt output (Output can theoretically be improved to 20 watts; applications include communications satellites and ships)

---

# Oki Electric Industry Company, Limited

---

A primary focus of Oki's strategies for long-term growth is the development of leading-edge products, such as 1Mb and 4Mb DRAMs. The Company also views GaAs and other new materials as key to achieving dramatic advances in semiconductor technology. Currently, the Company is refining technologies that allow mass production of GaAs devices. At the 1986 ISSCC, Oki presented a paper on an analog front-end LSI for 2,400-baud, split-band, full-duplex modems, using a pulsed digital-to-analog conversion technique.

## Licensing and Joint Ventures

Oki is involved in the following semiconductor licensing and joint-venture agreements:

- A licensing agreement with Intel whereby Oki manufactures and sells the 8086, 8088, 8051, 8085, and peripheral chips in CMOS
- An alternate-source agreement with Thomson-CSF for gate arrays and high-density MOS memory (All the gate array devices will use the same or compatible software and will be marketed by Oki and Thomson worldwide)
- A joint venture with Voest Alpine AG of Austria to produce 256K DRAMs, MPUs and gate arrays (The venture is 49 percent capitalized by Oki--the overall deal is estimated to be worth approximately \$285 million)
- Oki has established a partnership with Silicon Systems of the United States whereby Oki will produce and market single-chip modem ICs developed by Silicon Systems
- In cooperation with Catalyst Semiconductor of the United States, Oki has developed a CMOS 8-bit MCU with built-in EEPROM--chip size is 5.0mm x 4.5mm, and is adaptable to an IC card

## Product Portfolio Analysis

Figure 5 is a graphic analysis of Oki's product portfolio compared with worldwide competition. Figure 6 presents the same analysis, but applied only to the Company's Japanese competition. These figures show which product areas the Company has chosen to focus on.

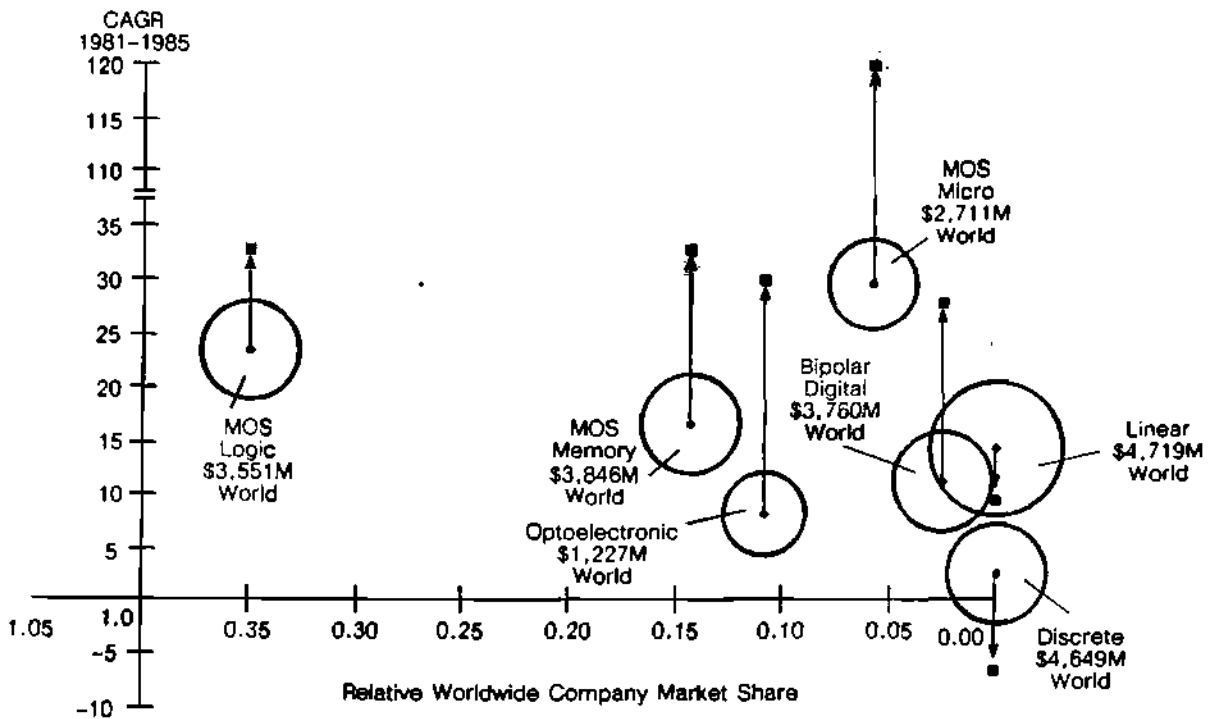
The x axis (horizontal axis) is Oki's market share relative to the leading manufacturer in each product area. If Oki is the leader in a product area, the market share shown is relative to the Company's leading competitor. (Note that in Figure 6 this market share refers to the Company's leading Japanese competitor.)

# Oki Electric Industry Company, Limited

The y axis is the historical product compound annual growth rate (CAGR) from 1981 to 1985. Oki's CAGR for each product is marked by a dot. In Figure 5, the worldwide product CAGR is marked by a dot surrounded by a circle that represents the total world market for the product. In Figure 6, the total Japanese company CAGR for each product is marked by a dot surrounded by a circle that represents total Japanese company sales for the product.

Figure 5

**Oki Electric Industry Company, Limited  
PRODUCT PORTFOLIO  
COMPARED WITH WORLDWIDE COMPETITION\***



Note: Up arrow indicates growth higher than worldwide industry average; down arrow indicates the opposite.

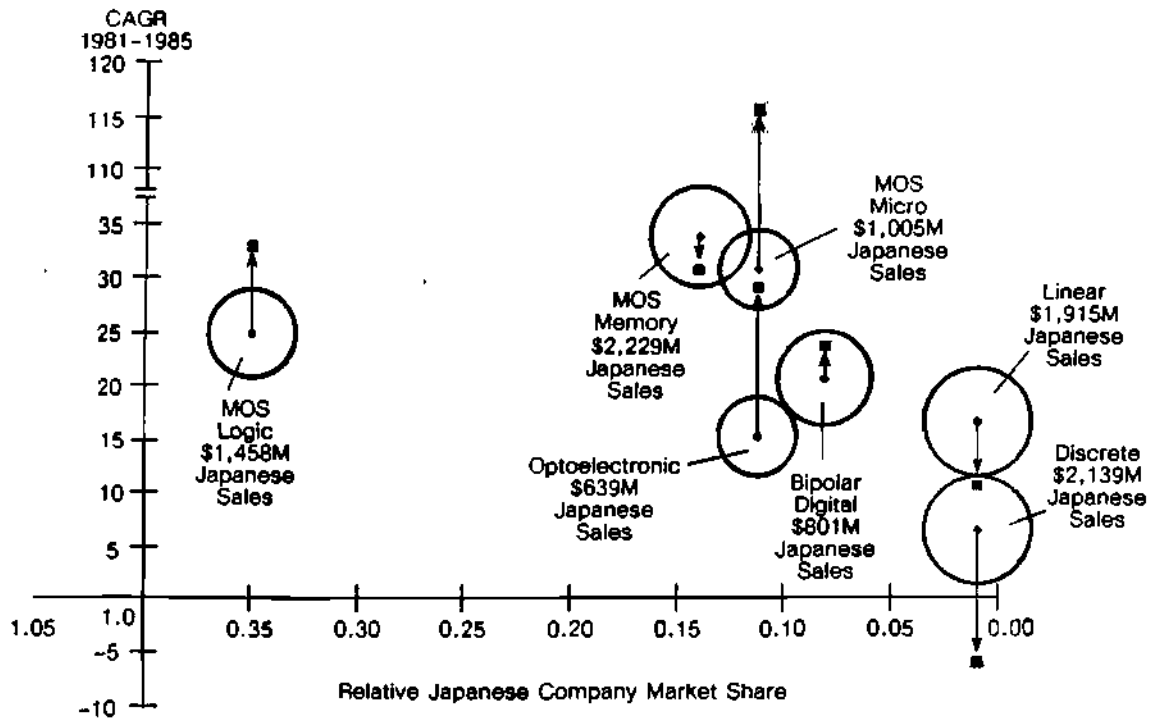
■ Oki

Source: Dataquest  
December 1986

# Oki Electric Industry Company, Limited

Figure 6

**Oki Electric Industry Company, Limited  
PRODUCT PORTFOLIO  
COMPARED WITH JAPANESE COMPETITION\***



Note: Up arrow indicates growth higher than Japanese companies' average; down arrow indicates the opposite.

■ Oki

Source: Dataquest  
December 1986

The locations of graph points can be interpreted as follows:

- Upper Right Quadrant--These are the "developing products." The Company is not the leading supplier of these products, but the products exhibit positive growth.
- Upper Left Quadrant--These are the "stars." The Company is the leading supplier of these products, and the products exhibit positive growth.

# Oki Electric Industry Company, Limited

- Lower Left Quadrant--These are the "cash cows." The Company is the leading supplier in a declining product segment, but there is generally a high profit margin on these products.
- Lower Right Quadrant--These are the "dogs." The CAGR for this product area is declining and the Company is not the leading supplier.

Viewed against both worldwide and Japanese-only competition, the product portfolio analysis shows that Oki's most competitive products are MOS logic devices and, to a lesser extent, MOS memory. On a worldwide basis, Oki's growth has been much higher than the industry average in all products except linear ICs and discretes. However, the Company has chosen to focus its R&D, manufacturing, and sales efforts on products with high growth potential; i.e., MOS and bipolar digital ICs, and optoelectronics.

Measured against its Japanese competitors, Oki experienced higher than average growth in MOS microdevices and logic, bipolar digital ICs, and optoelectronics. Its MOS memory growth has been lower than its Japanese competition; the same is true of linear ICs and discrete devices. We believe that Oki has made a concerted effort to devote more resources to MOS logic (watch and clock chips, ASICs) and fewer resources to MOS memory.

## Electronic Devices Industry Group

Sales of electronic devices were ¥80.1 billion in fiscal 1986, a 20 percent decrease from fiscal 1985. This represents 20 percent of total sales. Products include semiconductors, printed circuit boards, plasma display panel units, and reed relays and switches.

## Telecommunications Systems Industry Group

Sales of telecommunications systems were ¥99.3 billion in fiscal 1986, a 6 percent increase from fiscal 1985. This accounted for 25 percent of total sales. Products include switching systems, facsimile equipment, telephone sets, modems, and transmission systems.

During the fiscal year, Oki began production of cellular mobile telephones in Atlanta, Georgia, using locally procured parts.

# Oki Electric Industry Company, Limited

## Information Processing Systems Industry Group

Fiscal 1986 sales of the Information Processing Systems Division were ¥196.7 billion, a 3 percent increase over fiscal 1985, accounting for 50 percent of total sales. Information processing products include computers and peripherals, banking systems, medical electronics systems, teleprinters, telemetry and telecontrol systems, and point-of-sale systems.

During fiscal 1986, Oki introduced the if1000, a 32-bit workstation featuring multiuser, multitask operation and computer aided design and manufacturing capabilities. The if1000 will play a central role in Oki's development of expert systems and other artificial intelligence applications.

## INTERNATIONAL OPERATIONS

Overseas sales accounted for 26 percent of Oki's total consolidated revenue in fiscal 1986, compared with 17 percent in fiscal 1982. The CAGR for overseas sales was 25 percent from 1982 to 1986, while domestic sales grew at a CAGR of only 10 percent. Figure 7 shows the year-to-year growth of Oki's non-Japanese and Japanese sales from 1981 to 1986.

Oki has ten overseas subsidiaries and affiliates, including four in the United States, two in Singapore, two in West Germany, one in Taiwan, and one in Hong Kong. The Company's semiconductor operations overseas are handled by Oki Semiconductor Group in Santa Clara, California, and Oki Electric Europe GmbH in Dusseldorf, West Germany. Oki also maintains nine overseas liaison and sales offices, including one in Beijing, China.

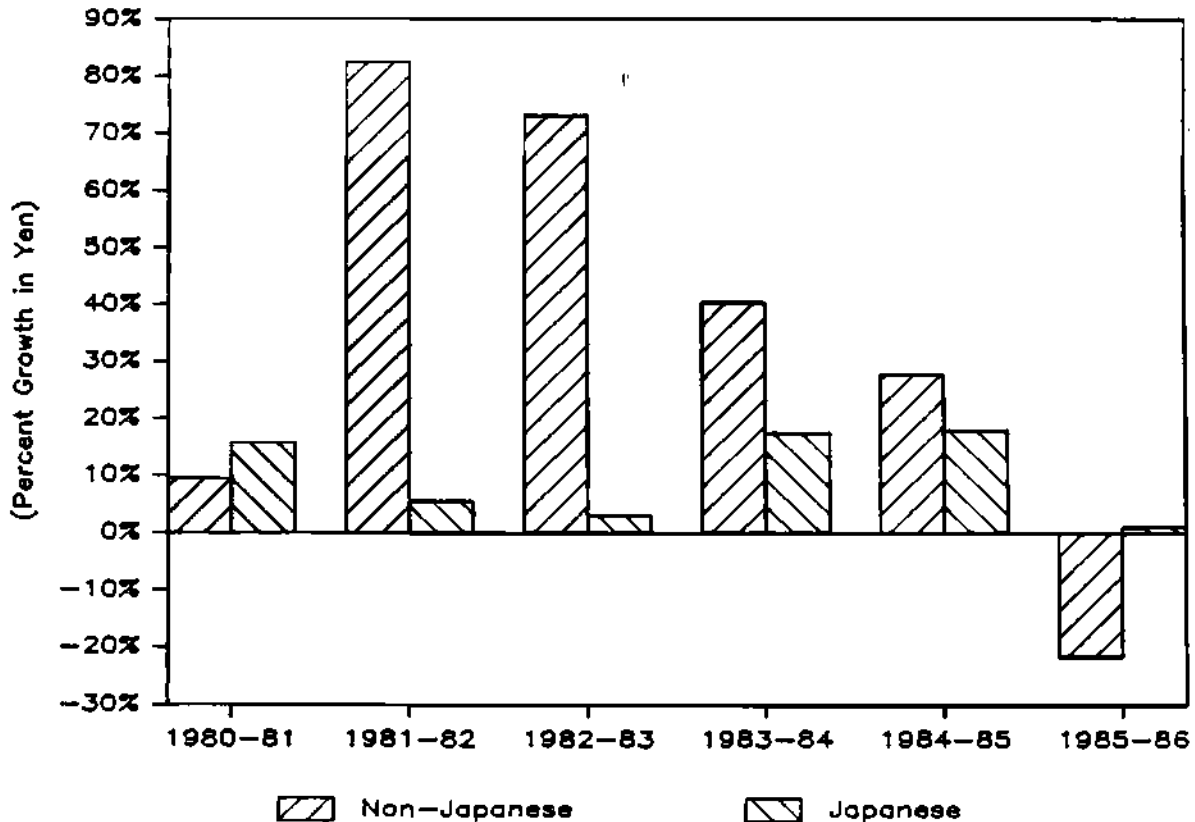
Oki Semiconductor Group, the U.S.-based semiconductor division of Oki Electric, is an important part of Oki's operations. Oki Semiconductor was established in 1978 as a division of Oki Electric Overseas Corp., a wholly owned subsidiary of Oki Electric. In 1980, Oki Semiconductor became an autonomous company and a direct subsidiary of Oki Electric. Oki Semiconductor has built a factory in Sunnyvale, California, for assembly and test. Oki Semiconductor originally subcontracted wafer fabrication and assembly to several U.S. companies, but subsequently ended this arrangement. The Company has reorganized its U.S. organization so that Oki Semiconductor Group is now a division of Oki America, Inc.



# Oki Electric Industry Company, Limited

Figure 7

Oki Electric Industry Company, Limited  
GROWTH OF NON-JAPANESE VERSUS JAPANESE REVENUE



Source: Dataquest  
December 1986

## MANUFACTURING FACILITIES

Oki has six semiconductor manufacturing facilities in Japan, plus a U.S. assembly and test facility. These are listed in Table 4. Figure 8 is a map of Japan that shows the Japanese factory locations. Oki has added a GaAs production line at its Hachioji factory, and plans to start production of GaAs devices for car telephones, other telecommunications, and measuring equipment by the end of this year. Oki has acquired a site near Sandai, Miyagi prefecture, for a new VLSI factory. The new factory is scheduled to begin operation in 1987 and will be a 6-inch fab.

# Oki Electric Industry Company, Limited

Table 4

Oki Electric Industry Company, Limited  
SEMICONDUCTOR MANUFACTURING FACILITIES

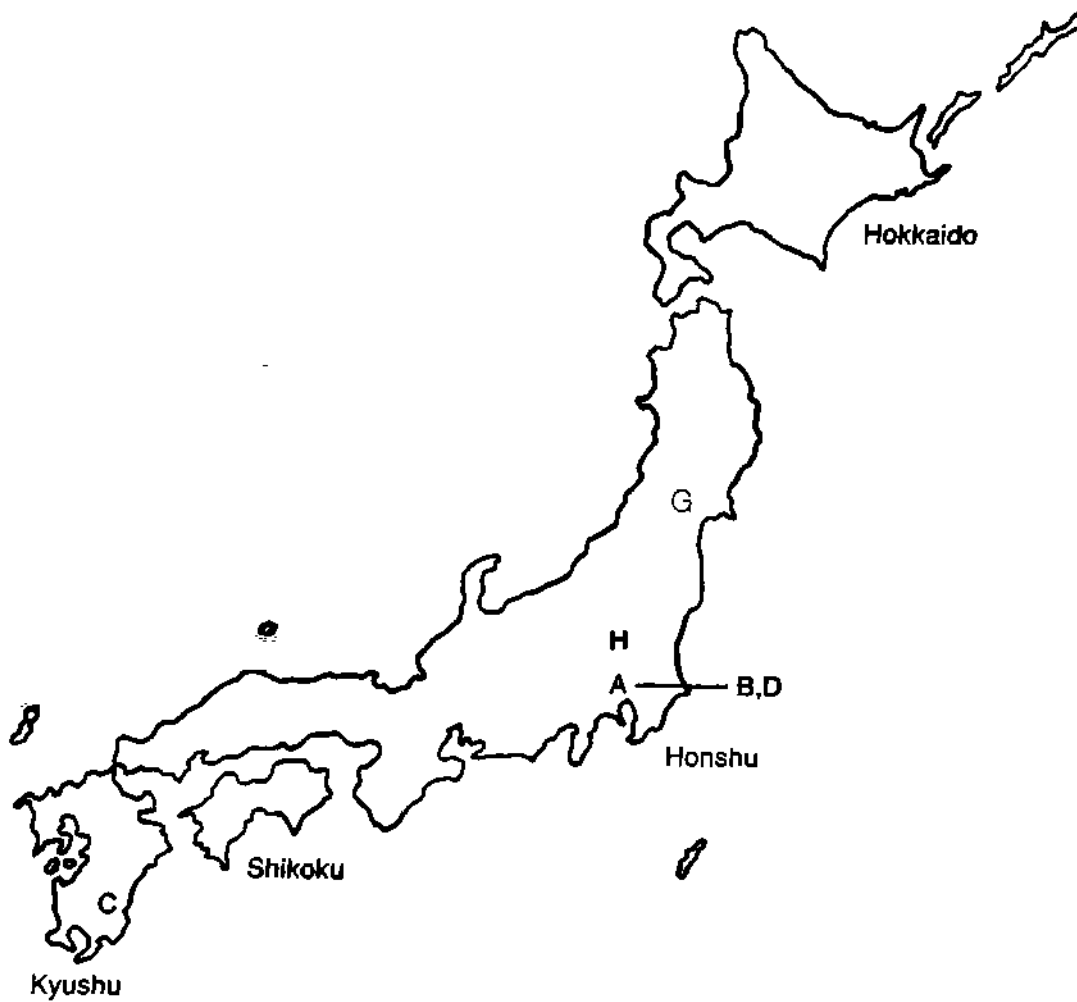
<u>Map Code</u>	<u>Location</u>	<u>Function and Products</u>
A	Chichibu Factory Saitama Prefecture (Est. 1975)	Assembly--ICs and discretes
B	Hachioji LSI Factory, Tokyo Metropolis (Est. 1961) (GaAs line added 1986)	Fab and test--ICs and discretes; GaAs
C	Miyazaki Oki Denki Miyazaki Prefecture (Est. 1981; 2nd line added 1984)	Fab and test--MOS memory, microdevices, logic
D	VLSI Pilot Production Plant Tokyo Metropolis (Est. 1983)	R&D--VLSI Fab and test--MOS ICs
E	Honjyo Factory Saitama Prefecture (Est. 1984)	Assembly and test--linear ICs
F	Yoshikawa Semiconductor Miyazaki Prefecture (Est. 1985)	Assembly and test--ICs
	Sunnyvale Factory California (Est. 1984)	Assembly and test--ICs
G	Sandai Factory Miyagi Prefecture (Est. 1987)	Fab--VLSI (6-inch wafers)

Source: Dataquest  
December 1986

# Oki Electric Industry Company, Limited

Figure 8

Oki Electric Industry Company, Limited  
SEMICONDUCTOR PLANT LOCATIONS



Source: Dataquest  
December 1986

# Oki Electric Industry Company, Limited

## RESEARCH AND DEVELOPMENT

Oki's total research and development (R&D) expenditure for fiscal 1986 was ¥16.2 billion, or 4 percent of revenue.

Oki operates a research facility at its Hachioji plant. One of the top priorities is development of prototype 4Mb and 16Mb DRAMs. In fiscal 1986, the Company established a ULSI Research Center on this site to conduct R&D on submicron technologies.

Recent R&D results include the refinement of technologies for mass production of GaAs ICs; the development of a series of multipurpose DSPs for use in ISDN systems; and the refinement of high-power semiconductor laser technologies for fiber-optic transmission systems.

## MARKETING

Oki has two major semiconductor distributors in Japan: Nihon Denso Industry Co., Ltd., and Ashitate Electric. Dataquest believes that more than 40 percent of Oki's Japanese semiconductor sales are made through distribution. In the United States, sales are made mainly through Oki Semiconductor Group; less than 2 percent of U.S. sales are made through distribution. Approximately 17 percent of Oki's semiconductor sales are captive.

# Oki Electric Industry Company, Limited

Oki Electric Industry Company, Limited  
7-12, Toranomon 1-chome, Minato-ku  
Tokyo 105, Japan  
Telephone: (03) 501-3111  
(Millions of Dollars Except Per Share Data)

## Balance Sheet (March 31)

	<u>1981*</u>	<u>1982*</u>	<u>1983*</u>	<u>1984</u>	<u>1985</u>
Working Capital	\$ 31.9	\$ 79.5	\$ 116.1	\$ 85.6	\$ 163.3
Long-Term Debt**	\$175.9	\$ 220.5	\$ 252.2	\$ 213.1	\$ 397.6
Shareholders' Equity	\$160.2	\$ 154.2	\$ 163.5	\$ 271.2	\$ 307.8
After-Tax Return on Average Equity (%)	15.3	10.5	6.2	14.4	12.2

## Operating Performance (Fiscal Year Ending March 31)

	<u>1981*</u>	<u>1982*</u>	<u>1983*</u>	<u>1984</u>	<u>1985</u>
Revenue	\$987.5	\$1,060.3	\$1,123.3	\$1,463.6	\$1,704.1
Japanese Revenue	\$881.5	\$ 877.7	\$ 832.5	\$1,032.6	\$1,173.5
Non-Japanese Revenue	\$106.0	\$ 182.6	\$ 290.8	\$ 431.0	\$ 530.6
Cost of Revenue**	\$624.1	\$ 686.0	\$ 818.9	\$1,030.5	\$1,208.2
R&D Expense**	\$ 41.2	\$ 44.1	\$ 46.2	\$ 61.9	\$ 67.8
SG&A Expense**	\$167.1	\$ 181.2	\$ 235.7	\$ 311.4	\$ 369.0
Pretax Income	\$ 49.1	\$ 29.7	\$ 34.1	\$ 76.3	\$ 83.3
Pretax Margin (%)	5.0	2.8	3.0	5.2	4.9
Effective Tax Rate (%)	50.0	45.6	70.3	48.4	54.3
Net Income	\$ 24.5	\$ 16.2	\$ 10.0	\$ 39.0	\$ 37.6
Average Shares Outstanding (Millions)	385	387	392	427	454
Per Share					
Earnings	\$ 0.06	\$ 0.04	\$ 0.03	\$ 0.09	\$ 0.08
Dividends**	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02
Book Value	\$ 0.42	\$ 0.40	\$ 0.42	\$ 0.62	\$ 0.61
Price Range	N/A	N/A	N/A	N/A	N/A
Total Employees	14,769	15,093	15,658	17,027	18,134
Capital Expenditures**	\$106.0	\$ 109.6	\$ 111.2	\$ 158.9	\$ 276.3
Exchange Rate (¥ per US\$)	216	229	249	236	245

N/A = Not Available

\*For 1981, 1982, and 1983 balance sheet and income statements were restated.

\*\*For 1981 and 1982 restated values are not available.

Source: Oki Electric Industry Co., Ltd.  
Annual Reports  
DATAQUEST  
February 1986

# Oki Electric Industry Company, Limited

Table 1

**Oki Electric Industry Company, Limited**  
**REVENUE BY MAJOR LINE OF BUSINESS**  
 (Billions of Yen)

	<u>Fiscal Year ending March 31</u>				
	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>
Telecommunications Systems	¥ 65.4	¥ 77.1	¥ 79.8	¥ 76.4	¥ 94.1
Information Processing Systems	100.5	114.7	139.4	178.4	203.6
Electronic Devices	32.5	37.8	46.8	74.8	100.0
Other	<u>14.9</u>	<u>13.2</u>	<u>13.7</u>	<u>15.8</u>	<u>19.8</u>
<b>Total Sales</b>	<b>¥213.3</b>	<b>¥242.8</b>	<b>¥279.7</b>	<b>¥345.4</b>	<b>¥417.5</b>
Exchange Rate (¥ per US\$)	216	229	249	236	245

Source: Oki Electric Industry Co., Ltd.  
 Annual Reports  
 DATAQUEST  
 February 1986

# Oki Electric Industry Company, Limited

Table 2

**Oki Electric Industry Company, Limited**  
**ESTIMATED SEMICONDUCTOR REVENUES**  
(Millions of Dollars)

	1978	1979	1980	1981	1982	1983	1984	1985
Total Semiconductor	-	-	-	98	129	229	362	307
Total Integrated Circuit	-	-	-	88	121	216	343	289
Bipolar Digital (Technology)	-	-	-	9	14	17	25	22
TTL	-	-	-	0	0	0	20	17
ECL	-	-	-	0	0	0	5	5
Other Bipolar Digital	-	-	-	-	-	-	-	-
Bipolar Digital (Function)	-	-	-	9	14	17	25	22
Bipolar Digital Memory	-	-	-	-	-	-	-	-
Bipolar Digital Logic	-	-	-	9	14	17	25	22
MOS (Technology)	-	-	-	77	106	197	315	264
NMOS	-	-	-	30	42	78	141	104
PMOS	-	-	-	5	5	5	1	-
CMOS	-	-	-	42	59	114	173	160
MOS (Function)	-	-	-	77	106	197	315	264
MOS Memory	-	-	-	31	59	101	149	90
MOS Micro Devices	-	-	-	2	6	19	46	43
MOS Logic	-	-	-	44	41	77	120	131
Linear	-	-	-	2	1	2	3	3
Total Discrete	-	-	-	5	4	3	4	4
Transistor	-	-	-	5	4	1	0	0
Small Signal Transistor	-	-	-	-	-	-	-	-
Power Transistor	-	-	-	-	-	-	-	-
Diode	-	-	-	-	-	-	-	-
Small Signal Diode	-	-	-	-	-	-	-	-
Power Diode	-	-	-	-	-	-	-	-
Zener Diode	-	-	-	-	-	-	-	-
Thyristor	-	-	-	-	-	-	-	-
Other Discrete	-	-	-	-	-	2	4	4
Total Optoelectronic	-	-	-	5	4	10	15	14
LED Lamps	-	-	-	-	-	-	4	4
LED Displays	-	-	-	-	-	-	-	-
Optical Couplers	-	-	-	-	-	-	-	-
Other Optoelectronics	-	-	-	-	-	-	11	10

Source: Dataquest  
August 1986

# Oki Electric Industry Company, Limited

Oki Electric Industry Co., Ltd.  
7-12, Toranomon 1-chome, Minato-ku  
Tokyo 105, Japan  
Telephone: (03) 501-3111  
(Billions of Yen Except Per Share Data)

## Balance Sheet (March 31)

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
Working Capital	¥ 15.3	¥ 11.1	¥ 3.1	¥ 11.6	¥ 23.0
Long-Term Debt	¥ 32.3	¥ 28.4	¥ 38.0	¥ 50.5	¥ 60.3
Shareholders' Equity	¥ 28.5	¥ 33.0	¥ 35.8	¥ 37.6	¥ 44.7
After-Tax Return on Average Equity (%)	(4.8)	10.1	11.3	9.3	7.7

## Operating Performance (Fiscal Year Ending March 31)

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
Revenue	¥136.7	¥165.5	¥186.1	¥214.2	¥247.6
Japanese Revenue	¥120.6	¥145.9	¥164.1	¥178.2	¥183.7
Non-Japanese Revenue	¥ 16.1	¥ 19.6	¥ 22.0	¥ 36.0	¥ 63.9
Cost of Revenue	¥103.3	¥114.8	¥134.8	¥157.1	¥182.2
R&D Expense*	¥ 5.9	¥ 7.3	¥ 8.9	¥ 10.1	N/A
SG&A Expense	¥ 27.5	¥ 33.1	¥ 36.1	¥ 41.5	¥ 50.3
Pretax Income	¥ (1.1)	¥ 9.1	¥ 7.9	¥ 5.4	¥ 7.5
Pretax Margin (%)	(0.8)	4.7	4.3	2.5	3.0
Effective Tax Rate (%)	N/M	60.3	50.7	37.0	61.3
Net Income	¥ (1.4)	¥ 3.1	¥ 3.9	¥ 3.4	¥ 2.9
Average Shares Outstanding (Millions)	340	346	385	387	392
Per Share					
Earnings	¥(4.06)	¥ 8.85	¥10.15	¥ 8.76	¥ 7.39
Dividends	¥ 0.00	¥ 4.00	¥ 5.00	¥ 5.00	¥ 5.00
Book Value	¥ 83.8	¥ 95.4	¥ 93.0	¥ 97.2	¥114.0
Price Range	N/A	N/A	N/A	N/A	N/A
Total Employees	12,317	11,868	12,000	12,076	12,255
Capital Expenditures	¥ 8.7	¥ 13.1	¥ 22.9	¥ 25.4	¥ 25.3
Exchange Rate (Yen per US\$)	¥200.0	¥232.0	¥215.5	¥228.7	¥249.1

N/A = Not Available; N/M = Not Meaningful

\*R&D expense is also included in cost of revenue and in SG&A expense.

Source: Oki Electric Industry Co., Ltd.  
Annual Reports  
DATAQUEST



# Oki Electric Industry Company, Limited

Table 1

Oki Electric Industry Co., Ltd.  
SALES BY MAJOR INDUSTRY SECTOR  
(Billions of Yen)

	Fiscal Year Ending March 31				
	1979	1980	1981	1982	1983
Telecommunications Systems	¥ 56.6	¥ 57.9	¥ 62.6	¥ 70.3	¥ 73.5
Data Processing Systems	64.4	86.2	94.4	109.1	130.4
Electronic Devices	13.2	19.2	25.4	30.6	39.5
Other	2.5	2.2	3.7	4.2	4.2
Total Sales	¥136.7	¥165.5	¥186.1	¥214.2	¥247.6
Exchange Rate (Yen per US\$)	¥200.0	¥232.0	¥215.5	¥228.7	¥249.1

Table 2

Oki Electric Industry Co., Ltd.  
SALES BY MAJOR CUSTOMER  
(Billions of Yen)

	Fiscal Year Ending March 31		
	1981	1982	1983
<b>NTT</b>	¥ 51.4	¥ 51.0	¥ 44.4
Other Japanese Government	25.1	27.2	22.7
Other Japan	87.7	100.0	116.5
Export	21.9	36.0	63.9
Total Sales	¥186.1	¥214.2	¥247.5

Source: Oki Electric Industry Co., Ltd.  
Annual Reports  
DATAQUEST

# Oki Electric Industry Company, Limited

Table 3

**Oki Electric Industry Co., Ltd.**  
**ESTIMATED SEMICONDUCTOR REVENUES**  
**(Millions of Dollars)**

	1981 *****	1982 *****
Total Semiconductor	98	119
Total Integrated Circuit	88	109
Bipolar Digital (Technology)	9	7
TTL		
DTL		
ECL		
Other Bipolar Digital		
Bipolar Digital (Function)	9	7
Bipolar Digital Memory	0	0
Bipolar Digital Logic	9	7
MOS (Technology)	77	101
NMOS	36	40
PMOS	5	5
CMOS	42	56
MOS (Function)	77	101
MOS Memory	31	55
MOS Microprocessor	2	6
MOS Logic	44	40
Linear	2	1
Total Discrete	10	10
Transistor	5	5
Small Signal Transistor		
Power Transistor		
Diode	0	0
Small Signal Diode	0	0
Power Diode	0	0
Zener Diode	0	0
Thyristor	0	0
Other Discrete	5	5
Total Optoelectronic	0	0
LED Lamps	0	0
LED Displays	0	0
Optical Couplers	0	0
Other Optoelectronics	0	0

Source: DATAQUEST

## Olin Corporation

120 Long Ridge Road  
Stamford, Connecticut 06904  
Telephone: (203) 356-2000  
Fax: (203) 356-3065  
Dun's Number: 00-133-8086

*Date Founded: 1892*

---

### CORPORATE STRATEGIC DIRECTION

Olin Corporation is a manufacturer of chemicals, metals and materials, defense-related products, and ammunition. The chemicals segment includes industrial chemicals, performance chemicals, and image-forming and related specialty chemicals. Products in the metals and materials area include copper alloy sheet, strip, rod, tube, and fabricated parts; stainless steel strip, specialty clad, and inlay materials; and electronic interconnect materials and services. The defense and ammunition area includes small-, medium-, and large-caliber defense ammunition and advanced technology products and services for the aerospace and defense industries.

Total revenue increased by 8.7 percent to \$2.5 billion\* in fiscal 1989 from \$2.3 billion in fiscal 1988. Net income increased 27.0 percent to \$124 million in fiscal 1989 from \$98 million in fiscal 1988. Olin employs 15,400 people worldwide.

Research and development expenditure totaled \$66 million in fiscal 1989, representing 2.6 percent of revenue. Capital spending totaled \$142 million in fiscal 1989, representing 6.0 percent of revenue.

More detailed information is available in Tables 1 and 2, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region. Information on revenue by distribution channel is not available. Table 3, a comprehensive financial statement, is at the end of this profile.

\*All dollar amounts are in US dollars.

---

### BUSINESS SEGMENT STRATEGIC DIRECTION

#### Chemicals

Olin's Chemical business segment consists of seven major operating segments: Urethane Chemicals, Electrochemicals, Pool Products, Electronic Chemicals, Cleaning Products and Services, Organics, and Specialty Chemicals.

Olin develops, manufactures, and markets industrial and performance chemicals. Olin's wholly owned subsidiary, Olin Hunt Specialty Products Inc., manufactures and markets image-forming and related specialty chemicals.

Olin Hunt's products include photoresists, high-purity semiconductor-grade acids and solvents, dopants, and etchants for use in the manufacture of semiconductors and printed wireboard products; toners and developers used in photocopiers and computer printers; and conductive materials used in the electronics industry.

#### Metals and Materials

Olin's Metals and Materials business segment consists of two major operating units: Olin Brass and Interconnect Materials.

The metals products business is focused on the electronics market, providing high-performance and high-quality materials needed by the electronics industry and other advanced technology customers. These

materials include specialty clad and inlay materials and Copperbond, a treated copper foil marketed to the printed circuit industry.

Olin's subsidiary, Fabricated Metal Products, fabricates ferrous and nonferrous specialty stamped metal products and shaped charge copper cones and produces specialized fabricated parts for durable goods and consumer recreational items.

Olin manufactures and sells strips, sheets, rods, and seamless and welded tubes of copper and copper alloy. Principal customers include producers of electrical and electronic equipment, producers of builders' hardware and appliances, the plumbing, automobile, and air-conditioning industries, and manufacturers of a variety of consumer goods. Fabricating operations allow Olin to produce stamped, formed, and drawn parts from its strip for many of these markets. In 1988, Olin acquired Bridgeport Brass Corporation, a producer of copper and copper alloy (strips, rods, and seamless tubes).

#### Defense and Ammunition

Olin's Defense and Ammunition business segment consists of three major operating units: Aerospace Division, Ordnance Division, and Winchester Division.

The Defense Systems Group's Aerospace Division manufactures specialty defense products, including small rocket engines used for altitude control and guidance, pulsed power systems, power supplies, and antiarmor warheads. Olin also operates the US government-owned Lake City Ammunition Plant, the largest small-caliber ammunition facility in the United States, as well as other government arsenals. Olin manufactures small-, medium-, and large-caliber defense ammunition; Winchester sporting ammunition (including shot shells and centerfire and rimfire ammunition); and smokeless powder.

In December 1988, Olin acquired General Defense Corporation, a prime systems contractor in large-caliber ammunition. The subsidiary's Tactical Systems Division produces large-caliber tank and artillery projectiles and components.

#### Further Information

For more information about the Company's business segments, please contact the appropriate industry service. Dataquest tracks Olin Hunt through the Semiconductor Equipment and Materials Service (SEMS).

**Table 1**  
**Five-Year Corporate Highlights (Millions of US Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$1,760.0	\$1,732.0	\$1,930.0	\$2,308.0	\$2,509.0
Percent Change	-	(1.59)	11.43	19.59	8.71
Capital Expenditure	\$154.0	\$128.0	\$115.0	\$147.0	\$142.0
Percent of Revenue	8.75	7.39	5.96	6.37	5.66
R&D Expenditure	\$54.0	\$56.0	\$62.0	\$58.0	\$66.0
Percent of Revenue	3.07	3.23	3.21	2.51	2.63
Number of Employees	14,900	13,200	14,100	16,400	15,400
Revenue (\$K)/Employee	\$118.12	\$131.21	\$136.88	\$140.73	\$162.92
Net Income	(\$165.0)	\$75.0	\$78.0	\$98.0	\$124.0
Percent Change	-	(145.45)	4.00	25.64	26.53
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	
Quarterly Revenue	\$671.00	\$658.00	\$580.00	\$600.00	
Quarterly Profit	\$34.00	\$35.00	\$24.00	\$31.00	

Source: Olin Corporation  
Annual Reports and Forms 10-K  
Dataquest (1990)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1985	1986	1987	1988	1989
North America	92.84	94.00	92.75	89.95	92.79
International	7.16	6.00	7.25	10.05	7.21

Source: Olin Corporation  
Annual Reports and Forms 10-K  
Dataquest (1990)

---

## 1989 SALES OFFICE LOCATIONS

North America—5  
Europe—5  
Asia/Pacific—5  
    Japan—1  
ROW—3

---

## MANUFACTURING LOCATIONS

### *North America*

Augusta, Georgia  
Chlorine, caustic soda, hydrochloric acid, sodium hypochlorite, sodium hydrosulfate

Beaumont, Texas  
Sulfuric acid and a mix of ammonium sulfite-bisulfite

Berea, Ohio  
Dry toners, developers

Bloomington, Illinois  
Stamped metal products, fabricated parts, shaped charge copper cones

Brandenburg, Kentucky  
Ethylene oxide, industrial glycols, glycol ethers, surfactants, polyols, functional fluids

Brook Park, Ohio  
Urethane foam systems

Bryan, Ohio  
Copper, copper alloy re-rolling

Charleston, Tennessee  
Chlorine, caustic soda, sodium hypochlorite, sodium hydrosulfite, calcium hypochlorite

Cuba, Missouri  
Copper alloy welded tube

East Alton, Illinois  
Copper and copper alloy sheet and strip, fabricated parts, composite metal strip for coins, specialty metal products

East Providence, Rhode Island  
Formulation and packaging of photoresists

Indianapolis, Indiana  
Copper and copper alloy strip, rod, seamless tube

Joliet, Illinois  
Industrial phosphates, high-grade fertilizers, sodium fluorides

Kansas City, Kansas  
Formulated water-treatment chemicals

Lancaster, Pennsylvania  
Mechanical and electronic fuses

Lincoln, Rhode Island  
Photographic and reprographic chemicals, photoresists

Livonia, Michigan  
Chloroisocyanurate packaging

Manteca, California  
Assembly of integrated circuits and microelectric packages

McIntosh, Alabama  
Chlorine, caustic soda, hydrogen, hydrazine propellant blending, storage

Mountain View, California  
Tape-automated bonding materials

Nazareth, Pennsylvania  
High-purity acids

New Bedford, Massachusetts  
Packages for hybrid integrated circuits

Niagara Falls, New York  
Chlorine, caustic soda, hydrogen, potassium hydroxide, sodium chlorite, sodium methylate, sodium hypochlorite

Ontario, California  
Conductive inks, coatings

Palisades Park, New Jersey  
Filming agents, liquid toners, plating chemicals

Redmond, Washington  
Rocket engines, gas generators, electronic subsystems for aircraft and ships

Rochester, New York  
Specialty chemicals and intermediates, biocides

Rolling Meadows, Illinois  
Photographic chemical systems

San Leandro, California  
Pulsed-power equipment and services, radiation simulators, ordnance components

Seward, Illinois  
Electronic chemicals, delivery systems

Shreveport, Louisiana  
Sulfuric acid

South Charleston, West Virginia  
Chloroisocyanurates, cyanuric acid

Tempe, Arizona  
Specialty etchants

Wadsworth, Ohio  
Ordnance components

Waterbury, Connecticut  
Copper foil, thin-gauge copper alloys and stainless steel, custom conversion rolling

---

## SUBSIDIARIES

### *North America*

Bridgeport Brass Corp. (United States)  
 General Defense Corp. (United States)  
 Hi-Pure Chemicals Inc. (United States)  
 Olin Fabricated Metal Products Inc. (United States)  
 Olin Financial Services Inc. (United States)  
 Olin Hunt Specialty Products Inc. (United States)  
 Olin Specialty Metals Group (United States)  
 Olin Technology Inc. (United States)  
 Pacific Electro Dynamics Inc. (United States)  
 Physics International Inc. (United States)  
 Rocket Research Co. (United States)

### *Europe*

Olin S.p.A. (Italy)

### *Asia/Pacific*

Olin Australia Ltd. (Australia)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

1989

### *Asahi Glass*

Olin and Asahi Glass formed Asahi-Olin America to make urethane materials principally for automotive applications. Asahi-Olin was founded in Japan in 1974 to supply automakers, and the new US company will supply Japanese companies in the United States.

---

## MERGERS AND ACQUISITIONS

1989

### *Indy Electronics*

Olin acquired majority ownership (55 percent) in Indy Electronics, a major contract assembler of ICs and microelectronic packages. Olin had previously had a 45 percent stake in Indy Electronics.

1988

### *General Defense*

Olin acquired General Defense for approximately \$104 million. General Defense markets large-caliber ammunition and artillery projectiles.

### *Bridgeport Brass*

Olin acquired Bridgeport Brass, a producer of copper and copper alloy products, including rod and tube.

---

## KEY OFFICERS

### *John W. Johnstone*

Chairman, president and chief executive officer

### *Donald W. Griffin*

Executive vice president

### *Robert L. Yohe*

Executive vice president

### *Joseph M. Gaffney*

Senior vice president, Planning and Development

### *Edward Pollack*

Senior vice president

### *C. Robert Tully*

Senior vice president and chief financial officer

### *Michael E. Campbell*

Vice president, Human Resources

### *Irving Chain*

Vice president and chief scientist

---

## PRINCIPAL INVESTORS

Connecticut National—16.8 percent  
 Boatmen's Bankshares Inc.—7.1 percent

---

## FOUNDERS

Information is not available.

**Table 3**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December**  
**(Millions of US Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Total Current Assets</b>	\$695.2	\$601.0	\$680.0	\$801.0	\$790.0
Cash	47.9	9.0	34.0	25.0	12.0
Receivables	324.3	321.0	362.0	437.0	453.0
Marketable Securities	-	-	-	-	-
Inventory	267.0	264.0	273.0	311.0	296.0
Other Current Assets	56.0	7.0	11.0	28.0	29.0
<b>Net Property, Plants</b>	\$718.0	\$720.0	\$727.0	\$801.0	\$781.0
<b>Other Assets</b>	\$185.0	\$224.0	\$278.0	\$338.0	\$333.0
<b>Total Assets</b>	<b>\$1,598.2</b>	<b>\$1,545.0</b>	<b>\$1,685.0</b>	<b>\$1,940.0</b>	<b>\$1,904.0</b>
<b>Total Current Liabilities</b>	\$391.0	\$391.0	\$404.0	\$617.0	\$585.0
<b>Long-Term Debt</b>	\$354.0	\$375.0	\$392.0	\$474.0	\$501.0
<b>Other Liabilities</b>	\$166.0	\$125.0	\$189.0	\$166.0	\$153.0
<b>Total Liabilities</b>	<b>\$911.0</b>	<b>\$891.0</b>	<b>\$985.0</b>	<b>\$1,257.0</b>	<b>\$1,239.0</b>
<b>Total Shareholders' Equity</b>	\$686.0	\$654.0	\$700.0	\$683.0	\$665.0
Converted Preferred Stock	-	-	-	-	-
Common Stock	24.0	21.0	22.0	20.0	19.0
Other Equity	93.0	123.0	204.0	193.0	178.0
Retained Earnings	569.0	510.0	474.0	470.0	468.0
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$1,597.0</b>	<b>\$1,545.0</b>	<b>\$1,685.0</b>	<b>\$1,940.0</b>	<b>\$1,904.0</b>
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Revenue</b>	\$1,760.0	\$1,732.0	\$1,930.0	\$2,308.0	\$2,509.0
US Revenue	1,634.0	1,628.0	1,790.0	2,076.0	2,328.0
Non-US Revenue	126.0	104.0	140.0	232.0	181.0
<b>Cost of Sales</b>	\$1,389.0	\$1,318.0	\$1,455.0	\$1,781.0	\$1,929.0
<b>R&amp;D Expense</b>	\$54.0	\$56.0	\$62.0	\$58.0	\$66.0
<b>SG&amp;A Expense</b>	\$252.0	\$252.0	\$264.0	\$289.0	\$287.0
<b>Capital Expense</b>	\$154.0	\$128.0	\$115.0	\$147.0	\$142.0
<b>Pretax Income</b>	(\$282.0)	\$115.0	\$127.0	\$151.0	\$192.0
<b>Pretax Margin (%)</b>	(16.02)	6.64	6.58	6.54	7.65
<b>Effective Tax Rate (%)</b>	(32.60)	34.80	38.60	35.10	35.40
<b>Net Income</b>	(\$165.0)	\$75.0	\$78.0	\$98.0	\$124.0
<b>Shares Outstanding, Millions</b>	23.0	22.4	23.1	21.1	20.0
<b>Per Share Data</b>					
Earnings	(\$8.28)	\$3.36	\$3.38	\$4.63	\$6.02
Dividend	\$1.50	\$1.52	\$1.60	\$1.70	\$1.95
Book Value	\$29.83	\$29.20	\$30.30	\$32.37	\$33.25



**Table 3 (Continued)**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December**  
**(Millions of US Dollars, except Per Share Data)**

<b>Key Financial Ratios</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<i>Liquidity</i>					
Current (Times)	1.78	1.54	1.68	1.30	1.35
Quick (Times)	1.10	0.86	1.01	0.79	0.84
Fixed Assets/Equity (%)	104.66	110.09	103.86	117.28	117.44
Current Liabilities/Equity (%)	57.00	59.79	57.71	90.34	87.97
Total Liabilities/Equity (%)	132.80	136.24	140.71	184.04	186.32
<i>Profitability (%)</i>					
Return on Assets	-	4.77	4.83	5.41	6.45
Return on Equity	-	11.19	11.52	14.17	18.40
Profit Margin	(9.38)	4.33	4.04	4.25	4.94
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	3.07	3.23	3.21	2.51	2.63
Capital Spending % of Revenue	8.75	7.39	5.96	6.37	5.66
Employees	14,900	13,200	14,100	16,400	15,400
Revenue (\$K)/Employee	\$118.12	\$131.21	\$136.88	\$140.73	\$162.92
Capital Spending % of Assets	9.64	8.28	6.82	7.58	7.46

Source: Olin Corporation  
Annual Reports and Forms 10-K  
Dataquest (1990)

## Omron Corporation

10, Tsuchudo-cho, Hanazono

Ukyo-ku, Kyoto 616, Japan

Telephone: 075-463-1161

Fax: 075-464-2607

Dun's Number: Not Available

*Date Founded: 1948*

---

### CORPORATE STRATEGIC DIRECTION

Omron Corporation is a world leader in the production of automation systems, components, and equipment. In the field of factory automation, Omron produces a wide array of products from computer systems to components. In commercial and consumer products, the Company provides subsystems to components, electronic fund transfer systems, electronic traffic control systems, health and medical equipment, and office automation systems.

Total revenue increased 11.8 percent to ¥416.2 billion (US\$2.9 billion) from ¥372.4 (US\$2.9 billion) for the year ended March 1990. (Percentage changes refer only to ¥ amounts; US\$ percentage changes will differ because of fluctuations in Dataquest exchange rates.) All operations recorded higher sales, with health and medical equipment producing the most substantial gain—57.3 percent—to a total of ¥25.9 billion (US\$181.8 million). Components and systems sales were up 9 percent to ¥256.7 billion (US\$1.8 billion), accounting for 62 percent of net sales. Electronic fund transfer systems increased revenue by 4 percent over the previous year, totaling ¥65.4 billion (US\$459), representing 15.7 percent of total revenue. Office automation systems posted a 16 percent gain in fiscal 1990, totaling ¥36.6 billion (US\$256.9 million) and representing 8.8 percent of total revenue.

Net income increased 9.7 percent totaling ¥20.8 billion (US\$146.0 million) in the year ended March 1990, up from ¥18.9 billion (US\$147.8 million). A reduction of income taxes arising from carrying forward the operating loss and prior years' accounting loss of subsidiaries helped boost the posted net income for fiscal 1990.

R&D expenditure totaled ¥25.9 billion (US\$181.9 million) in the year ended March 1990, representing 6.2 percent of revenue. This increase is 15 percent over the previous year's figure of ¥22.5 billion (US\$175.6 million). Capital spending totaled ¥40.8 billion (US\$286.5 million) in the year ended March 1990, representing 6.6 percent of revenue, a 65.1 percent increase over the previous year's figure of ¥24.7 billion (US\$192.9 million). Omron Corporation employed 15,823 people worldwide in fiscal 1990.

More detailed information is available in Tables 1 and 2, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region. Information on revenue by distribution channel is not available. Tables 3 and 4, comprehensive financial statements, are at the end of this profile.

---

### BUSINESS SEGMENT STRATEGIC DIRECTION

#### Control Components and Systems

The Control Components and Systems operating group consists of three divisions: Industrial, Consumer/Commercial, and Automotive Electronics. The Industrial Division provides such products as programmable controllers and sensors for factory automation and computer-integrated manufacturing (CIM). The 1989 introduction of the C200H, a new temperature controller, contributed significantly to the Industrial Division's sales. The Consumer/Commercial Division provides consumer electrical products, automatic vending machines, and office automation

equipment. New products that contributed significantly to sales were miniature relays for telecommunication, an input/output (I/O) terminal series, a mechanical sensor switch for consumer natural gas, and a power supply. Other products that registered substantial sales growth were scanners of the Man-Machine-Interface Products Group, and optical sensors of the Device Products Division. The Automotive Electronics Division provides such products as switches and relays for use in luxury cars.

Internationally, the Control Components and Systems group expanded its operations by developing markets and increasing local production. An important switch was made to local manufacturing and marketing subsidiaries in the second half of the fiscal year to promote conversion to regional management.

#### **Electronic Fund Transfer Systems**

The Electronic Fund Transfer Systems group provides an extensive line of unmanned banking machines, including bill changers and automatic teller machines, a multiline firm banking system, and electronic fund transfer systems (EFTSs) such as the Information Network System and the CATV System.

#### **Information Systems**

The Information Systems group provides electronic traffic control systems, security control systems, and inspection control systems. Currently, this division is involved in a large-scale project to install electronic traffic control systems in the metropolitan Tokyo area and in the Osaka and Kyoto areas.

#### **Health and Medical Equipment**

The Health and Medical Equipment group's principal products include an automatic blood cell analyzer, hyperthermia equipment for cancer treatment, a flow cytometer, a low-frequency massage machine, and rechargeable electronic sphygmomanometers and sphygmomanometers with pressure sensors or optical sensors.

#### **Office Automation Systems**

The Office Automation Systems group provides such products as personal computers, workstations, peripherals (including scanners and modems), and information networks. In 1988, the LUNA 32-bit holonic workstation was favorably received as an affordable desktop workstation. In computer peripherals, the division introduced a new modem series, scanners, and uninterruptible power supplies (UPSs). Also, Omron became the first manufacturer licensed to incorporate the Sigma workstation operating environment software into its workstations.

#### **Further Information**

For more information about the Company's business segments, please contact the appropriate industry service. Dataquest tracks Omron through the Japanese Semiconductor Application Markets (JSAM).

**Table 1**  
**Five-Year Corporate Highlights**  
(Millions of US Dollars)

	1986	1987	1988	1989	1990
Five-Year Revenue	\$1,252.8	\$1,752.1	\$2,286.6	\$2,904.1	\$2,921.5
Percent Change	-	39.85	30.50	27.00	0.60
Capital Expenditure	\$147.7	\$198.4	\$147.2	\$192.9	\$286.5
Percent of Revenue	11.79	11.33	6.44	6.64	9.81
R&D Expenditure	\$68.9	\$111.8	\$148.7	\$175.6	\$181.9
Percent of Revenue	5.50	6.38	6.50	6.05	6.23
Number of Employees	12,824	13,364	13,851	15,047	15,823
Revenue (\$K)/Employee	\$97.69	\$131.11	\$165.08	\$193.00	\$184.64
Net Income	\$11.6	\$19.1	\$78.3	\$147.8	\$146.0
Percent Change	-	64.14	309.90	88.81	(1.27)
Exchange Rate (US\$1=¥)	¥221.26	¥159.56	¥138.03	¥128.25	¥142.47
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	
Quarterly Revenue	NA	NA	NA	NA	
Quarterly Profit	NA	NA	NA	NA	

NA = Not available

Source: Omron Corporation  
Annual Reports  
Dataquest (1990)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1986	1987	1988	1989	1990
Japan	81.39	83.06	83.70	84.60	84.24
International	18.61	16.94	16.30	15.40	15.76

Source: Omron Corporation  
Annual Reports  
Dataquest (1990)

---

## 1990 SALES OFFICE LOCATIONS

North America—4  
Europe—15  
Asia/Pacific—52  
Japan—47  
ROW—2

---

## MANUFACTURING LOCATIONS

### *North America*

Omron Manufacturing of America Inc., Ohio, United States  
Manufacturer of control components

### *Europe*

Omron Electronics (U.K.) Ltd., United Kingdom  
Manufacturer of control components  
Omron Manufacturing of the Netherlands B.V., Netherlands  
Manufacturer of control components

### *Asia/Pacific*

Omron Malaysia Electronic Sdn. Bhd., Malaysia  
Manufacturer of control components  
Omron Taiwan Electronics Inc., Taiwan  
Manufacturer of control components

### *ROW*

Omron Componentes Ind. Nandan Factory, Brazil  
Manufacturer of control components

---

## SUBSIDIARIES

### *North America*

Omron Canada Inc. (Canada)  
Omron Electronics Inc. (United States)  
Omron Manufacturing of America Inc. (United States)  
Omron Research Institute Inc. (United States)  
Omron Systems of America Inc. (United States)  
Omron Systems of Canada Inc. (Canada)

### *Europe*

Omron Electronics A.B. (Sweden)  
Omron Electronics A.G. (Switzerland)  
Omron Electronics A/S (Norway)  
Omron Electronics B.V. (Netherlands)  
Omron Electronics Componentes e Sistemas Electronicos LDA (Portugal)  
Omron Electronics Europe B.V. (OEE-H.Q.) (Netherlands)  
Omron Electronics GesmbH (Austria)  
Omron Electronics GmbH (Germany)  
Omron Electronics O.Y. (Finland)  
Omron Electronics S.A. (Belgium)  
Omron Electronics S.A. (Spain)  
Omron Electronics S.a.r.L. (France)  
Omron Electronics S.r.L. (Italy)  
Omron Electronics (UK) Ltd. (England)  
Omron Finance Netherlands B.V. (Netherlands)  
Omron Geschäftssysteme GmbH (Germany)  
Omron Terminals (UK) Ltd. (England)

### *Asia/Pacific*

Omron Asia Pacific Trading Pte. Ltd. (Singapore)  
Omron Electronics Asia Ltd. (Hong Kong)  
Omron Electronics Pte. Ltd. (Australia)  
Omron Korea Co. Ltd. (South Korea)  
Omron Malaysia Sdn. Bhd (Malaysia)  
Omron Singapore Pte. Ltd. (Singapore)  
Omron Taiwan Electronics Inc. (Taiwan)  
Omron Trisak Co. Ltd. (Thailand)

### *ROW*

Omron Business Sistemas Electronicos da America Latina Ltda. (Brazil)  
Omron Electronica do Brasil Ltda. (Brazil)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

### *1988*

#### **Dalian Electronics Industries**

Omron and Dalian Electronic Industries of China reached a consignment production agreement. Under the agreement, Omron will provide parts, materials, production equipment, and technology for the production of its health care products.

**Sumitomo Electric Industries Ltd.**

Omron and Sumitomo Electric Industries will jointly market Sysnet, an optical local area network (LAN) developed jointly by the two companies for factory automation use, in Europe. The two companies will also cooperate on related operations, such as software developments tailored to users' specifications, as well as the training of system engineers. The system will be marketed through Omron's sales channels.

**Mitsui Engineering and Shipbuilding Co. Ltd.**

Omron and Mitsui Engineering and Shipbuilding Co. will establish a joint factory automation firm in Tokyo. The new firm, to be named O&M Systems Inc., will be equally owned by both parties.

1987

**Nippon Telephone and Telegraph (NTT) and Sumitomo Electric Industries Ltd.**

Omron, NTT, and Sumitomo Electric Industries jointly established a factory automation engineering firm, known as NTT Fanet Systems (Japan).

**IBM Japan Ltd.**

Omron and IBM Japan entered an agreement to link their sales of CIM systems that will integrate office systems, computer-assisted design/computer-assisted manufacturing (CAD/CAM) systems, and manufacturing systems to permit manufacturers to manage purchases, production, sales, and shipments. The companies will develop an interface that combines Omron's software for factory automation and IBM Japan's software for information processing.

**MERGERS AND ACQUISITIONS**

1990

**Buffalo Medical Specialties Manufacturing and Marshall Products**

Omron acquired Buffalo Medical Specialties Manufacturing and Marshall Products, a medical equipment manufacturer, for \$27.5 million. The US firm will be renamed Omron Marshall Products.

1987

**Carlo Gavassi Omron**

Omron acquired the remaining minority stake of Carlo Gavassi Omron (Switzerland), where it had held the majority.

**KEY OFFICERS****Takao Tateisi**

Chairman and director

**Nobuo Tateisi**

Vice chairman and director

**Yoshio Tateisi**

President and director

**Toshio Yagawa**

Vice president and director

**Kohel Jinkawa**

Vice president and director

**Noriyoshi Nakamura**

Senior managing director

**Isao Hatano**

Senior managing director

**PRINCIPAL INVESTORS**

Information is not available.

**FOUNDERS**

Information is not available.

**Table 3**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending March**  
**(Millions of US Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>
<b>Total Current Assets</b>	\$821.6	\$1,206.3	\$1,624.2	\$1,969.3	\$2,242.6
Cash	249.2	409.5	579.1	647.7	880.0
Receivables	295.9	417.2	556.5	678.1	666.3
Marketable Securities	39.8	64.3	112.1	182.4	207.9
Inventory	187.9	242.2	306.1	391.6	416.8
Other Current Assets	48.8	73.1	70.4	69.6	71.6
Net Property, Plants	\$333.8	\$543.3	\$634.8	\$749.0	\$824.7
Other Assets	\$64.9	\$118.3	\$120.9	\$130.8	\$168.7
<b>Total Assets</b>	<b>\$1,220.3</b>	<b>\$1,868.0</b>	<b>\$2,379.9</b>	<b>\$2,849.0</b>	<b>\$3,236.0</b>
<b>Total Current Liabilities</b>	\$506.6	\$676.0	\$852.3	\$1,057.7	\$1,076.2
Long-Term Debt	\$143.6	\$398.5	\$296.5	\$239.8	\$512.5
Other Liabilities	\$85.1	\$114.2	\$127.9	\$136.3	\$143.5
<b>Total Liabilities</b>	<b>\$735.3</b>	<b>\$1,188.7</b>	<b>\$1,276.7</b>	<b>\$1,433.9</b>	<b>\$1,732.2</b>
<b>Total Shareholders' Equity</b>	\$485.0	\$679.2	\$1,103.2	\$1,415.2	\$1,503.8
Converted Preferred Stock	-	-	-	-	-
Common Stock	38.7	53.8	190.8	260.7	259.0
Other Equity	162.9	226.3	391.8	473.0	507.5
Retained Earnings	283.4	399.1	520.6	681.5	737.3
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$1,220.3</b>	<b>\$1,868.0</b>	<b>\$2,379.9</b>	<b>\$2,849.0</b>	<b>\$3,236.0</b>
<b>Income Statement</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>
<b>Revenue</b>	\$1,252.8	\$1,752.1	\$2,286.6	\$2,904.1	\$2,921.5
Japan Revenue	1,019.6	1,455.3	1,913.9	2,456.8	2,461.2
Non-Japan Revenue	233.2	296.8	372.7	447.2	460.4
Cost of Sales	\$865.7	\$1,202.8	\$1,511.3	\$1,856.7	\$1,889.0
R&D Expense	\$68.9	\$111.8	\$148.7	\$175.6	\$181.9
SG&A Expense	\$242.7	\$329.6	\$418.7	\$520.8	\$532.3
Capital Expense	\$147.7	\$198.4	\$147.2	\$192.9	\$286.5
Pretax Income	\$56.2	\$71.6	\$186.9	\$309.7	\$307.9
Pretax Margin (%)	4.49	4.08	8.17	10.66	10.54
Effective Tax Rate (%)	72.30	72.20	58.70	59.50	54.50
Net Income	\$11.6	\$19.1	\$78.3	\$147.8	\$146.0
Shares Outstanding, Millions	171.4	171.8	205.6	214.3	229.1
<b>Per Share Data</b>					
Earnings	\$0.07	\$0.09	\$0.37	\$0.69	\$0.61
Dividend	\$0.05	\$0.07	\$0.09	\$0.11	\$0.09
Book Value	\$2.83	\$3.95	\$5.37	\$6.60	\$6.56
Exchange Rate (US\$1=¥)	¥221.26	¥159.56	¥138.03	¥128.25	¥142.47

Source: Omron Corporation  
Annual Reports  
Dataquest (1990)

Table 4  
Comprehensive Financial Statement  
Fiscal Year Ending March  
(Millions of Yen, except Per Share Data)

Balance Sheet	1986	1987	1988	1989	1990
Total Current Assets	¥181,790.0	¥192,477.0	¥224,189.0	¥252,559.0	¥319,503.0
Cash	55,147.0	65,345.0	79,937.0	83,062.0	125,376.0
Receivables	65,461.0	66,566.0	76,814.0	86,965.0	94,921.0
Marketable Securities	8,813.0	10,259.0	15,477.0	23,388.0	29,615.0
Inventory	41,574.0	38,649.0	42,249.0	50,219.0	59,387.0
Other Current Assets	10,795.0	11,658.0	9,712.0	8,925.0	10,204.0
Net Property, Plants	¥73,858.0	¥86,693.0	¥87,619.0	¥96,056.0	¥117,494.0
Other Assets	¥14,355.0	¥18,881.0	¥16,692.0	¥16,771.0	¥24,038.0
Total Assets	¥270,003.0	¥298,051.0	¥328,500.0	¥365,386.0	¥461,035.0
Total Current Liabilities	¥112,095.0	¥107,862.0	¥117,640.0	¥135,655.0	¥153,324.0
Long-Term Debt	¥31,762.0	¥63,586.0	¥40,931.0	¥30,753.0	¥73,022.0
Other Liabilities	¥18,834.0	¥18,222.0	¥17,654.0	¥17,484.0	¥20,438.0
Total Liabilities	¥162,691.0	¥189,670.0	¥176,225.0	¥183,892.0	¥246,784.0
Total Shareholders' Equity	¥107,312.0	¥108,381.0	¥152,275.0	¥181,494.0	¥214,251.0
Converted Preferred Stock	-	-	-	-	-
Common Stock	8,570.0	8,589.0	26,332.0	33,431.0	36,893.0
Other Equity	36,036.0	36,113.0	54,087.0	60,666.0	72,308.0
Retained Earnings	62,706.0	63,679.0	71,856.0	87,397.0	105,050.0
Total Liabilities and Shareholders' Equity	¥270,003.0	¥298,051.0	¥328,500.0	¥365,386.0	¥461,035.0
<b>Income Statement</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>
Revenue	¥277,198.0	¥279,569.0	¥315,618.0	¥372,447.0	¥416,231.0
Japan Revenue	225,598.0	232,213.0	264,172.0	315,091.0	350,644.0
Non-Japan Revenue	51,600.0	47,356.0	51,446.0	57,356.0	65,587.0
Cost of Sales	¥191,538.0	¥191,914.0	¥208,602.0	¥238,120.0	¥269,132.0
R&D Expense	¥15,238.0	¥17,833.0	¥20,528.0	¥22,525.0	¥25,911.0
SG&A Expense	¥53,695.0	¥52,586.0	¥57,799.0	¥66,793.0	¥75,841.0
Capital Expense	¥32,673.0	¥31,664.0	¥20,320.0	¥24,738.0	¥40,824.0
Pretax Income	¥12,438.0	¥11,417.0	¥25,792.0	¥39,718.0	¥43,865.0
Pretax Margin (%)	4.49	4.08	8.17	10.66	10.54
Effective Tax Rate (%)	72.30	72.20	58.70	59.50	54.50
Net Income	¥2,575.0	¥3,048.0	¥10,808.0	¥18,961.0	¥20,795.0
Shares Outstanding, Millions	171.4	171.8	205.6	214.3	229.1
<b>Per Share Data</b>					
Earnings	¥15.00	¥14.90	¥50.70	¥88.20	¥87.30
Dividend	¥11.00	¥11.00	¥11.80	¥14.50	¥12.40
Book Value	¥626.09	¥630.86	¥740.64	¥846.92	¥935.19



Table 4 (Continued)  
 Comprehensive Financial Statement  
 Fiscal Year Ending March  
 (Millions of Yen, except Per Share Data)

Key Financial Ratios	1986	1987	1988	1989	1990
<i>Liquidity</i>					
Current (Times)	1.62	1.78	1.91	1.86	2.08
Quick (Times)	1.25	1.43	1.55	1.49	1.70
Fixed Assets/Equity (%)	68.83	79.99	57.54	52.93	54.84
Current Liabilities/Equity (%)	104.46	99.52	77.25	74.74	71.56
Total Liabilities/Equity (%)	151.61	175.00	115.73	101.32	115.18
<i>Profitability (%)</i>					
Return on Assets	-	1.07	3.45	5.47	5.03
Return on Equity	-	2.83	8.29	11.36	10.51
Profit Margin	0.93	1.09	3.42	5.09	5.00
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	5.50	6.38	6.50	6.05	6.23
Capital Spending % of Revenue	11.79	11.33	6.44	6.64	9.81
Employees	12,824	13,364	13,851	15,047	15,823
Revenue (¥K)/Employee	¥21,615.56	¥20,919.56	¥22,786.66	¥24,752.24	¥26,305.44
Capital Spending % of Assets	12.10	10.62	6.19	6.77	8.85
Exchange Rate (US\$1=¥)	¥221.26	¥159.56	¥138.03	¥128.25	¥142.47

Source: Omron Corporation  
 Annual Reports  
 Dataquest (1990)

## Ing. C. Olivetti, S.p.A.

Via Jervis 77

10015 Ivrea, Italy

Telephone: 011-39-125-622639

Fax: 011-39-125-523884

Dun's Number: 42-870-4217

*Date Founded: 1908*

---

### CORPORATE STRATEGIC DIRECTION

Ing. C. Olivetti, S.p.A. (Olivetti, S.p.A.), a European manufacturer of office automation and data processing equipment, is the parent company of the Olivetti Group. The Olivetti Group is the holding company for Ing. C. Olivetti, S.p.A., and for over 220 directly and indirectly controlled companies that operate in more than 30 countries. The Company's most significant subsidiaries include Germany's Triumph-Adler (typewriters, personal computers, minicomputers, and office automation equipment), Britain's Acorn (personal computers for education), Norway's Scanvest Ring (one of Scandinavia's largest information technology suppliers), and the American I.S.C./Bunker Ramo Corp., which ranks second in the US banking automation market.

In 1989, the Olivetti Group was the tenth largest Information Systems company in the world. It had a 2.2 percent share of the \$255.8 billion world market. It has ten research laboratories in seven countries and 40 production facilities around the world. Its sales and customer engineering organizations operate through subsidiaries in 40 countries and through a network of agents in 100 countries where subsidiaries are not present.

On January 1, 1990, the Olivetti Group assumed a new organizational structure based on three independent operating company units, each fully dedicated to a specific product market area and responsible for a complete cycle of operations from design to production and sales: Olivetti Office, Olivetti Systems and Networks, and Olivetti Information Services. Operating alongside the three area-specific business units, the Olivetti Technology Group heads Teknecomp, Conner Peripherals (Europe), and LaserDrive companies, and manages Olivetti's investments in the area of special technologies. Heading the three individual units is the parent company, Olivetti, S.p.A., which assumes a unifying role to provide strategic direction,

central staff functions, and coordination between the separate units.

The Company shed its previous corporate structure because it had become incompatible with the structure of the industry within which it operated. There has been an increasing trend toward discontinuity and complexity within the information systems market. Olivetti's new decentralized structure is expected to provide greater flexibility and shorter response time to the increasing dynamics of the individual information systems sectors. Simultaneously, it will provide the efficiency and coordination that are necessary to remain competitive.

During 1989, the Company's management formulated a strategy that places greater emphasis on pushing leading-edge technology to market, providing added value in software and networks, and competing on price. The Company views its Open System Architecture (OSA) as a key element in its strategy. Based on industry and market standards, OSA permits the development of solutions that can be integrated with existing multivendor environments and will be open to future developments. OSA essentially facilitates Olivetti's strategy by allowing new technologies to be utilized with current products.

Sourcing, licensing, joint ventures, and acquisitions also play a large role in Olivetti's strategy. By quickly acquiring new technology, the Company will be in a better position to carry out its goal to become the industry's technology leader. Some of 1989's significant acquisitions include I.S.C. Systems Corporation, an American company operating in the banking automation sector, and O'Group, an Italian systems consultancy and software house. The Company also set up strategic joint ventures with Carnegie Group to manufacture and market expert systems, Digital Equipment Corporation (DEC) to market personal computers and customer engineering services, Kodak

to produce optical disks, Marconi Italiana to manufacture processing systems for the defense sector, and Mitsui and Sanyo to form the Olivetti Sanyo Industriale company to produce facsimile equipment. In total, investments in fixed and commercial assets in the first half of 1989 amounted to Lit 79.30 billion (US\$57.69 million), while nonasset investments amounted to Lit 80.3 billion (US\$58.42 million). In addition, the Company's subsidiaries spent Lit 336.0 billion (US\$244.5 million) in total investments.

In 1989, the Olivetti Group's consolidated revenue increased 7.4 percent to Lit 9.03 trillion (US\$6.57 billion) from Lit 8.41 trillion (US\$6.46 billion) in fiscal 1988. (Percentage changes refer only to Lit amounts; US\$ percentage changes will differ because of fluctuations in Dataquest exchange rates.) Operating profit decreased 5.8 percent to Lit 382.3 billion (US\$278.1 million) in fiscal 1989 from Lit 406.0 billion (US\$311.9 million) in fiscal 1988. Net income decreased 43 percent to Lit 202.8 billion (US\$147.5 million) in fiscal 1989 from Lit 356.2 billion (US\$273.7 million) in fiscal 1988. The decrease in net income was due primarily to the impact of large, extraordinary financial charges taken during 1989.

R&D costs increased 6 percent to Lit 478 billion (US\$347.8 million) in fiscal 1989 from Lit 452 billion (US\$347.3 million) in fiscal 1988. As a percent of revenue, R&D expenditures remained stable at approximately 5.3 percent. The individual product divisions are responsible for R&D work so that strategic planning can be geared more closely to individual markets, technologies, and applications. Also, the Company's R&D strategy is based on investing in areas in which the Olivetti Group is strong and obtains high returns, and on a series of agreements and alliances in the technological areas in which other companies have reached a position of leadership.

In July 1989, Olivetti's primary investor and strategic partner, American Telephone and Telegraph (AT&T), liquidated its 22.35 percent holding in the Company. AT&T sold its 100 million shares for Lit 140 trillion (US\$635 million) to CIR, the industrial holding company owned by the Company's chairman, Carlo De Benedetti. CIR now controls 40 percent, the major shareholder, of the Olivetti Group.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region and distribution channel.

Tables 4 and 5, comprehensive financial statements, are at the end of this profile.

---

## BUSINESS SEGMENT STRATEGIC DIRECTION

### Olivetti Office Equipment

The Olivetti Office Equipment Division designs, manufactures, and markets personal computers, typewriters, printers, facsimile machines, copiers, calculators and cash registers, and other products. Olivetti Office USA is the American subsidiary of Olivetti Office Equipment, marketing a full range of office equipment and supplies through an authorized dealer network. Olivetti Office Equipment has 25 production facilities worldwide.

Net revenue for the Olivetti Office Equipment Division remained relatively stable in fiscal 1989 at Lit 3.34 trillion (US\$2.43 billion), or 37 percent of total consolidated revenue. In 1989, 75 percent of the division's net sales were through an indirect network. This figure is expected to increase in 1990.

Given the competitive and dynamic nature of the industry, pressure is consistently being applied to the division's profit margins and technology base. The division has responded by reorganizing its structure to better control costs and streamline the decision making process. The division consolidated the functions of the development, production, and purchasing departments in order to create a more balanced organizational base and to direct new resources toward emerging market sectors. Furthermore, it emphasizes continuous technological product updating through increased direct communication with the market. Currently, it sees potential growth in the areas of facsimile machines, laser printers, midrange and low-end personal computers, laptops, and copiers.

### Personal Computers

The Olivetti Office Equipment Division offers a full line of professional and laptop personal computers. However, the products are marketed through the Olivetti Networks and Systems Division, discussed below.

### Typewriters

In 1989, the world market for portable, manual, and electric typewriters slowed considerably. Olivetti's

sales, however, were relatively stable, enabling the Company to further consolidate its leadership of the sector. Olivetti Office Equipment's 1989 European sales volumes for electronic typewriters doubled. However, sales of Olivetti's typewriter products decreased 6 percent to Lit 1.21 trillion (US\$880.3 billion) in fiscal 1989 from Lit 1.29 trillion (US\$991.1 billion) in fiscal 1988. Typewriter sales accounted 13.4 percent of the Company's total consolidated revenue in fiscal 1989.

### *Printers*

Olivetti Office Equipment is Europe's leading printer manufacturer, with printer sales increasing slightly to Lit 812.8 billion (US\$591.3 million) in fiscal 1989. Printer sales accounted for 9 percent of the Company's total consolidated revenue. Olivetti markets a full line of dot matrix and laser printers.

### *Facsimile Machines*

Olivetti's position in the facsimile market is limited. In order to increase its presence, Olivetti formed a joint venture with Mitsui and Sanyo Electric to establish Olivetti Sanyo Industriale, of which Olivetti owns 51 percent. Mitsui and Sanyo agreed to contribute facsimile technology, with Olivetti contributing most of the capital.

### *Copiers*

Copier sales increased 34 percent to Lit 541.9 billion (US\$394.3 million) in fiscal 1989 from Lit 403.6 billion (US\$310.0 million) in fiscal 1988. Copier sales accounted for 6 percent of the Company's total consolidated revenue in fiscal 1989. Olivetti markets a full line of copiers, most of which are manufactured by Olivetti-Canon Industriale, which was established by a joint venture between Canon and Olivetti. Olivetti also markets products manufactured by Konica and by its Triumph-Adler subsidiary.

### *Calculators and Cash Registers*

Olivetti Office Equipment's calculator and cash register sales remained fairly stable at Lit 298.0 billion (US\$216.8 million) in fiscal 1989. However, as a percent of the Company's total consolidated revenue, calculator and cash register sales decreased to 3.3 percent in fiscal 1989 from 3.5 percent in fiscal 1988.

### *Other Products*

Other products consist of office supplies and the Baltea Group, which consists of Baltea (display

filters), Malteadisk (magnetic floppy disks), and Diaspronsud (typewriter supplies). Other product sales were Lit 135.5 billion (US\$98.6 million) in fiscal 1989, or 1.5 percent of the Company's total consolidated revenue.

### *Olivetti Systems and Networks*

The Olivetti Systems and Networks (OS&N) Division designs, manufactures, and markets distributed data processing products, including personal computers, minicomputers and terminals, and telecommunication equipment. I.S.C./Bunker Ramo is the US subsidiary of OS&N. Net revenue for OS&N was Lit 4.88 trillion (US\$3.55 billion), or 54 percent of the Company's total consolidated revenue.

The long-term objective of OS&N is to offer distributed processing systems geared to specific application sectors. OS&N's strategies reflect trends in the market, where open systems are gaining control over traditional-type solutions based on proprietary systems.

### *Personal Computers*

Olivetti offers a complete line of personal computers providing competitive configurations of power, price, and performance. In 1989, Olivetti ranked as the sixth largest PC manufacturer in the world by capturing 2.3 percent of the world PC market. Personal computers are designed and manufactured by both the Office Equipment Division and the OS&N Division. Consequently, discussion of the personal computer product line and financial figures have been consolidated in this section for simplicity.

PC sales increased 13.0 percent to Lit 2.77 trillion (US\$2.12 billion) in fiscal 1989 from Lit 2.46 trillion (US\$1.89 billion) in fiscal 1988. PC sales accounted for 30.7 percent of the Company's total consolidated revenue.

The Company's line of personal computers is based on Intel's 8086, 80286, 80386, and 80486 microprocessors and two types of standard hardware: AT architecture and microchannel architecture (MCA). Olivetti also utilizes two operating systems that are expected to become the market standard: the MS-OS/2 and the UNIX System V.

With the Company holding significant leadership positions in many of the European markets and with the recent launches of several new products, including a new line of portable computers, Olivetti appears

well positioned to establish a more coordinated strategy for penetrating a wider potential client base with its PCs. The Company itself stresses its capacity to serve its customers' total computing and office equipment needs.

The OS&N personal computer offerings consist of 14 desktop, floor-standing, and laptop models. These models range from the low-end laptops to high-end professional computers. The OS&N offering also includes the entire range of professional and laptop personal computers made available by the Olivetti Office Equipment Division.

Acorn Computer Group Plc is a stock-listed company in which Olivetti owns an 80 percent shareholding. It is mainly a PC and workstation vendor in Britain, particularly the education field, where it is the market leader.

### *Minicomputers and Terminals*

Minicomputers and terminals accounted for 20.2 percent of the Company's total consolidated revenue. Sales remained fairly stable at Lit 1.82 trillion (US\$1.32 billion) in fiscal 1989. In 1989, the European computer systems market grew just over 9 percent in revenue. This figure includes sales of all computer systems except personal computers. Overall, 1989 was a year of transition in the European computer markets. Standards such as UNIX are growing in importance, while distinctions between products such as PCs, workstations, and midrange systems are blurring. Demand in the minicomputer market currently is being threatened by the increasing capabilities of new PCs and superminis. However, because of the minicomputer's evolution into a multiuser, multiprocessor, UNIX-based system, Dataquest predicts that the market will overcome the new threats and allow for some future growth.

In 1989, Olivetti pursued a systems renewal program by completing and upgrading the new LSX line and introducing the new low-end LSX 3010 and high-end models 3070 and 3080. In 1989, the Company introduced the 3035, which completes the offering of midrange minis, and the 3045, both of which are based on the high-speed Motorola 68000 microprocessor. This system line, which utilizes OSA, runs both the proprietary MOS operating system and an architecture based on a platform of standard hardware and software components. This will allow customers to implement the LSX system, even though they have previously invested in a different operating system.

The Company's main products in the terminal sector consist of the POS terminal, which is for mass merchandising, and the CAT 6500, which is focused at the banking industry, offering cash withdrawal, deposit, and bill payment facilities.

S.I.A.B., an Olivetti/Bull joint venture in the branch automation sector, manufactures automated teller machines (ATMs) and information terminals (CATs) for distribution by Olivetti and Bull. New software releases are expected to enhance the demand in the ATM market in 1990.

### *Peripherals*

The peripheral product line consists of workstations, printers, communication networks and memories, and some terminal products. In 1989, OS&N reorganized its customer engineering and maintenance activities in Europe (Decision Data) and in Italy (Ibimaint and Ciesse) into a new group named Decision Systems International. This group markets and services IBM-compatible peripherals in the European market.

### *Telecommunications Equipment*

Sales of telecommunications equipment increased 5 percent to Lit 388.3 billion (US\$282.5 million) in fiscal 1989 from Lit 369.9 billion (US\$284.2 million) in fiscal 1988. Telecommunication sales accounted for 4.3 percent of the Company's total consolidated revenue.

The Company's objective in this sector is to offer a complete product line, from business telephones to voice and data systems capable of handling thousands of lines. In mid-1988, as part of the special New Olivetti Voice and DATA System Announcement (NOVA) project, a plan was prepared for a global launch that included the installation of a special environment as evidence of Olivetti's capacity in the PABX sector. The Company's offering in this sector includes KTS intercommunicating systems, unattended switching systems linking special equipment and enhanced with special-purpose function keys, and systems of the Meridien line that Olivetti manufactures and distributes in Italy on license from Northern Telecom. These replaced the traditional ICS 6000 range in September 1988. These systems represent the most recent generation of PABX integrated systems and can be configured for development and integration with the features and services expected in the future Integrated Services Digital Network (ISDN).

### **Olivetti Information Services**

The Olivetti Information Services Division recorded revenue of Lit 451.6 billion (US\$328.6 million) in fiscal 1989. Its revenue accounted for 5 percent of the Company's total consolidated revenue. Olivetti Information Services offers computer services for business users, including software, value-added network services, voice/data services, managerial consulting and training, and electronic publishing.

In 1989, the division implemented an organizational structure based on the Company groupings addressing vertical markets (finance, industry, public administration, and defense), specialist services (training and networking processing services), and specialized systems (systems integration and turnkey systems). In each grouping, a lead company coordinates activities.

### **Other**

The Olivetti Technologies Division operates in the ancillary computer hardware field through the Teknecomp Group, and also develops and manages large-scale industrial projects in and outside Italy. The division recorded net revenue of Lit 361.2 billion (US\$262.8 million), or 4 percent of the Company's total consolidated revenue.

### **Further Information**

For more information about the Olivetti's business segments, please contact the appropriate Dataquest industry service.

**Table 1**  
**Five-Year Corporate Highlights (Millions of US Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$3,216	\$4,908	\$5,680	\$6,459	\$6,571
Percent Change	-	52.62	15.73	13.72	1.72
Capital Expenditure	\$297	\$348	\$551	\$618	\$719
Percent of Revenue	9.24	7.10	9.70	9.57	10.95
R&D Expenditure	\$149	\$262	\$330	\$347	\$348
Percent of Revenue	4.63	5.35	5.81	5.38	5.29
Number of Employees	48,944	59,091	58,087	57,560	56,937
Revenue (US\$K)/Employee	\$66	\$83	\$98	\$112	\$115
Net Income	\$264	\$379	\$256	\$274	\$148
Percent Change	-	43.82	(32.55)	6.97	(46.09)
Exchange Rate (US\$1=Lit)	Lit 1,909.45	Lit 1,490.82	Lit 1,298.50	Lit 1,301.60	Lit 1,374.50
1989 Calendar Year	Q1	Q2	Q3	Q4	
Quarterly Revenue	NA	NA	NA	NA	
Quarterly Profit	NA	NA	NA	NA	

NA = Not available

Source: Ing. C. Olivetti, S.p.A.  
Annual Reports and Forms 10-K  
Dataquest(1990)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1985	1986	1987	1988	1989
Europe	68.60	73.20	80.10	78.80	79.30
International	31.40	26.80	19.90	21.20	20.70
North America	16.90	15.30	9.10	10.20	9.20
Latin America	5.60	3.50	3.10	2.90	3.00
All Others	8.90	8.00	7.70	8.10	8.50

Source: Ing. C. Olivetti, S.p.A.  
Annual Reports  
Dataquest (1990)

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1988	1989
Direct Sales	46.00	NA
Indirect Sales	54.00	NA
VARs	21.60	NA
Dealers	32.40	NA

NA = Not available

Source: Ing. C. Olivetti, S.p.A.  
Annual Reports  
Dataquest (1990)

---

**1989 SALES OFFICE LOCATIONS**

North America—6  
 Europe—18  
 Asia/Pacific—8  
 ROW—8

---

**MANUFACTURING LOCATIONS**
*North America*

Olivetti Supplies Inc., Harrisburg, Pennsylvania  
 (United States)  
 Function not available

*Europe*

Aros, S.p.A., Cormano (Italy)  
 Components, motors, and electromechanical and  
 electronic equipment  
 Baltea, S.p.A., Leini (Italy)  
 Office accessories and furniture  
 Balteadisk, S.p.A., Arnad (Italy)  
 Office accessories and furniture  
 Circuiti Stampati Italiana, S.p.A., Pianezza (Italy)  
 Printed circuit boards  
 Dating, S.p.A., Borgoticino (Italy)  
 Data entry systems  
 Di.W.S. Plastic, S.r.l., Abbiategrosso (Italy)  
 Thermoplastic components  
 Diaspronud, S.p.A., Pozzuoli (Italy)  
 Office accessories and furniture  
 Eleprint, S.p.A., Ivrea (Italy)  
 Thermoplastic components  
 Hermes Precisa International S.A., Yverdon  
 (Switzerland)  
 Printers  
 Hispano Olivetti S.A., Barcelona (Spain)  
 Personal computers  
 Larimart, S.p.A., Roma (Italy)  
 Protected telecommunications equipment  
 Mael, S.p.A., Carsoli (Italy)  
 Lottery systems, office automation  
 Manifattura Valle dell'Orco, S.p.A., Sparone  
 Canavese (Italy)  
 Rubber and silicone components  
 Microfusione Italiana, S.p.A., Fizzonasco di Pieve  
 Emanuele (Italy)  
 Casting  
 Naples (Italy)  
 Personal computers

Nord Elettronica, S.p.A., Altare (Italy)  
 Printed circuit boards  
 Norsk Computer Industri A/S, Sandnes (Norway)  
 Personal computers  
 OSAI A-B, S.p.A., South Bernardo d'Ivrea (Italy)  
 Control units  
 Olivetti Peripheral Equipment, S.p.A., Bernardo  
 d'Ivrea (Italy)  
 Peripherals  
 Olivetti Peripherals Europe, S.p.A., South Bernardo  
 d'Ivrea (Italy)  
 Peripherals  
 Olivetti Prodotti Industriali, S.p.A., Marcanise (Italy)  
 Factory automation  
 Olivetti Synthesis, S.p.A., Massa (Italy)  
 Office accessories and furniture  
 Olivetti Telecomunicazioni, S.p.A., Pozzuoli (Italy)  
 Telecommunications products  
 Olivetti-Canon Industriale, S.p.A., Aglie' (Italy)  
 Copiers  
 Olteco, S.p.A., Ivrea (Italy)  
 Function not available  
 Prodest International, S.p.A., Pozzuoli (Italy)  
 Function not available  
 S.I.A.B. S.A., Cassis (France)  
 Function not available  
 Scarmagno (Italy)  
 Personal computers  
 Selin Societa' per l'Elettronica Industriale e Navale,  
 S.p.A., Genova (Italy)  
 Components, motors, and electromechanical and  
 electronic equipment  
 Societa' Generale Elastomeri-S.G.E., S.p.A., South  
 Olcese (Italy)  
 Rubber and silicone components  
 TA Triumph-Adler AG, Nurnberg (Germany)  
 Function not available  
 Tecnosafe, S.p.A., Milano (Italy)  
 Security systems  
 Tecnost, S.p.A., Ivrea (Italy)  
 Factory automation equipment  
 Tecnotour, S.p.A., Zola Predosa (Italy)  
 Control systems  
 Tecsinter, S.p.A., Ivrea (Italy)  
 Powder sintering  
 Teknecomp, S.p.A., Cavaglia (Italy)  
 Printed circuit boards

*Asia/Pacific*

Olivetti (Singapore) Pte. Ltd. (Singapore)  
 Function not available

*ROW*

Hileia S.A., Manaus (Brazil)  
 Function not available



Multidata S/A, Manaus (Brazil)  
Function not available  
Olivetti de Brasil S.A., Sao Paulo (Brazil)  
Function not available

---

## SUBSIDIARIES

### *North America*

American I.S.C./Bunker Ramo Corp., Dover,  
Pennsylvania (United States)  
Olivetti Canada Ltd., Toronto (Canada)  
Olivetti de Puerto Rico Inc., San Juan (Puerto Rico)  
Olivetti Supplies Inc., Harrisburg, Pennsylvania  
(United States)  
Olivetti USA Inc., Irving, Texas (United States)  
Triumph-Adler Royal Inc., Mountainside, New Jersey  
(United States)

### *Europe*

Acom Computer Group Plc, Cambridge (England)  
Aros, S.p.A., Cormano (Italy)  
Austro Olivetti GmbH, Wien (Austria)  
Baltea, S.p.A., Leini (Italy)  
Balteadisk, S.p.A., Amad (Italy)  
British Olivetti Ltd., London (England)  
Caridata (Italy)  
Ci Settanta (Italy)  
Circuiti Stampati Italia, S.p.A., Pianezza (Italy)  
Dating, S.p.A., Borgoticino (Italy)  
Decision Data Computer GmbH, Salzburg (Austria)  
Decision Data Computer S.A., Bagnolet (Belgium)  
Decision Data Computer (Belgium) S.A./N.V.,  
Bruxelles (Belgium)  
Decision Data Computer (G.B.) Ltd., Sunbury on  
Thames (England)  
Decision Data Computer GmbH, Dusseldorf  
(Germany)  
Decisions Systems International (Italy)  
Delos (Italy)  
Deutsche Olivetti GmbH, Frankfurt (Germany)  
Di.W.S. Plastic, S.r.l., Abbiategrasso (Italy)  
Diaspronsud, S.p.A., Pozzuoli (Italy)  
Elea (Italy)  
Elea Quality Consult (Italy)  
Elea, S.p.A., Burolo (Italy)  
Elemedia (Italy)  
Eleprint, S.p.A., Ivrea (Italy)  
Eusterna (Italy)  
Extera (Italy)  
G4S Ricerca, Societa' consortile per azioni, Bari  
(Italy)

Hermes Precisa B.V., Gouda (Netherlands)  
Hermes Precisa Belgium S.A., Bruxelles (Belgium)  
Hermes Precisa International S.A., Yverdon (Spain)  
Hermes Precisa Ltd., Colchester (England)  
Hispano Olivetti S.A., Barcelona (Spain)  
Japy Hermes Precisa France S.A., Paris (France)  
Larimart, S.p.A., Roma (Italy)  
Logos Progetti (Italy)  
Mael, S.p.A., Carsoli (Italy)  
Manifattura Valle dell'Orco, S.p.A., Sparone  
Canavese (Italy)  
Microfusione Italiana, S.p.A., Fizzonasco di Pieve  
Emanuele (Italy)  
Nomos Sistema (Italy)  
Nord Elettronica, S.p.A., Altare (Italy)  
Norsk Computer Industri A/S, Sandnes (Norway)  
OSAI A-B, S.p.A., South Bernardo d'Ivrea (Italy)  
Olivetti (Suomi) O.Y., Helsinki (Finland)  
Olivetti A/B, Malmo (Sweden)  
Olivetti A/S, Kobenhavn (Denmark)  
Olivetti Belge S.A., Bruxelles (Belgium)  
Olivetti Hellas A.E., Athens (Greece)  
Olivetti Information Services, S.p.A., Milano (Italy)  
Olivetti Nederland B.V., Ed Leiden (Netherlands)  
Olivetti Norge A/S, Oslo (Norway)  
Olivetti Peripheral Equipment, S.p.A., Bernardo  
d'Ivrea (Italy)  
Olivetti Peripherals Europe, S.p.A., South Bernardo  
d'Ivrea (Italy)  
Olivetti Portuguesa, S.a.r.l., Lisboa (Portugal)  
Olivetti Prodotti Industriali, S.p.A., Marcianise (Italy)  
Olivetti Ricerca, Societa' consortile per azioni,  
Pozzuoli (Italy)  
Olivetti Synthesis, S.p.A., Massa (Italy)  
Olivetti Telecomunicazioni, S.p.A., Pozzuoli (Italy)  
Olivetti-Canon Industriale, S.p.A., Aglie' (Italy)  
Olivetti-Logabax S.A., Paris (France)  
Olteco, S.p.A., Ivrea (Italy)  
PBS (Italy)  
Prodest International S.p.A., Pozzuoli (Italy)  
Radiocor, S.p.A., Milano (Italy)  
S.L.A.B. S.A., Cassis (France)  
Scanvest Ring A/S, Sandnes (Norway)  
Selin Societa' per l'Elettronica Industriale e Navale,  
S.p.A., Genova (Italy)  
Sikania Software (Italy)  
Simo (Italy)  
Sistemi Software (Italy)  
Sixcom, S.p.A., Milano (Italy)  
Societa' Generale Elastomeri-S.G.E., S.p.A., South  
Olcese (Italy)  
Software Sistemi, S.p.A., Bari (Italy)  
Syntax (Italy)  
Syntax Stato (Italy)  
Systech (Italy)  
Systema (Italy)

Systema, S.p.A., Roma (Italy)  
 TA Triumph-Adler AG, Nurnberg (West Germany)  
 Tecnosafe, S.p.A., Milano (Italy)  
 Tecnost, S.p.A., Ivrea (Italy)  
 Tecnotour, S.p.A., Zola Predosa (Italy)  
 Tecsinter, S.p.A., Ivrea (Italy)  
 Teknecomp, S.p.A., Cavaglia (Italy)  
 Trends and Strategy (Italy)  
 Triumph-Adler (U.K.) Ltd., London (England)  
 Triumph-Adler Distribuzione Italia, S.p.A., Milano (Italy)  
 Triumph-Adler France S.A., Rueil-Malmaison (France)  
 Unit (Italy)

#### *Asia/Pacific*

Olivetti Australia Pty. Ltd., Sydney (Australia)  
 Olivetti Corporation of Japan, Tokyo (Japan)  
 Olivetti (H.K.) Ltd. (Hong Kong)  
 Olivetti (Malaysia) Sdn. Bhd., Kuala Lumpur (Malaysia)  
 Olivetti Pacific Distributors Ltd. (Hong Kong)  
 Olivetti (Singapore) Pte. Ltd. (Singapore)  
 TA Triumph-Adler (Australia) Pty. Ltd., Silverwater (Australia)

#### *ROW*

Hileia S.A., Manaus (Brazil)  
 Multidata S/A, Manaus (Brazil)  
 Olivetti Africa Pty. Ltd., Johannesburg (South Africa)  
 Olivetti Argentina S.A., Buenos Aires (Argentina)  
 Olivetti Colombiana S.A., Bogota (Columbia)  
 Olivetti de Chile S.A., Santiago (Chile)  
 Olivetti de Venezuela C.A., Caracas (Venezuela)  
 Olivetti de Brasil S.A., Sao Paulo (Brazil)  
 Olivetti Elektronik sanayi Ve Ticaret A.S., Istanbul (Turkey)  
 Olivetti Mexicana S.A., Ciudad de Mexico (Mexico)  
 Olivetti Peruana S.A., Lima (Peru)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

### *1990*

#### **System Integrators Inc.**

An OEM agreement was made for the OS&N Division's 80286-based AT bus and 80386SX-based Micro Channel micros.

Bell Atlantic International, Cellular Communications, Shearson Lehman, and Televerket Omnitel-Sistemi Radiocellulari, a car/mobile telephone company, was formed by a joint venture.

#### **Energoprojekt Holding Corp. and Dinara**

Olivetti Energodata was formed as a joint venture to market Olivetti's computers in Yugoslavia.

#### **Decision Data Computer**

Decision Data's products will be marketed by Olivetti in Europe.

#### **Seiko Instruments**

A joint venture was formed to produce liquid crystal displays.

#### **American Telephone and Telegraph**

An OEM license was signed to obtain AT&T's LAN Manager/X server software.

#### **UNIX International**

UNIX International is a marketing group formed by 22 high-tech firms, including the Australian UNIX Group, Commodore, Fujitsu, Oracle, Pyramid, Stratus, Sun Microsystems, and Wyse.

#### **Microsoft Corporation**

Olivetti will offer Microsoft's Windows 3.0, Excel, and Word for Windows as the suggested standard components of its Olivetti-IBIS 3.0 Integrated Business and Information System office automation suite for the Olivetti Open System Architecture.

#### **Aeritalia and Seiko Instruments**

Olivetti, Aeritalia, and Seiko jointly established Tecdis, a liquid crystal display company.

#### **Kawasaki Steel and Eastman Kodak Company**

Literal, an optical disk drive company, was established through a joint venture.

### *1989*

#### **Cariplo**

Olivetti and Cariplo jointly established Caridata, a computerized credit-card management company.

#### **Finlavoro**

Olivetti and Finlavoro jointly established Eusterna, a computer services company for the public administration and the environmental sectors.

#### **U.S. Carnegie Group**

Olivetti and U.S. Carnegie jointly established Delos, an industry and factory automation company.

**ERG, S.p.A.**

Elca and ERG jointly established Research & Strategy, a research and marketing consultancy company.

**VNINNS (a company of the Soviet Ministry for Automation)**

Olivetti and VNINNS jointly established International Information Services, a computer services company.

**Eastman Kodak Company**

Olivetti and Kodak jointly established LaserDrive Ltd., an optical disk drive company.

**Mitsui and Sanyo**

The companies formed Olivetti Sanyo Industriale to produce facsimile equipment.

**Eastman Kodak Company**

The companies agreed to jointly develop, manufacture, and market 5.25- and 3.5-inch optical disk drives for personal computers.

**Carnegie Group**

The organizations agreed to manufacture and market expert systems.

**Wyse Technology**

Wyse agreed to supply Olivetti with DEC-compatible terminals for the ANSI market.

**Marconi Italiana**

The companies agreed to manufacture processing systems for the defense sector.

**Digital Equipment Corporation**

The companies have a marketing agreement for PCs and customer engineering services.

**1988**

**Y-E Data**

The companies formed a joint venture called Pegasus, to develop, produce, and market business laptop computers.

**Conner Peripherals**

The companies formed a joint venture to produce and market Winchester disk drives for minicomputers and personal computers.

**1987**

**Ibimaint, S.p.A.**

Olivetti made an equity investment in this company that provides maintenance for IBM and compatible minicomputers and peripherals.

**Canon, Inc.**

The companies formed a joint venture company, Olivetti-Canon Industriale, S.p.A., to develop and produce copiers and general automatic image-processing equipment.

**Microsoft**

The companies formed a joint venture called Eikon, headquartered in Rome, to develop optical disks for the European market.

**Laser Friendly**

The companies formed a strategic partnership that gave Olivetti exclusive European distribution rights to The Office Publisher, Laser Friendly's PC-based desktop publishing software.

**Lee Data**

Lee Data signed an agreement with Olivetti to form joint venture companies to market a combination of Lee Data and Olivetti products for the 3270 market in countries outside the United States and Italy.

---

## MERGERS AND ACQUISITIONS

**1989**

**L.S.C. Systems Corporation**

An American company operating in the banking automation sector

**O'Group**

An Italian systems consultancy and software house

---

## KEY OFFICERS

**Carlo De Benedetti**

Chairman and chief executive officer

**Vittorio Cassoni**

Managing director, Ing. C. Olivetti, S.p.A.

**Franco De Benedetti**

Vice president and managing director, Olivetti Information Services, S.p.A.

**Elserino Piol**

Vice president and managing director, Olivetti Systems and Networks, S.p.A.

**Franco Tato**

Managing director, Olivetti Office Equipment, S.r.l.

**Ettore Morezzi**  
Managing director, Olivetti Technologies Group

---

**FOUNDERS**

Information is not available.

**PRINCIPAL INVESTORS**

Carlo de Benedetti

**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December 31**  
**(Millions of US Dollars, except Per Share Data)**

Balance Sheet	1985	1986	1987	1988	1989
Total Current Assets	\$2,949.9	\$5,624.8	\$6,930.9	\$7,589.5	\$8,450.9
Cash	198.1	236.5	649.3	867.5	706.7
Receivables	1,177.5	1,986.9	2,459.5	3,089.6	3,189.6
Marketable Securities	915.8	2,214.6	2,494.3	1,939.8	2,974.1
Inventory	584.1	995.1	1,039.9	1,408.6	1,316.3
Other Current Assets	74.4	191.8	288.0	284.0	264.2
Net Property, Plants	\$578.6	\$868.3	\$1,104.0	\$1,182.2	\$1,165.4
Other Assets	\$202.9	\$226.7	\$247.7	\$274.7	\$451.1
<b>Total Assets</b>	<b>\$3,731.4</b>	<b>\$6,719.9</b>	<b>\$8,282.6</b>	<b>\$9,046.3</b>	<b>\$10,067.5</b>
Total Current Liabilities	\$1,480.5	\$2,507.2	\$3,101.6	\$3,454.2	\$3,484.2
Long-Term Debt	\$779.9	\$1,521.6	\$1,878.2	\$2,204.2	\$3,149.8
Other Liabilities	\$277.0	\$575.6	\$775.7	\$797.5	\$801.6
<b>Total Liabilities</b>	<b>\$2,537.5</b>	<b>\$4,604.4</b>	<b>\$5,755.6</b>	<b>\$6,455.9</b>	<b>\$7,435.6</b>
Total Shareholders' Equity	\$1,193.9	\$2,115.4	\$2,527.1	\$2,590.4	\$2,631.9
Share Capital	258.9	367.2	423.5	422.5	439.9
Capital Surplus	248.3	648.0	748.9	747.2	994.2
Treasury Stock	(3.7)	(4.0)	(3.0)	(3.3)	(3.2)
Revaluation Reserves	221.4	283.5	332.2	332.1	316.8
Retained Earnings	468.9	820.8	1,025.4	1,092.0	884.2
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$3,731.4</b>	<b>\$6,719.9</b>	<b>\$8,282.6</b>	<b>\$9,046.3</b>	<b>\$10,067.5</b>
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Revenue	\$3,215.8	\$4,908.0	\$5,680.0	\$6,459.3	\$6,570.5
European	2,206.1	3,592.6	4,549.7	5,089.9	5,210.4
International	1,009.8	1,315.3	1,130.3	1,369.4	1,360.1
Cost of Sales	\$1,885.9	\$2,981.6	\$3,496.9	\$4,032.7	\$4,196.7
R&D Expense	\$148.7	\$262.4	\$330.2	\$347.3	\$347.8
SG&A Expense	\$845.8	\$1,355.5	\$15,933.0	\$1,767.8	\$1,747.8
Capital Expense	\$297.2	\$348.3	\$550.9	\$617.9	\$719.4
Pretax Income	\$281.6	\$483.3	\$413.9	\$332.4	\$258.2
Pretax Margin (%)	11.42	10.16	13.72	19.43	25.45
Effective Tax Rate (%)	17.90	32.50	23.80	25.38	32.77
Net Income	\$263.7	\$379.3	\$255.8	\$273.7	\$147.5
Shares Outstanding, Millions	494.4	515.5	453.2	549.9	554.1
<b>Per Share Data</b>					
Earnings	\$536	\$736	\$564	\$497	\$266
Dividend	\$178	\$228	\$262	\$261	\$196
Book Value	\$4.53	\$5.58	\$9.88	\$9.47	\$17.84
Exchange Rate (US\$1=Lit)	Lit 1,909.45	Lit 1,490.82	Lit 1,298.50	Lit 1,301.60	Lit 1,374.50

Source: Ing. C. Olivetti, S.p.A.  
 Annual Reports  
 Dataquest (1990)

**Table 5**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December 31**  
**(Billions of Lire, except Per Share Data)**

<b>Balance Sheet</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Total Current Assets</b>	Lit 5,632.7	Lit 8,385.6	Lit 8,999.8	Lit 9,878.5	Lit 11,615.8
Cash	378.3	352.5	843.1	1,129.2	971.3
Receivables	2,248.4	2,962.1	3,193.6	4,021.4	4,384.1
Marketable Securities	1,748.6	3,301.6	3,238.8	2,524.9	4,087.9
Inventory	1,115.3	1,483.5	1,350.3	1,833.4	1,809.3
Other Current Assets	142.1	285.9	374.0	369.6	363.2
Net Property, Plants	Lit 1,104.8	Lit 1,294.5	Lit 1,433.6	Lit 1,538.7	Lit 1,601.9
Other Assets	Lit 387.4	Lit 338.0	Lit 321.6	Lit 357.5	Lit 620.1
<b>Total Assets</b>	<b>Lit 7,124.9</b>	<b>Lit 10,018.1</b>	<b>Lit 10,755.0</b>	<b>Lit 11,774.7</b>	<b>Lit 13,837.8</b>
<b>Total Current Liabilities</b>	Lit 2,827.0	Lit 3,737.8	Lit 4,027.4	Lit 4,496.0	Lit 4,789.1
Long-Term Debt	Lit 1,489.2	Lit 2,268.5	Lit 2,438.9	Lit 2,869.0	Lit 4,329.4
Other Liabilities	Lit 529.0	Lit 858.1	Lit 1,007.3	Lit 1,038.0	Lit 1,101.8
<b>Total Liabilities</b>	<b>Lit 4,845.2</b>	<b>Lit 6,864.4</b>	<b>Lit 7,473.6</b>	<b>Lit 8,403.0</b>	<b>Lit 10,220.3</b>
<b>Total Shareholders' Equity</b>	Lit 2,279.7	Lit 3,153.7	Lit 3,281.4	Lit 3,371.7	Lit 3,617.5
Share Capital	494.4	547.4	549.9	549.9	604.6
Capital Surplus	474.2	966.0	972.5	972.5	1,366.5
Treasury Stock	(7.0)	(6.0)	(3.9)	(4.3)	(4.4)
Revaluation Reserves	422.7	422.6	431.4	432.3	435.5
Retained Earnings	895.4	1,223.7	1,331.5	1,421.3	1,215.3
<b>Total Liabilities and Shareholders' Equity</b>	<b>Lit 7,124.9</b>	<b>Lit 10,018.1</b>	<b>Lit 10,755.0</b>	<b>Lit 11,774.7</b>	<b>Lit 13,837.8</b>
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Revenue</b>	Lit 6,140.5	Lit 7,316.9	Lit 7,375.5	Lit 8,407.4	Lit 9,031.2
European	4,212.4	5,356.0	5,907.8	6,625.0	7,161.7
International	1,928.1	1,960.9	1,467.7	1,782.4	1,869.5
Cost of Sales	Lit 3,601.0	Lit 4,445.0	Lit 4,540.8	Lit 5,248.9	Lit 5,768.4
R&D Expense	Lit 284.0	Lit 391.2	Lit 428.8	Lit 452.0	Lit 478.0
SG&A Expense	Lit 1,615.0	Lit 2,020.8	Lit 20,689.0	Lit 2,301.0	Lit 2,402.4
Capital Expense	Lit 567.5	Lit 519.2	Lit 715.3	Lit 804.2	Lit 988.8
Pretax Income	Lit 537.7	Lit 720.5	Lit 537.5	Lit 432.6	Lit 354.9
Pretax Margin (%)	11.42	10.16	13.72	19.43	25.45
Effective Tax Rate (%)	17.90	32.50	23.80	25.38	32.77
Net Income	Lit 503.6	Lit 565.5	Lit 332.2	Lit 356.2	Lit 202.8
Shares Outstanding, Millions	494.4	515.5	453.2	549.9	554.1
<b>Per Share Data</b>					
Earnings	Lit 1,023	Lit 1,097	Lit 733	Lit 647	Lit 366
Dividend	Lit 340	Lit 340	Lit 340	Lit 340	Lit 270
Book Value	Lit 4.53	Lit 5.58	Lit 9.88	Lit 9.47	Lit 17.84

**Table 5 (Continued)**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December 31**  
**(Billions of Lire, except Per Share Data)**

<b>Key Financial Ratios</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<i>Liquidity</i>					
Current (Times)	1.99	2.24	2.23	2.20	2.43
Quick (Times)	1.60	1.85	1.90	1.79	2.05
Fixed Assets/Equity (%)	48.46	41.05	43.69	45.64	44.28
Current Liabilities/Equity (%)	124.01	118.52	122.73	133.35	132.39
Total Liabilities/Equity (%)	212.54	217.66	227.76	249.22	282.52
<i>Profitability (%)</i>					
Return on Assets	-	6.60	3.20	3.16	1.58
Return on Equity	-	20.82	10.32	10.71	5.80
Profit Margin	8.20	7.73	4.50	4.24	2.25
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	4.63	5.35	5.81	5.38	5.29
Capital Spending % of Revenue	9.24	7.10	9.70	9.57	10.95
Employees	48,944	59,091	58,087	57,560	56,937
Revenue (Lit M)/Employee	Lit 125	Lit 124	Lit 127	Lit 146	Lit 159
Capital Spending % of Assets	7.97	5.18	6.65	6.83	7.15
Exchange Rate (US\$1=Lit)	Lit 1,909.45	Lit 1,490.82	Lit 1,298.50	Lit 1,301.60	Lit 1,374.50

Source: Ing. C. Olivetti, S.p.A.  
Annual Reports  
Dataquest (1990)

# Ing. C. Olivetti & C., S.p.A.

Table 3

The Olivetti Group  
REVENUE BY GEOGRAPHIC REGION  
(Billions of Lire)

<u>Parent Company</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>
Italy	Lit 1,129.9	Lit 1,378.4	Lit 1,694.6	Lit 2,074.2
Europe (excl. Italy)	1,275.1	1,452.4	1,608.7	2,136.7
North America	282.8	262.0	532.3	1,041.1
Latin America	291.0	208.4	265.7	341.6
Far East and Africa	<u>362.6</u>	<u>435.0</u>	<u>476.7</u>	<u>546.9</u>
Total	Lit 3,341.4	Lit 3,736.2	Lit 4,578.0	Lit 6,140.5

Source: Ing. C. Olivetti & C., S.p.A.  
Annual Report

## Employees

At the end of 1985, Olivetti employed 49,000 persons worldwide.

## Marketing

Olivetti's sales and marketing organization is divided into major subsidiaries and commercial areas. The major subsidiaries include:

- Italian sales division
- Olivetti France
- Deutsche Olivetti
- British Olivetti
- Hispano Olivetti
- Hermes Precisa
- Hermes Italia
- Olivetti USA



# Ing. C. Olivetti & C., S.p.A.

Twenty-seven subsidiaries handle sales in the following commercial areas:

- Europe
- Scandinavia
- Far East and South Africa
- Latin America
- North America
- International distribution

## Research and Development

Olivetti has research and development (R&D) centers in Italy, the United States (California), France, Switzerland, Spain, and Singapore. Joint R&D is also being conducted with AT&T, Acorn, and Toshiba.

R&D expenses rose in proportion to revenue and represented a ratio of 5.0 percent of revenue in 1985, unchanged from 1984. Total R&D personnel increased from 3,223 in 1984 to 3,502 in 1985. Personnel working in R&D represented 7.2 percent of the Company work force in 1985. A four-year history of R&D expenditures and employment levels is shown in Table 4.

Table 4

### The Olivetti Group RESEARCH AND DEVELOPMENT TRENDS

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>
R&D Expenses (billions of lire)	Lit 162.2	Lit 187.2	Lit 228.5	Lit 284.0
R&D Personnel (as of Dec. 31)	3,028	3,173	3,223	3,502
R&D Personnel/Total Group Personnel	6.1%	6.6%	6.8%	7.2%

Source: Ing. C. Olivetti & C., S.p.A.  
Annual Report

# Ing. C. Olivetti & C., S.p.A.

Selected R&D projects being pursued are:

- Ink jet and thermal transfer for nonimpact printers
- Perpendicular recording technologies for disks
- Voice compression, synthesis, and recognition, with the goal of using the human voice as an input/output vehicle in the man/machine interface

The new Olivetti products and R&D activities carried out by the Group are oriented toward the future development of multifunctional systems with expansion and integration of data processing, office automation, and telecommunications.

## PRODUCTS

### Personal Computers

Olivetti is a major PC supplier in Europe and is also considered the major supplier of the AT&T 6300 in the United States. In 1982, Olivetti introduced its first personal computer, the M20. The M20 16-bit personal computer used the Company's proprietary operating system PCOS (Professional Computer Operating System) and was targeted to the business professional standalone market. Olivetti discontinued the M20 in 1985 due to its incompatibility with the existing MS-DOS line.

Olivetti extended its computer line in 1983 to include the M10, a true portable designed by Kyocera. The M10 was marketed in the United States by Docutel/Olivetti to the home and business markets. This personal computer was also discontinued in 1985.

At the 1984 Hannover Fair in Germany, Olivetti introduced its first MS-DOS PCs, the M21 (transportable) and the M24 (desktop), for the European and Canadian marketplaces. With these introductions, Olivetti made a commitment to the MS-DOS marketplace. In 1985, Docutel/Olivetti began to sell the M24 in the United States under the Docutel label. Dataquest estimates that in 1984, 57,000 M21 units and 6,000 M24 units were sold, and in 1985, 113,000 M21 units and 13,000 M24 units were sold, worldwide. Olivetti discontinued production of the M21 in 1986 due to the introduction of the M22, which competes for the same target audiences.

# Ing. C. Olivetti & C., S.p.A.

In February 1986, Olivetti announced three new personal computers for the European marketplace: the M19 (an educational desktop PC), the M22 (a true portable PC), and the M28 (an AT-compatible PC). These latest systems will complement Olivetti's existing MS-DOS personal computers, the M21 and M24. These product introductions are significant in that Olivetti is the first key manufacturer in the personal computer marketplace to introduce a true portable with a hard disk that can be integrated into the system unit and to introduce a designed and dedicated MS-DOS PC specifically for the education marketplace.

Table 5 lists Olivetti's personal computer product line.

Table 5

## Ing. C. Olivetti & C., S.p.A. PERSONAL COMPUTER PRODUCT LINE

<u>Products</u>	<u>Introduction</u>	<u>Discontinued</u>	<u>Highlights</u>
M20	1982	1985	16-bit, PCOS, desktop
M10	1983	1985	True portable by Kyocera
M21	1984	1986	Transportable, MS-DOS
M24	1984		Desktop, MS-DOS
M19	1986		Desktop, MS-DOS, for education
M22	1986		True portable, RD, MS-DOS
M28	1986		Desktop, AT compatible

Source: Dataquest  
June 1987

### Minicomputers and Terminals

Olivetti's offering in the minicomputer sector consists of the Line 1 systems, sold mainly through direct sales organizations, and the AT&T 3B, sold mainly through value-added resellers (VARs).

Development work was completed for the renewal of the entire L1 Line in 1986. This included structural developments, and significant improvements in product configurability and improved price performance.

Announcements at Hannover 1986 included graphics workstations PE24 and PE28, with high-resolution display and CAD/CAM applications for scientific-technical work, and the PB24 workstation, with specialized peripherals and software for use in bank teller environments, both as a standalone unit and in LAN configurations.

# Ing. C. Olivetti & C., S.p.A.

## Electronic Typewriters and Word Processing Systems

The electronic typewriter range was enhanced with the introduction of the ET Compact 60, and development began on a new model with higher performance capabilities than the ETC60.

The word processing sector was notable for the introduction of the concept of "videotyping" with the announcement of the ETV240 and ETV250. These are the first models in this new word processing line whose entry-level configurations offer integrated display and memory.

## Peripherals

Olivetti achieved good commercial results in the printer sector in 1985. Overall sales were significantly higher than those of the previous year.

Announcements in 1985/1986 included the PR40 specialized bank printer, the PR38C multifunction color printer, the PCPR3 and PCPR4 high-resolution "professional" multifunctional printers, and the DM280 and DM290 double-definition dot matrix printers.

## Telecommunications Equipment

Development work continued during 1985 on products for text, voice, and data communications in the area of advanced office automation applications and experimental telematics services.

In telephone systems, the Company's 1985 objectives were to maintain and improve Olivetti's presence in the Italian market. A contract was finalized with AT&T in 1985 for a manufacturing and marketing license for a midrange PABX, and work continued on the modifications required for its introduction in Italy and the United Kingdom.

# Optek Technology, Inc.

Optek Technology, Inc.  
1215 West Crosby Road  
McKinney, TX 75006  
(214) 323-2200

Established 1979  
No. of Employees: 2,100

## **BACKGROUND**

Optek Technology, Inc., was founded by James D. Crownover in 1979 as Crown Semiconductor, Inc., to design, develop, and manufacture optoelectronic products for military and commercial markets. The Company was reincorporated in Delaware in August 1984, at which time it changed its name to Optek Technology, Inc. Optek's sales in 1986 exceeded \$11 million; the Company has more than 200 active customers. The Company is now the largest manufacturer of IR optoelectronics products in the world.

Optek became a public company with an initial offering of 900,000 shares offered to the public at \$6.00 per share in July 1987. There were 2.165 million shares of common stock outstanding and held of record by 94 stockholders as of May 1, 1987. The Company's authorized capital stock was 12 million shares of common stock and 1 million shares of preferred stock as of July 23, 1987.

In July 1988, Optek acquired TRW Optoelectronics, which added approximately 1,400 employees and 326,000 square feet of facilities. In 1987, TRW Opto sales were approximately \$45 million. In 1989, corporate headquarters were relocated to the present address.

## **COMPANY DIRECTORS AND EXECUTIVES**

- President and Chairman—James D. Crownover (formerly cofounder and senior vice president, Spectronics)
- Executive Vice President, General Manager, and Secretary—Tom L. Barnes (formerly manager of Inventory Control, TRW/Optron)
- Vice President, Finance, and Treasurer—James M. Barry (formerly vice president and CFO, OptoSwitch, Inc.)
- Vice President, Military Division—Robert A. Fletcher (formerly General Manager of TRW Opto)
- Assistant Secretary—Mary Sanderford (formerly of Optek)
- Director of Plastic Operations—Hollis G. Cotten (formerly cofounder and president, C&F Tooling, Inc.)

# Optek Technology, Inc.

- Director of Commercial Engineering—Richard G. Dahlberg (formerly director of engineering, C&F Tooling, Inc.)
- Director of Sales, Marketing, and Advanced Engineering—Larry Newman
- Director of National Sales—James W. Trautwein (formerly marketing manager, TRW/Optron)
- Director—Rodes Ennis
- Director—Grant Dove
- Director—Don W. Hodges
- Director—Donald M. Johnston
- Director—Michael Cahr

## **FINANCIAL BACKING**

Optek's initial public offering was July 1987.

## **ALLIANCES**

None

## **SERVICES**

The Company provides custom chip design and fabrication services.

## **PROCESS TECHNOLOGY**

Optek uses GaAs, GaAlAs, and silicon processes.

## **PRODUCTS**

- LEDs
- Emitters, including visible and IR emitters

# Optek Technology, Inc.

- Sensors, including photosensors, reflective sensors, and Photologic and Hallogic sensors (Photologic and Hallogic are trademarks of Optek Technology, Inc.)
- Optocouplers and optoisolators
- Interrupters (slotted switches)
- Hybrids

## **Applications**

- Military/aerospace equipment
- EDP and peripheral hardware
- Security systems
- Robotics
- Instrumentation
- Communications systems

## **FACILITIES**

- Carrollton, Texas—Corporate headquarters and wafer fab, totaling 205,000 square feet
- McKinney, Texas—A 20,000-square-foot building on 1.7 acres housing administration, engineering, and fab
- Dallas, Texas—Plastics molding shop comprising 10,000 square feet
- Mineral Wells, Texas—Military processing and environmental test facility consisting of 50,000 square feet
- Juarez, Mexico—Assembly facility (Optek's subsidiary beneficially owns three buildings totaling 75,000 square feet used for assembly, operated as a Maquiladora, an official Mexican government term for a foreign-owned company operating under Mexican law.)

# Opto Tech Corporation

Opto Tech Corporation  
32 Industrial East 4th Road  
Science-Based Industrial Park  
Hsinchu, Taiwan, ROC  
(025)777-481/3

Established 1982  
No. of Employees: 100

## **BACKGROUND**

Opto Tech is a spin-off of Fine Microelectronics and is owned by local investors and the Bank of Communications. It began production in July 1984. The Company plans to offer J-FET, microwave, and other transistor and diode products.

## **COMPANY EXECUTIVES**

- President—James Chiu
- Business Liaison—S. Shyu

## **FINANCIAL BACKING**

The Company received a total of \$2.5 million from Bank of Communications, Fortune Plastic Manufacturing Company, and Opto Corporation employee investments.

## **SERVICES**

- Design
- Manufacturing

## **PROCESS TECHNOLOGY**

Opto Tech uses GaAs and silicon processes.



# Opto Tech Corporation

## **PRODUCTS**

- **LEDs**
- **Photodiodes**
- **Phototransistors**
- **IR devices**
- **Silicon wafers**

## **Applications**

Consumer electronics

## **FACILITIES**

Hsinchu, Taiwan--9,175 square-foot facility

# OPTOTEK Limited

OPTOTEK Limited  
62 Steacie Drive  
Kanata, Ontario, Canada K2K 2A9  
(613)591-0336

Established 1977  
No. of Employees: Approximately 200

## BACKGROUND

OPTOTEK Limited was founded in 1977 to specialize in LEDs and associated electronics for military and commercial applications in North America, Europe, and Japan. In 1981, the Company began developing GaAs MMICs.

## COMPANY EXECUTIVES

- President—David Kennedy
- Vice President of Marketing—David Kennedy, Acting
- Chief Technologist—Randy North

## SERVICES

- MMIC foundry
- Ion implantation and annealing
- Thick-film and thin-film hybrid packaging

## PROCESS TECHNOLOGY

- GaAs MESFET, 0.5-micron, selective ion implantation
- HgCdTe processing

# OPTOTEK Limited

## PRODUCTS

- Infrared LEDs, visible LEDs, and LED arrays
- Photovoltaic detectors
- Custom MMICs and hybrids

## FACILITIES

The OPTOTEK facilities total 37,000 square feet of space, including Class 1,000/100 clean rooms.

# Optek Technology, Inc.

Optek Technology, Inc.  
345 Industrial Blvd.  
McKinney, TX 75609  
(214) 234-3804

Established 1979  
No. of Employees: 557

## **BACKGROUND**

Optek Technology, Inc., was founded by Jame D. Crownover in 1979 as Crown Semiconductor, Inc., to design, develop, and manufacture optoelectronic products for military and commercial markets. The Company was reincorporated in Delaware in August 1984, at which time it changed its name to Optek Technology, Inc. Optek's sales in 1986 exceeded \$11 million; the Company has more than 200 active customers.

Optek became a public company with an initial offering of 900,000 shares offered to the public at \$6.00 per share in July 1987. There were 2.165 million shares of common stock outstanding and held of record by 94 stockholders as of May 1, 1987. The Company's authorized capital stock was 12 million shares of common stock and 1 million shares of preferred stock as of July 23, 1987.

## **COMPANY DIRECTORS AND EXECUTIVES**

- President—James D. Crownover (Formerly cofounder and senior vice president, Spectronics)
- Executive Vice President, General Manager, Secretary, Treasurer, and Director—Tom L. Barnes (formerly manager of Inventory Control, TRW/Optron)
- Vice President, Finance James M. Barry (formerly vice president and CFO, OptoSwitch, Inc.)
- Vice President/Director of Commercial Operations—Hollis G. Cotten (formerly cofounder and president, C&F Tooling, Inc.)
- Vice President/Manager of Commercial Engineering—Richard G. Dahlberg (formerly director of engineering, C&F Tooling, Inc.)
- Vice President/Director of Aerospace Operations—Larry D. Major (formerly vice president, OptoSwitch, Inc.)
- Vice President/Manager of Marketing and Sales—James W. Trautwein (formerly marketing manager, TRW/Optron)

# Optek Technology, Inc.

- Director—Rodes Ennis
- Director—Don W. Hodges
- Director—Donald M. Johnston

## **FINANCIAL BACKING**

Optek's initial public offering was July 1987.

## **ALLIANCES**

None

## **SERVICES**

The Company provides custom chip design and fabrication services.

## **PROCESS TECHNOLOGY**

Optek uses GaAs, GaAlAs, and silicon processes.

## **PRODUCTS**

- LEDs
- Emitters
- Sensors
- Optocouplers
- Interrupters
- Slotted switches

# Optek Technology, Inc.

## **Applications**

- Military/aerospace equipment
- EDP and peripheral hardware
- Security systems
- Robotics
- Instrumentation
- Communications systems

## **FACILITIES**

- McKinney, Texas—Optek owns a 20,000-square-foot building on 1.7 acres; the building houses administration, engineering, and fab.
- Juarez, Mexico—Optek's subsidiary beneficially owns a 24,000-square-foot building used for assembly, operated as a Maquiladora, an official Mexican government term for a foreign-owned company operating under Mexican law.

**Optek Technology, Inc.**

**(Page intentionally left blank)**

# Opto Tech Corporation

Opto Tech Corporation  
32 Industrial East 4th Road  
Science-Based Industrial Park  
Hsinchu, Taiwan, ROC  
(035)777-481/3

Established 1983  
No. of Employees: 100

## **BACKGROUND**

Opto Tech is a spin-off of Fine Microelectronics and is owned by local investors and the Bank of Communications. It began production in July 1984.

## **COMPANY EXECUTIVES**

- President—James Chiu (formerly president, Petrochemical Industry)
- Business Liaison—S. Shyu

## **FINANCIAL BACKING**

The Company received a total of \$2.5 million from Bank of Communications, Fortune Plastic Manufacturing Co., and Opto Tech Corp. employee investments.

## **SERVICES**

- Design
- Manufacturing

## **PROCESS TECHNOLOGY**

Opto Tech uses GaAs and silicon processes.

## **PRODUCTS**

- LEDs
- Photodiodes
- Phototransistors
- IR devices
- Silicon wafers



# Opto Tech Corporation

## **Applications**

Its products are used in consumer electronics.

## **FACILITIES**

The Company has a 9,175-square-foot facility in Hsinchu, Taiwan.

## Oracle Corporation

20 Davis Drive  
Belmont, California 94002  
Telephone: (415) 598-8000  
Fax: (415) 595-0630  
Dun's Number: 14-470-9193

*Date Founded: 1977*

---

### CORPORATE STRATEGIC DIRECTION

Oracle Corporation is the largest software-only vendor of database management software whose major area of growth lies in the UNIX market. Oracle is second only to Digital in the VMS market, and has established strong beachheads in the MS-DOS and IBM mainframe markets.

The core suite of Oracle products runs on more computer architectures than any other DBMS product, thus allowing applications developers to leverage their efforts by writing one application that will run on any computer that Oracle is ported to. The recent direction of the Company's product answers a growing market demand for speed and security to support on-line transaction processing.

Oracle's total revenue increased 107 percent to \$583.7 million\* in fiscal 1989 from \$282.1 million in fiscal 1988. Net income increased 90.7 percent to \$81.8 million in fiscal 1989 from \$42.9 million in fiscal 1988. Oracle employed 4,148 people worldwide during fiscal year 1989.

The U.S. sales contribution to the total revenue grew to \$301.7 million in 1989. North American sales accounted for 51.7 percent of total, down slightly from 52.5 percent in fiscal 1988. International sales accounted for 48.3 percent during 1989, with 34.0 percent of total revenue generated through European sales. The company has a large majority of its sales offices located in the United States, Europe, and Asia. Within the United States, Oracle sells its products through its own direct sales and service force that consists of 1,267 employees. Outside of the United States, Oracle utilizes 24 subsidiaries with

1,530 sales and service employees. Oracle also markets its products through hardware original equipment manufacturers (OEMs) and software value-added resellers (VARs), who combine their computer hardware or software applications packages and redistribute them together. During fiscal years 1989 and 1988, Oracle's OEMs and VARs accounted for 9.0 and 5.0 percent, respectively, of total revenue.

R&D expenditures totaled \$52.6 million in fiscal 1989, \$25.7 million in fiscal 1988, and \$9.9 million in fiscal year 1987. The respective percentages of the total revenue for these figures are 9.0, 9.1, and 7.6. R&D activities are focused on porting new versions and new releases of Oracle, extending the Oracle architecture to make effective use of new hardware technologies, extending and enhancing Oracle relational DBMS, and developing new and enhanced applications development productivity tools, end-user applications software packages, and office automations applications.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region and distribution channel. Table 4, a comprehensive financial statement, is at the end of this profile.

---

### BUSINESS SEGMENT STRATEGIC DIRECTION

#### Software

##### *The Oracle Relational DBMS*

The Oracle Relational DBMS is Oracle's principal product. It gives users the ability to define, retrieve, manipulate, and control data stored in a computer,

\*All dollar amounts are in U.S. dollars.

using the SQL language. SQL is a nonprocedural language that specifies database operations in terms of what is to be done, not how it is done. It automatically navigates through the internal storage mechanism of the computer to locate and then retrieve or modify the data user's request. Because it performs the navigation, applications programs therefore generally require little or no modification when changes are made in the format or structure of the database. This independence from the database structure reduces the costs of software maintenance and the initial amount of applications development time.

Oracle entered the on-line transaction processing market with its announcement of Oracle Version 6.0 and its option that provides high-volume and high-speed transaction processing.

### *Applications Development Productivity Tools*

Oracle currently offers applications development productivity tools as separate products to be used as add-ons to the Oracle Relational DBMS. These tools are as follows:

- SQL\*Forms, which lets application developers design, prototype, and customize forms-based applications without programming.
- SQL\*ReportWriter, which lets application developers create highly formatted reports without programming.
- SQL\*Menu, which lets application designers build a dynamic menu interface to both Oracle and non-Oracle products and applications.
- SQL\*Plus, which lets users execute SQL queries interactively and from a command file, and lets them perform data administration and data transfer functions.
- SQL\*Graph, which lets users generate high-resolution pie, line, or bar graphs from data stored in an Oracle database.
- SQL\*Report, which lets application developers build complex reports programmatically.
- CASE\*Method, which is a methodology that provides a structure for system designers to use in developing and implementing systems.
- CASE\*Dictionary, which supports the CASE\*Method, provides utilities to help system designers develop, implement, and document application systems.
- CASE\*Designer, which provides a bit-mapped graphical interface to CASE\*Dictionary.
- CASE\*Generator, which allows application

developers to generate working SQL\*Forms applications using information in CASE\*Dictionary.

- SQL\*Forms, SQL\*Plus and SQL\*Report, which are available on all of the computers and operating systems on which Oracle Version 6.0 is available. SQL\*ReportWriter, SQL\*Menu, the CASE\* products, and SQL\*Graph are on many of the significant computers and operating systems on which the Oracle Relational DBMS is available.

### *Decision Support Products*

Oracle provides decision support products for use with the Oracle Relational DBMS. These products are as follows:

- SQL\*QMX is an ad hoc query and fill-in-the-blank reporting tool for end users.
- Easy\*SQL gives casual and novice users a simple interface for building and using Oracle databases without having to learn SQL command syntax.
- Oracle database add-in for Lotus 1-2-3 allows Lotus 1-2-3 users to access and manipulate data within an Oracle database from their 1-2-3 spreadsheet. Oracle for 1-2-3 is available on MS-DOS.
- SQL\*Calc is a portable spreadsheet interface to the Oracle Relational DBMS that lets users access and modify the data within the database from a SQL\*Calc spreadsheet.

All Oracle's decision support products, except Oracle for Lotus 1-2-3, are available on DEC VAX minicomputers that use the VMS operating system and on the IBM PC XT, PC AT, PS 2, and compatible microcomputers.

### *Programmer Tools*

Oracle provides tools that enable a programmer to access an Oracle database using SQL from programs written in traditional programming languages. These tools—Pro\*COBOL, Pro\*C, Pro\*FORTRAN, Pro\*Ada, Pro\*PL/I, and Pro\*Pascal—provide programmatic interfaces to the indicated languages. The Pro\* series of tools is available on most computers and operating systems on which the Oracle Relational DBMS is available.

### *End-User Application Products*

During 1989, Oracle introduced Oracle Financials, an integrated family of end-user accounting applications products that use the Oracle Relational DBMS and

Oracle's development and decision support tools to provide full-function end-user accounting systems. The four Oracle products in this family, each of which integrate with a customer's existing accounting systems or with other Oracle Financial products, are as follows:

- Oracle General Ledger is a full-function financial management and accounting system that provides users with journal entry, budgeting, allocation, on-line inquiry, and standard and custom reporting capabilities.
- Oracle Purchasing is a purchasing and accounting system that lets users process purchase requisitions and receiving information, produce purchase orders, and generate related accounting reports.
- Oracle Payables is a disbursement management system that allows users to process vendor invoices and to produce payments, on-line inquiries, cash forecasts, and bank reconciliation and other accounts payable reports. When combined with Oracle Purchasing, Oracle Payables automatically matches to purchase order information, thus eliminating duplicate data entry and providing control over expenditures.
- Oracle Assets lets users track property and equipment, compute book and tax depreciation, build capital budgets, and generate reports supporting these activities.

### *Office Automation Products*

Oracle offers three office automation products for use with the Oracle Relational DBMS. They are as follows:

- Oracle\*Mail is a portable, distributed electronic mail system. Gateways are provided for integrating Oracle\*Mail with VMS Mail and UNIX Mail systems. Oracle\*Mail currently is available on VAX/VMS, Sun3, and Sequent.
- SQL\*Calc is a portable spreadsheet interface to the Oracle Relational DBMS that lets users access and modify data within the database from a SQL\*Calc spreadsheet.
- The Oracle database add-in for Lotus 1-2-3 allows Lotus 1-2-3 users to access and manipulate data within an Oracle database from their 1-2-3 spreadsheet. Oracle for 1-2-3 is available on MS-DOS.

### **Further Information**

For more information about Oracle Corporation's business segments, please contact Dataquest's Office Systems Industry Service or Software Industry Service.

**Table 1**  
**Five-Year Corporate Highlights (Thousands of U.S. Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$23,159.0	\$55,383.0	\$131,271.0	\$282,113.0	\$583,673.0
Percent Change	-	139.14	137.02	114.91	106.89
Capital Expenditure	NA	NA	NA	NA	NA
Percent of Revenue	0	0	0	0	0
R&D Expenditure	\$3,886.0	\$6,978.0	\$9,949.0	\$25,708.0	\$52,570.0
Percent of Revenue	16.78	12.60	7.58	9.11	9.01
Number of Employees	239	556	1,121	2,207	4,148
Revenue (\$K)/Employee	\$97	\$100	\$117	\$128	\$141
Net Income	\$1,551.0	\$5,896.0	\$15,623.0	\$42,886.0	\$81,766.0
Percent Change	-	280.14	164.98	174.51	90.66
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	
Quarterly Revenue	\$90,639.00	\$123,745.00	\$153,354.00	\$215,935.00	
Quarterly Profit	\$7,067.00	\$17,189.00	\$23,964.00	\$33,546.00	

NA = Not available

Source: Oracle Corporation  
 Annual Reports and Forms 10-K  
 Dataquest (1990)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1985	1986	1987	1988	1989
North America	67.45	65.04	53.21	52.51	51.69
International	32.55	34.96	46.79	47.49	48.31
Europe	27.15	29.81	37.38	36.19	33.96
ROW	5.40	5.15	9.41	11.30	14.35

Source: Oracle Corporation  
 Annual Reports  
 Dataquest (1990)

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1988	1989
Direct Sales	95.00	91.00
Indirect Sales	5.00	9.00
VARs/OEMs	5.00	9.00

Source: Oracle Corporation  
 Annual Reports  
 Dataquest (1990)

---

## 1989 SALES OFFICE LOCATIONS

North America—46  
 Japan—3  
 Europe—47  
 Asia/Pacific—39  
 ROW—16

---

## MANUFACTURING LOCATIONS

Oracle does not utilize manufacturing facilities.

---

## SUBSIDIARIES

### *North America*

Oracle Complex Systems Corporation (United States)  
 Oracle Corporation Canada, Inc. (Canada)  
 Oracle Credit Corporation (United States)  
 Oracle Real Estate Corporation (United States)

### *Japan*

Oracle Corporation Japan

### *Europe*

Oracle Corporation Svenska AB (Sweden)  
 Oracle Corporation, United Kingdom Ltd. (United Kingdom)  
 Oracle Danmark AS (Denmark)  
 Oracle Datenvankssysteme GmbH (Austria)  
 Oracle Deutschland GmbH (West Germany)  
 Oracle Finland OY (Finland)  
 Oracle France S.A. (France)  
 Oracle Iberica SA (Spain)  
 Oracle Norge A.S. (Norway)  
 Oracle Software Schweiz AG (Switzerland)  
 Oracle Systems Software BV (Netherlands)

### *Asia/Pacific*

Oracle China Inc. (China)  
 Oracle Corporation (Pakistan)  
 Oracle Korea, Ltd. (Korea)

Oracle New Zealand (New Zealand)  
 Oracle Systems Australia Pty. Ltd. (Australia)  
 Oracle Systems Hong Kong Ltd. (Hong Kong)  
 Oracle Systems S.E. Asia (S Pte.) (Singapore)

### *ROW*

Oracle Corporation Middle East, U.A.E.  
 Oracle Mexico S.A. de C.V. (Mexico)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

### *1989*

#### **Hewlett-Packard**

Hewlett-Packard's Apollo division signed a marketing agreement with Oracle. Both companies will promote and market Oracle's RDBMS software products.

#### **Tektronix**

Oracle and Tektronix signed a joint marketing agreement to develop Oracle RDBMS for use with Tektronix's RISC-based XD88 graphics.

#### **BiiN**

Oracle and BiiN signed a cooperative agreement under which Oracle will develop secure versions of the Oracle RDBMS for BiiN customers.

#### **Sun Microsystems**

A marketing agreement between Oracle and Sun Microsystems calls for cooperative marketing programs, continuing exchanges of technical personnel, and participation in joint sales opportunities.

#### **SEMATECH**

Oracle joined the association of semiconductor suppliers.

#### **Motorola**

Oracle and Motorola signed a joint marketing agreement with Oracle Port of RDBMS to RISC-based computers.

#### **Stratus Computer**

Oracle and Stratus Computer signed a strategic marketing and technology-sharing agreement.

#### **Clarion Software Corporation**

An agreement calls for Clarion to develop an interface for its acclaimed Professional Developer that will link the program to database management systems from Oracle.

1988

**Sequent**

Oracle and Sequent signed a joint marketing agreement to develop the Oracle Financials packages, consisting of Oracle general ledger, Oracle payables, Oracle purchasing, and Oracle assets to Sequent's customer base.

**The Santa Cruz Operation**

An alliance with The Santa Cruz Operation consists of a three-part agreement for new product development, technology exchange, and cooperative marketing programs.

**Uniplex**

Oracle and Uniplex signed a marketing agreement for the exchange of technology between the two companies.

**Hewlett-Packard**

Oracle and Hewlett-Packard signed an agreement for Oracle to provide Oracle Financials applications packages on the HP 9000 800 Series computers.

**Applix, Inc.**

Oracle and Applix, Inc., signed a joint marketing agreement to join Oracle database with Applix, Inc.'s Integrated Office-Automation System.

---

**KEY OFFICERS**

**Lawrence J. Ellison**

President and chief executive officer

**Robert N. Miner**

Senior vice president and director

**Gary D. Kennedy**

Senior vice president, US Operations

**John R. Luongo**

Senior vice president, International Division

**Peter R. Tierney**

Senior vice president, Product Division

**Jeffrey L. Walker**

Senior vice president and chief financial officer

---

**PRINCIPAL INVESTORS**

Lawrence J. Ellison—27.2 percent, Founder

Robert N. Miner—10.3 percent

**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending May**  
**(Thousands of U.S. Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Total Current Assets	\$9,962.0	\$41,471.0	\$109,138.0	\$191,827.0	\$336,933.0
Cash	599.0	12,524.0	37,557.0	48,610.0	49,393.0
Receivables	9,032.0	26,554.0	65,205.0	129,999.0	261,989.0
Marketable Securities	NA	NA	NA	NA	NA
Inventory	NA	NA	NA	NA	NA
Other Current Assets	331.0	2,393.0	6,376.0	13,218.0	25,551.0
Net Property, Plants	\$4,491.0	\$14,152.0	\$26,896.0	\$47,554.0	\$94,455.0
Other Assets	\$1,010.0	\$1,805.0	\$7,758.0	\$10,187.0	\$28,821.0
<b>Total Assets</b>	<b>\$15,463.0</b>	<b>\$57,428.0</b>	<b>\$143,792.0</b>	<b>\$249,568.0</b>	<b>\$460,209.0</b>
Total Current Liabilities	\$6,383.0	\$22,293.0	\$48,425.0	\$102,183.0	\$178,333.0
Long-Term Debt	\$1,373.0	\$5,641.0	\$9,025.0	\$5,363.0	\$39,208.0
Other Liabilities	\$340.0	\$843.0	\$3,686.0	\$7,379.0	\$12,114.0
<b>Total Liabilities</b>	<b>\$8,096.0</b>	<b>\$28,777.0</b>	<b>\$61,136.0</b>	<b>\$114,925.0</b>	<b>\$229,655.0</b>
Total Shareholders' Equity	\$7,367.0	\$28,651.0	\$82,656.0	\$134,643.0	\$230,554.0
Converted Preferred Stock	2,848.0	NA	NA	NA	NA
Common Stock	625.0	18,466.0	288.0	313.0	346.0
Other Equity	NA	395.0	56,955.0	66,031.0	80,143.0
Retained Earnings	3,894.0	9,790.0	25,413.0	68,299.0	150,065.0
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$15,463.0</b>	<b>\$57,428.0</b>	<b>\$143,792.0</b>	<b>\$249,568.0</b>	<b>\$460,209.0</b>
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Revenue	\$23,159.0	\$55,383.0	\$131,271.0	\$282,113.0	\$583,673.0
U.S. Revenue	15,620.0	36,022.0	69,851.0	148,145.0	301,714.0
Non-U.S. Revenue	7,539.0	19,361.0	61,420.0	133,968.0	281,959.0
Cost of Sales	NA	\$5,644.0	\$18,661.0	\$51,241.0	\$100,987.0
R&D Expense	\$3,886.0	\$6,978.0	\$9,949.0	\$25,708.0	\$52,570.0
SG&A Expense	\$16,531.0	\$37,563.0	\$74,254.0	\$141,269.0	\$307,156.0
Capital Expense	NA	NA	NA	NA	NA
Pretax Income	\$2,585.0	\$10,475.0	\$27,898.0	\$64,979.0	\$120,245.0
Pretax Margin (%)	11.16	18.91	21.25	23.03	20.60
Effective Tax Rate (%)	40.00	44.00	44.00	34.00	32.00
Net Income	\$1,551.0	\$5,896.0	\$15,623.0	\$42,886.0	\$81,766.0
Shares Outstanding, Thousands	12,770.0	27,432.0	62,514.0	132,950.0	135,066.0
<b>Per Share Data</b>					
Earnings	\$0.12	\$0.21	\$0.25	\$0.32	\$0.61
Dividend	NA	NA	NA	NA	NA
Book Value	\$0.58	\$1.04	\$1.32	\$1.01	\$1.71



**Table 4 (Continued)**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending May**  
**(Thousands of U.S. Dollars, except Per Share Data)**

<b>Key Financial Ratios</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<i>Liquidity</i>					
Current (Times)	1.56	1.86	2.25	1.88	1.89
Quick (Times)	1.56	1.86	2.25	1.88	1.89
Fixed Assets/Equity (%)	60.96	49.39	32.54	35.32	40.97
Current Liabilities/Equity (%)	86.64	77.81	58.59	75.89	77.35
Total Liabilities/Equity (%)	109.90	100.44	73.96	85.36	99.61
<i>Profitability (%)</i>					
Return on Assets	-	16.18	15.53	21.80	23.04
Return on Equity	-	32.74	28.07	39.47	44.78
Profit Margin	6.70	10.65	11.90	15.20	14.01
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	16.78	12.60	7.58	9.11	9.01
Capital Spending % of Revenue	0	0	0	0	0
Employees	239	556	1,121	2,207	4,148
Revenue (\$K)/Employee	\$97	\$100	\$117	\$128	\$141
Capital Spending % of Assets	0	0	0	0	0

NA = Not available

Source: Oracle Corporation  
 Annual Reports and Forms 10-K  
 Dataquest (1990)

# Oracle Corporation

20 Davis Drive  
Belmont, California 94002  
Telephone: (415) 598-8000  
Fax: (415) 595-0630  
Dun's Number: 14-470-9193

*Date Founded: 1977*

---

## CORPORATE STRATEGIC DIRECTION

Oracle Corporation is the largest software-only vendor of database management software in the world. It dominates the UNIX market, is second only to Digital in the VMS market, and has established strong beachheads in the MS-DOS and IBM mainframe markets.

The core suite of Oracle products runs on more computer architectures than any other database management system (DBMS) product. Applications developers can leverage their efforts by writing one application that will run on any computer to which Oracle is ported. The recent direction of the Company's product line is in direct response to a growing market demand for DBMS products offering speed and security to support on-line transaction processing (OLTP).

Oracle's total revenue increased 115 percent to \$282 million\* in fiscal 1988 from \$131 million in fiscal 1987. Its net income increased 175 percent to \$43 million in fiscal 1988 from \$16 million the previous year. Oracle employs more than 2,000 people worldwide.

The U.S. sales contribution to Oracle's total revenue grew to \$148 million in 1988. North American sales accounted for 52.5 percent of total sales, down slightly from 53.2 percent in fiscal 1987. A large majority of the Company's sales offices are located in the United States.

Research and development expenditures totaled \$26 million in fiscal 1988, representing 9 percent of revenue. Capital spending totaled \$31 million in fiscal 1988, or 11 percent of revenue.

---

\*All dollar amounts are in U.S. dollars.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region and distribution channel. Table 4, a comprehensive financial statement, is at the end of this profile.

---

## BUSINESS SEGMENT STRATEGIC DIRECTION

### Software

Oracle got the jump on the competition by predicting the importance of IBM's Structured Query Language (SQL), which has become the lingua franca of the database world.

At the MS-DOS level, Oracle will increase market share only when OS/2 is better established. Oracle's datasheet add-in for Lotus 1-2-3 is conceptually a brilliant product because it allows users to turn a collection of 1-2-3 worksheets into a relational DBMS. However, memory constraints under MS-DOS have deterred its success. Oracle has made two recent moves to gain more of the personal computer market. First, it established a relationship with Word-Tech, a dBASE clone manufacturer. Oracle dBXL will allow dBASE applications to retrieve data from Oracle database engines. Second, it arranged for a Hypercard (Apple Macintosh) front end for the Oracle database engine.

In the UNIX market, Oracle has moved way ahead of Ingres and Informix, its top two competitors. The fact that UNIX hardware represents such a significant price/performance advantage over more proprietary systems has resulted in mushrooming rates of growth

in the UNIX installed base. Oracle's ability to run mainframe applications unchanged on UNIX machines has greatly accelerated Oracle's penetration of the UNIX market.

In September 1989, Oracle announced the formation of the Graphics Product division. This division is chartered to produce and market a line of graphics-oriented products for end users and applications

developers, and to provide graphics technologies to other Oracle independent business units for future products.

#### **Further Information**

For more information about the Company's business segment, please contact the appropriate industry service.

**Table 1**  
**Three-Year Corporate Highlights\* (Millions of U.S. Dollars)**

	1986	1987	1988	
Three-Year Revenue	\$55.4	\$131.2	\$282.1	
Percent Change	-	136.82	115.02	
Capital Expenditure	\$11.5	\$16.9	\$31.0	
Percent of Revenue	20.76	12.88	10.99	
R&D Expenditure	\$7.0	\$7.9	\$25.7	
Percent of Revenue	12.64	6.02	9.11	
Number of Employees	556	1,121	2,207	
Revenue (\$K)/Employee	\$99.64	\$117.04	\$127.82	
Net Income	\$5.9	\$15.6	\$42.9	
Percent Change	-	164.41	175.00	
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>
Quarterly Revenue	\$153.35	\$175.49	N/A	N/A
Quarterly Profit	\$23.96	\$11.68	N/A	N/A

\*1984 and 1985 annual reports were unavailable.  
 N/A = Not Available

Source: Oracle Corporation  
 Annual Reports  
 Dataquest  
 January 1990

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1986	1987	1988
North America	67.85	53.20	52.50
International	32.15	46.80	47.50
Europe	29.81	37.38	36.18
All Others	2.34	9.42	11.32

Source: Oracle Corporation  
 Annual Reports  
 Dataquest  
 January 1990

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1987	1988
Direct Sales	93.00	95.00
Indirect Sales	7.00	5.00
Distributors	7.00	5.00

Source: Oracle Corporation  
 Annual Reports  
 Dataquest  
 January 1990

---

## 1988 SALES OFFICE LOCATIONS

North America—27  
Europe—11  
Asia/Pacific—6  
ROW—2

---

## SUBSIDIARIES

### *North America*

Oracle Corporation Canada, Inc. (Canada)

### *Europe*

Oracle Corporation Svenska AB (Sweden)  
Oracle Corporation, United Kingdom Ltd. (United Kingdom)  
Oracle Danmark AS (Denmark)  
Oracle Datenbanksysteme GmbH (Austria)  
Oracle Deutschland GmbH (West Germany)  
Oracle Finland OY (Finland)  
Oracle France S.A. (France)  
Oracle Iberica SA (Spain)  
Oracle Norge A.S. (Norway)  
Oracle Software Schweiz AG (Switzerland)  
Oracle Systems Software BV (Netherlands)

### *Asia/Pacific*

Oracle China Inc. (China)  
Oracle Corporation (Pakistan)  
Oracle New Zealand (New Zealand)  
Oracle Systems Australia Pty. Ltd. (Australia)  
Oracle Systems Hong Kong Ltd. (Hong Kong)  
Oracle Systems Singapore Pte. Ltd. (Singapore)

### *ROW*

Oracle Corporation Middle East (U.A.E.)  
Oracle Mexico S.A. de C.V. (Mexico)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

### *1989*

#### **Hewlett-Packard**

Hewlett-Packard's Apollo division signed a marketing agreement with Oracle under which both

companies will promote and market Oracle's RDBMS software products.

#### **Tektronix**

The companies made a joint marketing agreement to develop Oracle RDBMS for use with Tektronix's RISC-based XD88 graphics.

#### **BiiN**

The companies made a cooperative agreement under which Oracle was to develop secure versions of the Oracle RDBMS for BiiN customers.

#### **Sun Microsystems**

The companies' marketing agreement calls for cooperative marketing programs, continuing exchanges of technical personnel, and participation in joint sales opportunities.

#### **Sematech**

Oracle joined the association of semiconductor suppliers.

#### **Motorola**

The companies made a joint marketing agreement for Oracle RDBMS to be used with RISC-based computers.

#### **Stratus Computer**

The companies made a strategic marketing and technology-sharing agreement.

#### **Clarion Software Corporation**

The companies have an agreement in which Clarion is to develop an interface for its Professional Developer that will link the program to database management systems from Oracle.

### *1988*

#### **Sequent**

The companies made a joint marketing agreement for Oracle's financial accounting application package.

#### **The Santa Cruz Operation**

An alliance between the companies consists of a three-part agreement for new product development, technology exchange, and cooperative marketing programs.

#### **Uniplex**

A marketing agreement between the two companies was made for exchange of technology.

#### **Hewlett-Packard**

Oracle agreed to provide Oracle financial application packages on the HP 9000, 8000 Series computers.

**Applix, Inc.**

The companies made a joint marketing agreement to join Oracle Database with Applix's Integrated Office-Automation System.

**John R. Luongo**

Senior vice president, International Division

**Peter R. Tierney**

Senior vice president, Product Division

**Jeffrey L. Walker**

Senior vice president and chief financial officer

---

**KEY OFFICERS**

**Lawrence J. Ellison**

President and chief executive officer

**Robert N. Miner**

Senior vice president

**Gary D. Kennedy**

Senior vice president, U.S. Operations

---

**PRINCIPAL INVESTORS**

Lawrence J. Ellison (founder)—27.2 percent

Robert N. Miner—10.3 percent

**Table 4**  
**Comprehensive Financial Statement\***  
**Fiscal Year Ending May**  
**(Millions of U.S. Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
<b>Total Current Assets</b>	<b>\$41.4</b>	<b>\$109.1</b>	<b>\$191.8</b>
Cash	12.5	37.6	48.6
Receivables	27.5	65.2	130.0
Other Current Assets	1.4	6.3	13.2
<b>Net Property, Plants</b>	<b>\$14.2</b>	<b>\$26.9</b>	<b>\$47.6</b>
<b>Other Assets</b>	<b>\$1.8</b>	<b>\$7.8</b>	<b>\$10.2</b>
<b>Total Assets</b>	<b>\$57.4</b>	<b>\$143.8</b>	<b>\$249.6</b>
<b>Total Current Liabilities</b>	<b>\$22.3</b>	<b>\$48.4</b>	<b>\$102.2</b>
<b>Long-Term Debt</b>	<b>\$5.6</b>	<b>\$9.0</b>	<b>\$5.4</b>
<b>Other Liabilities</b>	<b>\$0.8</b>	<b>\$3.7</b>	<b>\$7.4</b>
<b>Total Liabilities</b>	<b>\$28.7</b>	<b>\$61.1</b>	<b>\$115.0</b>
<b>Total Shareholders' Equity</b>	<b>\$28.7</b>	<b>\$82.7</b>	<b>\$134.6</b>
Common Stock	18.5	0.3	0.3
Other Equity	0.4	57.0	66.0
Retained Earnings	9.8	25.4	68.3
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$57.4</b>	<b>\$143.8</b>	<b>\$249.6</b>
<b>Income Statement</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
<b>Revenue</b>	<b>\$55.4</b>	<b>\$131.2</b>	<b>\$282.1</b>
U.S. Revenue	36.0	69.8	148.1
Non-U.S. Revenue	19.4	61.4	134.0
<b>Cost of Sales</b>	<b>N/A</b>	<b>N/A</b>	<b>\$51.2</b>
<b>R&amp;D Expense</b>	<b>\$7.0</b>	<b>\$7.9</b>	<b>\$25.7</b>
<b>SG&amp;A Expense</b>	<b>\$37.6</b>	<b>\$95.0</b>	<b>\$141.3</b>
<b>Capital Expense</b>	<b>\$11.5</b>	<b>\$16.9</b>	<b>\$31.0</b>
<b>Pretax Income</b>	<b>\$10.5</b>	<b>\$27.9</b>	<b>\$65.0</b>
<b>Pretax Margin (%)</b>	<b>18.95</b>	<b>21.27</b>	<b>23.04</b>
<b>Effective Tax Rate (%)</b>	<b>44.00</b>	<b>44.00</b>	<b>34.00</b>
<b>Net Income</b>	<b>\$5.9</b>	<b>\$15.6</b>	<b>\$42.9</b>
<b>Shares Outstanding, Millions</b>	<b>13.2</b>	<b>28.8</b>	<b>60.1</b>
<b>Per Share Data</b>			
Earnings	\$0.43	\$0.50	\$0.65
Dividends	0	0	0
Book Value	\$2.17	\$2.87	\$2.24

Table 4 (Continued)  
 Comprehensive Financial Statement\*  
 Fiscal Year Ending May  
 (Millions of U.S. Dollars, except Per Share Data)

Key Financial Ratios	1986	1987	1988
<i>Liquidity</i>			
Current (Times)	1.86	2.25	1.88
Quick (Times)	1.86	2.25	1.88
Fixed Assets/Equity (%)	49.48	32.53	35.36
Current Liabilities/Equity (%)	77.70	58.52	75.93
Total Liabilities/Equity (%)	100.00	73.88	85.44
<i>Profitability (%)</i>			
Return on Assets	-	15.51	21.81
Return on Equity	-	28.01	39.48
Profit Margin	10.65	11.89	15.21
<i>Other Key Ratios</i>			
R&D Spending % of Revenue	12.64	6.02	9.11
Capital Spending % of Revenue	20.76	12.88	10.99
Employees	556	1,121	2,207
Revenue (\$K)/Employee	\$99.64	\$117.04	\$127.82
Capital Spending % of Assets	20.03	11.75	12.42

\*1984 and 1985 annual reports were unavailable.  
 N/A = Not Available

Source: Oracle Corporation  
 Annual Reports  
 Dataquest  
 January 1990



# Ortel Corporation

Ortel Corporation  
2015 West Chestnut Street  
Alhambra, CA 91803  
(818) 281-3636

Established 1980  
No. of Employees: 78

## **BACKGROUND**

Ortel Corporation is a privately owned company founded in 1980 by Dr. Israel Ury, Dr. Amnon Yarviv, and Dr. Nadav Bar-Chaim. Prior to 1980, the founders were at the California Institute of Technology. The Company makes a complete line of semiconductor lasers, detectors, and fiber-optic transmitters and receivers.

Ortel also performs government-sponsored R&D in ultrahigh-speed and integrated optoelectronics, high-power lasers and laser arrays, and phase conjugate optics. The Company has conducted R&D under contracts from DARPA, NRL, RADC, MICOM, and others.

## **COMPANY EXECUTIVES**

- President/CEO—Wim Selders
- Vice President, Manufacturing—Claude Matthews
- Vice President/Controller—Pete Moerbeek
- Director of Marketing—Larry Stark
- Chief Technology Officer—Israel Ury
- Director of Sales—Bill Moore
- Director of QA—Bob Mielke

## **SERVICES**

- R&D
- Design
- Manufacturing
- Test

# Ortel Corporation

## **PROCESS TECHNOLOGY**

The Company uses GaAs buried heterostructure technology.

## **PRODUCTS**

- GaAs lasers
- Detectors
- Fiber-optic transmitters and receivers at 840nm and 1,300nm with bandwidths to 12 GHz

## **Applications**

Ortel's products are used in analog communications and defense electronics.

## **FACILITIES**

Alhambra, California—Corporate headquarters, R&D, and manufacturing facilities totaling 24,000 square feet, of which approximately 8,000 feet are clean rooms (Class 100)

## Osaka Titanium Co.

1, Higashi-Hamacho  
Amagasaki City, Hyogo, Japan  
Telephone: 06-411-1121  
Fax: 06-413-3435  
Telex: 64510  
Dun's Number: 69-087-8475

*Date Founded: 1950*

---

### CORPORATE STRATEGIC DIRECTION

Osaka Titanium Co. is the world's largest manufacturer of metallic titanium and one of Japan's top producers of semiconductor silicon. The Company is a member of the Sumitomo Metal Industries Group. Osaka has established itself in the United States by absorbing US Semiconductor Corporation, an epitaxial wafer maker, in 1987.

Revenue for year ended March 1990 was ¥6.1 billion (US\$421.7 million). This is a 21.3 percent increase over the previous year's figure of ¥50.0 billion (US\$347.6 million). (Percentage changes refer only to ¥ amounts; US\$ percentage changes will differ because of fluctuations in Dataquest exchange rates.) Net income was posted as a decrease of 38.5 percent at year ended March 1990 to ¥2.0 billion (US\$13.7 million) from ¥3.2 billion (US\$22.3 million) in the previous year.

R&D expenditure totaled ¥705 million (US\$4.9 million) for year ended March, 1990. Capital expenditure totaled ¥3.2 billion (US\$22.7 million) for the same period and is expected to increase to ¥4.4 billion (US\$30.9 million) by year ending March 1991. The Company had 762 employees as of fiscal year ended March 1990.

No financial analysis is included in this backgrounder because financial information was unavailable.

---

### BUSINESS SEGMENT STRATEGIC DIRECTION

Sponge titanium is currently in capacity production due to increased demand from US and European civil

aircraft manufacturers. Sponge titanium also is used in seawater desalination plants. Profits are expected to rise, offsetting lowered sales resulting from silicon production cuts.

Metallic titanium is responsible for 28 percent of total revenue for year ended March 1990; semiconductor silicon is responsible for the remaining 72 percent. The Company exports approximately 20 percent of its products.

### Further Information

For further information about the Company's business segments, please contact the appropriate Dataquest industry service.

---

### 1990 SALES OFFICE LOCATIONS

*Information is not available.*

---

### MANUFACTURING LOCATIONS

#### *North America*

Cincinnati Semiconductor, Inc., United States

Wafer production

OTC Semiconductor Corporation, United States

Wafer production

US Semiconductor Corporation, United States  
Wafer production

*Asia/Pacific*

Hyushu Electronic Metal  
Silicon wafer processing  
Kyushu Denshi Kinzoku  
Production of silicon wafers for 4Mb chips

---

**SUBSIDIARIES**

*North America*

Cincinnati Semiconductor, Inc. (United States)  
OTC Semiconductor Corporation (United States)  
US Semiconductor Corporation (United States)

---

**ALLIANCES, JOINT VENTURES, AND  
LICENSING AGREEMENTS**

1990

Toho Titanium Co. and Showa Denko KK  
Osaka Titanium, joined by Toho Titanium and  
Showa Denko, plan to build a pilot plant with a  
1,000-metric-ton annual capacity on the  
Company's premises in Amagasaki, Japan, in  
1992.

---

**MERGERS AND ACQUISITIONS**

1987

US Semiconductor  
Osaka Titanium purchased US Semiconductor to  
help launch itself in the United States.

---

**KEY OFFICERS**

Hiroshi Kojima  
Chairman of the board  
Shigeru Tamamoto  
President

---

**PRINCIPAL INVESTORS**

Information is not available.

---

**FOUNDERS**

Information is not available.

# Pacific Monolithics, Inc.

Pacific Monolithics, Inc.  
245 Santa Ana Court  
Sunnyvale, CA 94086  
(408) 732-8000

Established 1984  
No. of Employees: 100

## **BACKGROUND**

Allen F. Podell and Doug Lockie founded Pacific Monolithics (PM) in 1984. Mr. Podell is considered an expert in the field of GaAs ICs. Donald A. Bond, CEO, joined the Company in July 1985. Products include both custom and standard IC designs. The Company introduced the industry's first GaAs ASIC cell library for MMICs in 1986; there are now approximately 400 cells in the library.

Production delivery of the first product type, a low-noise block downconverter called the LNB, began in April 1985. Pacific Monolithics was the first company to produce such a device to a yield-tolerant design rule set, and was able to reduce cost of the device to less than \$20. PM was producing more than 15,000 LNAs per month at the end of 1985. By mid-1989, Pacific Monolithics had developed approximately 1,500 MMIC chip devices for their customer base.

## **COMPANY DIRECTORS AND EXECUTIVES**

- Chairman of the Board—Allen F. Podell
- President/CEO—Donald A. Bond (formerly vice president and general manager, Microwave Division, Sanders)
- Executive Vice President—Allen F. Podell (formerly president, A.F. Podell Associates)
- Manager, Special Projects—Doug Lockie (formerly president, Strategic Technologies)
- Vice President, Business Development—Frank Russell (formerly sales manager, Avantek)
- Vice President, Engineering—Pang Ho (formerly president, Geotech)
- Vice President, Controller—Joel Keissig

# Pacific Monolithics, Inc.

## **FINANCIAL BACKING**

In August 1985, PM received its initial financing of \$5.0 million from Vanguard Associates, IAI, Shaw Ventures, Hytek Corp., Sand Hill Financial Corp., and Canadian Enterprises Development Corp. Additional capital was made available in August 1988.

## **SERVICES**

- Design, including yield-tolerant standard MMIC cell family
- Packaging
- Test

## **STRATEGIC ALLIANCES**

Pacific Monolithics routinely uses the foundry services of TriQuint and four other companies.

## **PROCESS TECHNOLOGY**

The Company uses GaAs D-mode MESFET, E/D-mode MESFET, and HBT processing to less than 0.2 micron gate lengths.

## **PRODUCTS**

PM produces MMICs, including PM-CV series converters, amplifiers, switches, and other products.

## **Applications**

Its products are used in consumer, communications, and defense electronics.

## **FACILITIES**

PM's Sunnyvale, California, facility has 34,000 square feet, including a 6,000-square-foot Class 100 clean room.

# Pacific Monolithics, Inc.

Pacific Monolithics, Inc.  
245 Santa Ana Court  
Sunnyvale, CA 94086  
(408) 732-8000

Established 1984  
No. of Employees: 45

## BACKGROUND

Allen F. Podell and Doug Lockie founded Pacific Monolithics (PM) in 1984. Mr. Podell is considered an expert in the field of GaAs ICs. Donald A. Bond, CEO, joined the Company in July 1985. Products include both custom and standard IC designs. The Company introduced the industry's first GaAs ASIC cell library for MMICs in 1986.

Production delivery of the first product type, a low-noise block downconverter called the LNB, began in April 1985. Pacific Monolithics was the first company to produce such a device to a yield-tolerant design rule set, and was able to cost-reduce the device to less than \$20. PM was producing more than 15,000 LNBs per month at the end of 1985.

## BOARD

- Mr. Podell is chairman of the board.

## COMPANY EXECUTIVES

- President/CEO—Donald A. Bond (formerly vice president and general manager of the Microwave Division, Sanders)
- Executive Vice President—Allen F. Podell (formerly president, A.F. Podell Associates)
- Vice President, Operations—Larry Templeton (formerly vice president and director of Engineering, Western Telephone)
- Vice President, Marketing and Sales—Doug Lockie (formerly president, Strategic Technologies)
- Vice President, Business Development—Frank Russell (formerly sales manager, Avantek)
- Vice President, Engineering—Pang Ho (formerly president, Geotech)
- Manufacturing Manager—Raymond Waugh (formerly founder and engineering director, Iridian)

# Pacific Monolithics, Inc.

## **FINANCIAL BACKING**

In 1985, PM received its initial financing from Vanguard Associates, IAI, Shaw Ventures, Hytek Corp., Sand Hill Financial Corp., and Canadian Enterprises Development Corp.

## **SERVICES**

- Design, including yield-tolerant standard MMIC cell family
- Packaging
- Test

## **STRATEGIC ALLIANCES**

Pacific Monolithics uses the foundry services of TriQuint and other companies.

## **PROCESS TECHNOLOGY**

The Company uses GaAs MESFET technology.

## **PRODUCTS**

PM produces MMICs, including PM-CV series converters.

## **Applications**

Its products are used in consumer, communications, and defense electronics.

## **FACILITIES**

PM's Sunnyvale, California, facility has 22,000 square feet, including a 6,000-square-foot clean room. The facility can be expanded by 13,000 square feet.



## Pacific Telesis Group

140 New Montgomery Street  
San Francisco, California 94105

Telephone: (415) 882-8000

Fax: (415) 362-2913

Dun's Number: 10-346-0846

*Date Founded: January 1, 1984*

---

### CORPORATE STRATEGIC DIRECTION

The Pacific Telesis Group is one of seven Bell regional holding companies (RHCs) created as a result of the US District Court's decision to restructure the Bell System and American Telephone & Telegraph (AT&T). The historic AT&T antitrust settlement ordered AT&T to divest its 22 Bell operating companies (BOCs) and its control of the local exchange services. The 22 BOCs were reorganized into seven RHCs, one of which was the Pacific Telesis Group. On January 1, 1984, the Pacific Telesis Group and the six other RHCs began life as independent corporations, separate from their former parent, AT&T.

Pacific Telesis Group is the holding company that represents an entire family of companies offering business and residential consumers a variety of public network services and a wide variety of premises communications products and services. The Pacific Telesis companies provide products and services through the BOCs and the PacTel Companies. The BOCs consist of Pacific Bell (Pac Bell) and Nevada Bell, which provide local service and network access to toll and long distance services. The PacTel companies market wireless communications services, business information systems, and cable television service in the United States and internationally.

Revenue for 1989 totaled \$9.6 billion,\* an increase of 1.2 percent from the 1988 figure of \$9.5 billion. Strong growth in new customer lines at Pacific Bell and Nevada Bell and healthy profit gains for Pacific Bell Directory and PacTel Cellular contributed significantly to the increase in revenue.

The Pacific Telesis Group does not report international versus domestic sales. According to the

\*All dollar amounts are in US dollars.

Modified Final Judgment (MFJ), which is the final set of instructions for the restructuring of the Bell System, the RHCs are not allowed to manufacture telecommunications products after the divestiture.

Net income increased by 4.6 percent to \$1.24 billion in fiscal 1989, up from \$1.18 billion in fiscal 1988. The increase was due primarily to the growth of cellular and directory earnings.

Capital spending totaled \$1.9 billion, representing 19.8 percent of revenue in fiscal 1989. This is an increase of 19.3 percent over the 1988 figure of \$1.6 billion. This increase was primarily to replace existing equipment (\$210 million) and to increase the capacity and improve the efficiency of existing property (\$1.5 billion).

The Pacific Telesis Group does not report R&D expenditure separately. Its R&D is performed by Bell Communications Research, of which the Pacific Telesis Group is one-seventh owner, with the remaining RHCs each having an equal share.

More detailed information is available in Tables 1 and 2, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by distribution channel. Information on revenue by region is not available. Table 3, a comprehensive financial statement, is at the end of this profile.

---

### BUSINESS SEGMENT STRATEGIC DIRECTION

#### Telecommunication

Pacific Bell and Nevada Bell are the Pacific Telesis operating companies, providing local exchange

services, network access, and a variety of products and services to more than 22 million customers. According to Dataquest, Pacific Telesis had 9.7 percent share in the local telephone services market for 1989. At second quarter ended June 1990, Pacific Telesis had approximately 13.9 million access lines. Each Pacific Telesis BOC has a communications subsidiary that markets and services customer premises equipment to business customers throughout the Pacific Telesis territory and in surrounding areas where appropriate.

Another subsidiary of Pacific Telesis Group is the Pacific Bell Directory, which publishes the white-and-yellow-pages directories for all Pacific Bell and Nevada Bell regional services.

PacTel Cellular provides cellular telephone services under the PacTel Cellular name in selected markets in California and major urban areas in other states. Net income for 1989 rose 255 percent to \$55.4 million over the 1988 figure. In 1989, Germany awarded its second national cellular license to Mannesmann Mobilefunk GmbH consortium, in which Pacific Telesis International (PTI) is a member. PTI will design, engineer, and play a key role in the construction of the new digital system. As a member of another consortium, PTI was offered a license to build and operate one of the United Kingdom's three new personal communications networks (PCNs). The consortium, led by British Aerospace Plc, expects the new system to be operational in 1992. PTI manages and operates telecommunications businesses in Japan, South Korea, Spain, and Thailand.

The PacTel Paging subsidiary provides paging services in selected markets in Arizona, California, Florida, Georgia, Kentucky, Missouri, and Texas. The Multicom Incorporated subsidiary markets paging services in conjunction with the Chesapeake and Potomac, Illinois Bell, and Ohio Bell BOCs. PacTel Paging is the fourth largest provider of paging services in the United States, based on the number of paging units in service.

PacTel Infosystems, a subsidiary that marketed telephone and microcomputer systems, office automation products, and local area networks (LANs), had most of its assets sold to several ComputerLand franchises in June 1989.

PacTel Business Systems is a subsidiary that sells and services key systems, PBXs, and Centrex service to small and medium-size businesses and branch offices of large companies. In 1989, Pacific Telesis had 756,000 Centrex lines, ranking third with 12 percent market share. PacTel Business Systems also has approximately 1,000 Integrated Services Digital Network (ISDN) lines installed as of year ending 1989.

The PacTel Products subsidiary is among the ten companies that made up 70 percent of the single-line telephone equipment worldwide market share in 1988. PacTel Products, a joint venture with Vodavi Technology Corporation, distributes telecommunications products nationally through more than 3,000 retail outlets.

Other PacTel subsidiaries include PacTel Cable, PacTel Properties, and PacTel Finance (now part of PacTel Business Systems). PacTel Cable is focusing in the United Kingdom for the 1990s and has shown an interest in acquiring CATV, a cable company in the United States outside its territory. PacTel Properties is concentrating on maintaining its properties in San Diego, Los Angeles, and San Francisco. PacTel Finance recently merged with PacTel Business Systems and provides lease financing services for the PacTel companies and their customers.

#### Further Information

For more information about the Company's business segment, please contact the appropriate Dataquest industry service.

**Table 1**  
**Five-Year Corporate Highlights (Millions of US Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$8,498.6	\$8,977.3	\$9,131.0	\$9,483.0	\$9,593.0
Percent Change	-	5.63	1.71	3.85	1.16
Capital Expenditure	\$2,256.9	\$2,103.2	\$2,028.0	\$1,590.0	\$1,896.0
Percent of Revenue	26.56	23.43	22.21	16.77	19.76
R&D Expenditure	NA	NA	NA	NA	NA
Percent of Revenue	NA	NA	NA	NA	NA
Number of Employees	71,488	74,937	71,877	69,500	69,369
Revenue (\$K)/Employee	\$118.88	\$119.80	\$127.04	\$136.45	\$138.29
Net Income	\$929.1	\$1,079.4	\$950.0	\$1,188.0	\$1,242.0
Percent Change	-	16.18	(11.99)	25.05	4.55
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	
Quarterly Revenue	\$2,343.0	\$2,407.0	\$2,368.0	\$2,475.0	
Quarterly Profit	\$317.0	\$325.0	\$278.0	\$322.0	

NA = Not available

Source: Pacific Telesis Group  
Annual Reports  
Dataquest (1990)

**Table 2**  
**Revenue by Distribution Channel (Percent)**

Channel	1987	1988	1989
Direct Sales	100.00	100.00	100.00
Indirect Sales	0	0	0

Source: Dataquest (1990)

---

## 1989 SALES OFFICE LOCATIONS

Information is not available.

---

## MANUFACTURING LOCATIONS

According to the MFJ, the RHCs are not allowed to manufacture telecommunications products after the divestiture.

---

## SUBSIDIARIES

### *North America*

Location Technologies Inc. (United States)  
Multicom Incorporated (United States)  
Nevada Bell (United States)  
PacTel Business Systems Inc. (United States)  
PacTel Cable (United States)  
PacTel Capital Funding (United States)  
PacTel Capital Resources (United States)  
PacTel Cellular (United States)  
PacTel Cellular Inc. (United States)  
PacTel Cellular Inc. of Lima (United States)  
PacTel Cellular of Saginaw Inc. (United States)  
PacTel Communications Companies (United States)  
PacTel Corporation (United States)  
PacTel Paging (United States)  
PacTel Personal Communications (United States)  
PacTel Products (United States)  
PacTel Properties (United States)  
PacTel Publishing (United States)  
PacTel RE Insurance Co. Inc. (United States)  
Pacific Bell (United States)  
Pacific Bell Directory (United States)  
Pacific Telesis Group Washington (United States)  
Pacific Telesis International (United States)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

1989

### **Mannesmann Mobilefunk GmbH**

In December 1989, Pacific Telesis announced that Germany has awarded its second national cellular

license to the Mannesmann Mobilefunk consortium, in which Telesis is a partner.

### **Millicom Inc.**

This consortium, to which Pacific Telesis (U.K.) Ltd. belongs, was awarded a license to operate a National Personal Communications Network in the United Kingdom.

---

## MERGERS AND ACQUISITIONS

1989

### **GSA Telecommunications**

PacTel Business Systems acquired this substantial base of clients.

### **ComputerLand**

PacTel Infosystems, which marketed telephone and microcomputer systems, office automation products, and LANs, had most of its assets sold to several ComputerLand franchises in June 1989.

---

## KEY OFFICERS

### **Sam Ginn**

Chairman of the board, president, and chief executive officer

### **John E. Hulse**

Vice chairman of the board and chief financial officer

### **C. Lee Cox**

Group president and chief executive officer, PacTel Corporation

### **Phillip J. Quigley**

Group president and chief executive officer, Pacific Bell

---

## PRINCIPAL INVESTORS

Information is not available.

---

## FOUNDERS

Information is not available.

---

**Table 3**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December**  
**(Millions of US Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Total Current Assets</b>	\$1,972.2	\$2,156.3	\$2,232.0	\$2,243.0	\$2,085.0
Cash	26.0	200.6	5.0	0	0
Receivables	1,446.2	1,390.7	1,434.0	1,506.0	1,601.0
Inventory	121.7	116.3	161.0	134.0	97.0
Other Current Assets	378.3	448.7	632.0	603.0	387.0
<b>Net Property, Plants</b>	\$16,968.4	\$17,244.9	\$17,192.0	\$17,155.0	\$17,079.0
<b>Other Assets</b>	\$597.7	\$919.3	\$1,632.0	\$1,793.0	\$2,030.0
<b>Total Assets</b>	\$19,538.3	\$20,320.5	\$21,056.0	\$21,191.0	\$21,194.0
<b>Total Current Liabilities</b>	\$1,983.3	\$2,405.1	\$2,785.0	\$2,543.0	\$2,797.0
<b>Long-Term Debt</b>	\$5,803.5	\$5,514.6	\$5,321.0	\$5,475.0	\$5,325.0
<b>Other Liabilities</b>	\$4,434.5	\$4,647.5	\$5,060.0	\$5,088.0	\$5,184.0
<b>Total Liabilities</b>	\$12,221.3	\$12,567.2	\$13,166.0	\$13,106.0	\$13,306.0
<b>Total Shareholders' Equity</b>	\$7,317.0	\$7,753.3	\$7,890.0	\$8,085.0	\$7,888.0
Common Stock*	10.7	21.5	43.0	43.0	43.0
Other Equity	5,064.4	5,068.5	4,939.0	4,689.0	4,026.0
Retained Earnings	2,241.9	2,663.3	2,908.0	3,353.0	3,819.0
<b>Total Liabilities and Shareholders' Equity</b>	\$19,538.3	\$20,320.5	\$21,056.0	\$21,191.0	\$21,194.0
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Revenue</b>	\$8,498.6	\$8,977.3	\$9,131.0	\$9,483.0	\$9,593.0
<b>Total Cost and Expenses</b>	\$6,245.3	\$6,488.3	\$7,026.0	\$6,990.0	\$7,072.0
<b>Capital Expenditures</b>	\$2,256.9	\$2,103.2	\$2,028.0	\$1,590.0	\$1,896.0
<b>Pretax Income</b>	\$1,739.0	\$1,979.0	\$1,617.0	\$1,972.0	\$2,038.0
<b>Pretax Margin (%)</b>	20.46	22.04	17.71	20.80	21.24
<b>Effective Tax Rate (%)</b>	44.70	44.30	40.20	38.70	37.40
<b>Net Income</b>	\$929.1	\$1,079.4	\$950.0	\$1,188.0	\$1,242.0
<b>Shares Outstanding, Millions</b>	409.3	430.1	430.6	423.2	411.4
<b>Per Share Data</b>					
<b>Earnings</b>	\$2.27	\$2.51	\$2.21	\$2.81	\$3.02
<b>Dividend</b>	\$1.43	\$1.52	\$1.64	\$1.76	\$1.88
<b>Book Value</b>	\$17.88	\$18.03	\$18.32	\$19.10	\$19.17

**Table 3 (Continued)**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December**  
**(Millions of US Dollars, except Per Share Data)**

<b>Key Financial Ratios</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<i>Liquidity</i>					
Current (Times)	0.99	0.90	0.80	0.88	0.75
Quick (Times)	0.93	0.85	0.74	0.88	0.71
Fixed Assets/Equity (%)	231.90	222.42	217.90	212.18	216.52
Current Liabilities/Equity (%)	27.11	31.02	35.30	31.45	35.46
Total Liabilities/Equity (%)	167.03	162.09	166.87	162.10	168.69
<i>Profitability (%)</i>					
Return on Assets	4.94	5.42	4.59	5.62	5.86
Return on Equity	13.47	14.32	12.15	14.87	15.55
Profit Margin	10.93	12.02	10.40	12.53	12.95
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	NA	NA	NA	NA	NA
Capital Spending % of Revenue	26.56	23.43	22.21	16.77	19.76
Employees	71,488	74,937	71,877	69,500	69,369
Revenue (\$K)/Employee	\$118.88	\$119.80	\$127.04	\$136.45	\$138.29
Capital Spending % of Assets	11.55	10.35	9.63	NA	8.95

\*1985 and 1986 common stock data have been restated for a two-for-one stock split in 1987.  
 NA = Not available

Source: Pacific Telesis Group  
 Annual Reports  
 Dataquest (1990)

## Pacific Telesis Group

140 New Montgomery Street  
San Francisco, California 94105

Telephone: (415) 882-8000

Fax: (415) 362-2913

Dun's Number: 10-346-0846

*Date Founded: January 1, 1984*

---

### CORPORATE STRATEGIC DIRECTION

The Pacific Telesis Group is one of seven regional Bell operating companies (RBOCs) created as a result of the U.S. District Court's decision to restructure the Bell System and American Telephone & Telegraph (AT&T). The historic AT&T antitrust settlement ordered AT&T to divest its 22 Bell operating companies (BOCs) and its control of the local exchange services. The 22 BOCs were reorganized into seven RBOCs, one of which was the Pacific Telesis Group. On January 1, 1984, the Pacific Telesis Group and the six other RBOCs began life as independent corporations, separate from their former parent, AT&T.

Pacific Telesis Group is the holding company that represents an entire family of companies offering business and residential consumers a variety of public network services and a wide variety of premises communications products and services. Pacific Telesis' companies provide products and services primarily through a two-state area: California and Nevada.

Pacific Telesis' total revenue increased 4 percent to \$9.5 billion\* in fiscal 1988 from \$9.1 billion in fiscal 1987. Its net income increased 25 percent to \$1.2 billion in fiscal 1988 from \$950 million in fiscal 1987. The Pacific Telesis Group employs approximately 69,500 people worldwide.

The Pacific Telesis Group does not report international versus domestic sales. According to the Modified Final Judgment (MFJ), which is the final set of instructions for the restructuring of the Bell System, the RBOCs are not allowed to manufacture telecommunications products after the divestiture.

The Pacific Telesis Group also does not report R&D expenditures separately. Research and development for the Pacific Telesis Group is performed by Bell

Communications Research, of which the Pacific Telesis Group is one-seventh owner, with the remaining RBOCs each having an equal share. Capital spending totaled \$2.0 billion in fiscal 1987, representing 22 percent of Pacific Telesis Group's revenue. Because of the new consolidated format accepted by the Pacific Telesis Group in 1988, capital expenditures were not reported independently from other expenses.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region and distribution channel. Table 4, a comprehensive financial statement, is at the end of this profile.

---

### BUSINESS SEGMENT STRATEGIC DIRECTION

#### Telecommunications

Pacific Bell and Nevada Bell are the Pacific Telesis operating companies, each providing local exchange services, network access, and a variety of products and services to more than 2.3 million customers in each service area. Each Pacific Telesis BOC has a communications subsidiary that markets and services customer premises equipment to business customers throughout the Pacific Telesis territory and in surrounding areas where appropriate.

Another Pacific Telesis Group subsidiary is Pacific Bell Directory, which publishes the white-and-yellow-pages directories for all Pacific Bell and Nevada Bell regional services. In 1988, Pacific Bell Directory introduced the SMART Yellow Pages, which will enhance its market position and lay a foundation for new products and services in the 1990s.

---

\*All dollar amounts are in U.S. dollars.

PacTel Communications, another subsidiary, provides cellular telephone services under the PacTel Cellular name in selected markets in California and other major urban areas. The PacTel Cellular subsidiary owns or has the rights to acquire cellular interests in 32 markets. In December 1989, Pacific Telesis announced that West Germany has awarded its second national cellular license to the Mannesmann Mobilefunk GmbH consortium, in which Telesis is a partner. In 1988, Pacific Bell and Nevada Bell filed with the Federal Communications Commission to offer voice mail services to their customers.

The PacTel Paging/Gencom, Inc., subsidiary provides paging services in selected markets in Arizona, California, Florida, Georgia, Kentucky, Missouri, and Texas. The Multicom Incorporated subsidiary markets paging services in conjunction with the Chesapeake and Potomac, Illinois Bell, and Ohio Bell telephone operating companies. PacTel Paging is the fourth largest provider of paging services in the United States based on the number of paging units in service.

PacTel Infosystems, a subsidiary that marketed telephone and microcomputer systems, office automation products, and local area networks (LANs), had most of its assets sold to several ComputerLand franchises in June 1989.

PacTel Business Systems is a subsidiary that sells and services key systems, PBXs, and Centrex service to small and medium-size businesses and branch offices of large companies. In 1989, PacTel Business Systems has acquired a substantial base of clients from GSA Telecommunications in Hayward, California. Pacific Telesis ranked third in the Centrex

services market segment in 1988, with 15.7 percent of the worldwide market share.

Another subsidiary, PacTel Spectrum Services, provides communications assurance programs that include coordination of systems changes, remote system diagnostics, preventive monitoring, inventory tracking, and reporting.

The PacTel Products subsidiary is among the 10 companies that make up 70 percent of the single-line telephone equipment worldwide market share in 1988. PacTel Products, a joint venture with Vodavi Technology Corporation, distributes telecommunications products nationally through more than 3,000 retail outlets.

PacTel Finance is a subsidiary that provides lease financing services for the PacTel companies and their customers. The PacTel Properties subsidiary engages in real estate investment and development, operating primarily in California. Neither of these businesses are expected to contribute very much to revenue.

Pacific Telesis International manages and operates telecommunications businesses in Great Britain, Japan, South Korea, Spain, and Thailand. In 1989, Pacific Telesis International added two new franchises in the United Kingdom, licensed to provide cable television service to more than 200,000 homes.

#### Further Information

For more information about the Company's business segment, please contact the appropriate industry service.



**Table 1**  
**Five-Year Corporate Highlights (Millions of U.S. Dollars)**

	1984	1985	1986	1987	1988
Five-Year Revenue	\$7,824.3	\$8,498.6	\$8,977.3	\$9,131.0	\$9,483.0
Percent Change	-	8.62	5.63	1.71	3.85
Capital Expenditure	\$2,082.4	\$2,256.9	\$2,103.2	\$2,028.0	N/A
Percent of Revenue	26.61	26.56	23.43	22.21	N/A
R&D Expenditure	N/A	N/A	N/A	N/A	N/A
Percent of Revenue	N/A	N/A	N/A	N/A	N/A
Number of Employees	76,881	71,488	74,937	71,877	69,500
Revenue (\$K)/Employee	\$101.77	\$118.88	\$119.80	\$127.04	\$136.45
Net Income	\$828.5	\$929.1	\$1,079.4	\$950.0	\$1,188.0
Percent Change	-	12.14	16.18	(11.99)	25.05
1989 Calendar Year	Q1	Q2	Q3	Q4	
Quarterly Revenue	\$2,343.0	\$2,407.0	\$2,268.0	N/A	
Quarterly Profit	\$317.0	\$325.0	\$278.0	N/A	

N/A = Not Available

Source: Pacific Telesis Group  
 Annual Reports  
 Dataquest  
 January 1990

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1984	1985	1986	1987	1988
North America	N/A	N/A	N/A	N/A	N/A
International	N/A	N/A	N/A	N/A	N/A

N/A = Not Available

Source: Dataquest  
 January 1990

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1987	1988
Direct Sales	100.00	100.00
Indirect Sales	0	0

Source: Dataquest  
 January 1990

---

## 1988 SALES OFFICE LOCATIONS

North America—Not available  
Japan—Not available  
Europe—Not available  
Asia/Pacific—Not available  
ROW—Not available

---

## MANUFACTURING LOCATIONS

According to the Modified Final Judgment (MFJ), which is the final set of instructions for the restructuring of the Bell System, the RBOCs are not allowed to manufacture telecommunications products after the divestiture.

---

## SUBSIDIARIES

### *United States*

Aircall Inc.  
Delta Tel Answering Inc.  
Gensub of IA Inc.  
Gensub of KNEE Inc.  
Hawthorn Secrephone Service  
Intrastate Radio Telephone Inc.  
J W J Enterprise Inc.  
Multicom Incorporated  
Nevada Bell  
Pacific Bell  
Pacific Bell Directory  
Pacific Telesis International  
PacTel Business Systems  
PacTel Capital Resources  
PacTel Cellular Inc.  
PacTel Communications Companies  
PacTel Corporation  
PacTel Finance  
PacTel Mobile Companies  
PacTel Paging  
PacTel Paging/Gencom Inc.  
PacTel Products  
PacTel Properties  
PacTel Spectrum Services Inc.  
Page-Phone Inc.  
Radio Dispatch Services Inc.  
Radio Page Inc.  
Radio Paging & Radio-Telephone  
Tel-Page Inc.  
Tel-Page Inc.-Peninsula

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

1989

### **Mannesmann Mobilefunk GmbH**

In December 1989, Pacific Telesis announced that West Germany has awarded its second national cellular license to the Mannesmann Mobilefunk consortium, in which Telesis is a partner.

### **Millicom Inc.**

A consortium to which Pacific Telesis (U.K.) Ltd. belongs was awarded a license to operate a National Personal Communications Network in the United Kingdom.

1987

### **Teletrac**

A joint venture with PacTel Corporation, designed to bring together the technological and operational expertise of two corporations, formed PacTel Teletrac.

---

## MERGERS AND ACQUISITIONS

1989

### **GSA Telecommunications**

PacTel Business Systems acquired this substantial base of clients.

### **ComputerLand**

PacTel Infosystems, which marketed telephone and microcomputer systems, office automation products, and LANs, had most of its assets sold to several ComputerLand franchises in June 1989.

---

## KEY OFFICERS

### **Sam Ginn**

Chairman of the board, president and chief executive officer

### **John E. Hulse**

Vice chairman of the board and chief financial officer

### **C. Lee Cox**

Group president and chief executive officer, PacTel Corporation

### **Phillip J. Quigley**

Group president and chief executive officer, Pacific Bell

**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December**  
**(Millions of U.S. Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
<b>Total Current Assets</b>	\$1,615.2	\$1,972.2	\$2,156.3	\$2,232.0	\$2,243.0
Cash	4.0	26.0	200.6	5.0	N/A
Receivables	1,107.4	1,446.2	1,390.7	1,434.0	N/A
Inventory	135.0	121.7	116.3	161.0	N/A
Other Current Assets	368.8	378.3	448.7	632.0	N/A
<b>Net Property, Plants</b>	\$15,999.5	\$16,968.4	\$17,244.9	\$17,192.0	\$17,155.0
<b>Other Assets</b>	\$461.8	\$597.7	\$919.3	\$1,632.0	\$1,793.0
<b>Total Assets</b>	<b>\$18,076.5</b>	<b>\$19,538.3</b>	<b>\$20,320.5</b>	<b>\$21,056.0</b>	<b>\$21,191.0</b>
<b>Total Current Liabilities</b>	\$2,003.7	\$1,983.3	\$2,405.1	\$2,785.0	\$2,543.0
<b>Long-Term Debt</b>	\$5,384.5	\$5,803.5	\$5,514.6	\$5,321.0	\$5,475.0
<b>Other Liabilities</b>	\$4,206.0	\$4,434.5	\$4,647.5	\$5,060.0	\$5,088.0
<b>Total Liabilities</b>	<b>\$11,594.2</b>	<b>\$12,221.3</b>	<b>\$12,567.2</b>	<b>\$13,166.0</b>	<b>\$13,106.0</b>
<b>Total Shareholders' Equity</b>	\$6,482.3	\$7,317.0	\$7,753.3	\$7,890.0	\$8,085.0
Common Stock	10.0	10.7	21.5	43.0	N/A
Other Equity	4,560.8	5,064.4	5,068.5	4,939.0	N/A
Retained Earnings	1,911.5	2,241.9	2,663.3	2,908.0	N/A
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$18,076.5</b>	<b>\$19,538.3</b>	<b>\$20,320.5</b>	<b>\$21,056.0</b>	<b>\$21,191.0</b>
<b>Income Statement</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
<b>Revenue</b>	\$7,824.3	\$8,498.6	\$8,977.3	\$9,131.0	\$9,483.0
<b>Total Cost and Expenses</b>	\$5,849.9	\$6,245.3	\$6,488.3	\$7,026.0	\$6,990.0
<b>Capital Expenditures</b>	\$2,082.4	\$2,256.9	\$2,103.2	\$2,028.0	N/A
<b>Pretax Income</b>	\$1,487.8	\$1,739.0	\$1,979.0	\$1,617.0	N/A
<b>Pretax Margin (%)</b>	19.02	20.46	22.04	17.71	N/A
<b>Effective Tax Rate (%)</b>	41.50	44.70	44.30	40.20	N/A
<b>Net Income</b>	\$828.5	\$929.1	\$1,079.4	\$950.0	\$1,188.0
<b>Shares Outstanding, Millions</b>	195.8	409.3	430.1	430.6	423.2
<b>Per Share Data</b>					
<b>Earnings</b>	\$4.23	\$2.27	\$2.51	\$2.21	\$2.81
<b>Dividends</b>	\$2.70	\$1.43	\$1.52	\$1.64	\$1.76
<b>Book Value</b>	\$33.11	\$17.88	\$18.03	\$18.32	\$19.10

**Table 4 (Continued)**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December**  
**(Millions of U.S. Dollars, except Per Share Data)**

<b>Key Financial Ratios</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
<i>Liquidity</i>					
Current (Times)	0.81	0.99	0.90	0.80	0.88
Quick (Times)	0.74	0.93	0.85	0.74	0.88
Fixed Assets/Equity (%)	246.82	231.90	222.42	217.90	212.18
Current Liabilities/Equity (%)	30.91	27.11	31.02	35.30	31.45
Total Liabilities/Equity (%)	178.86	167.03	162.09	166.87	162.10
<i>Profitability (%)</i>					
Return on Assets	-	4.94	5.42	4.59	5.62
Return on Equity	-	13.47	14.32	12.15	14.87
Profit Margin	10.59	10.93	12.02	10.40	12.53
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	N/A	N/A	N/A	N/A	N/A
Capital Spending % of Revenue	26.61	26.56	23.43	22.21	N/A
Employees	76,881	71,488	74,937	71,877	69,500
Revenue (\$K)/Employee	\$101.77	\$118.88	\$119.80	\$127.04	\$136.45
Capital Spending % of Assets	11.52	11.55	10.35	9.63	N/A

Notes: 1984 common stock data have been restated for a two-for-one stock split in 1986.  
1985 and 1986 common stock data have been restated for a two-for-one stock split in 1987.  
N/A = Not Available

Source: Pacific Telesis Group  
Annual Reports  
Dataquest  
January 1990

## Packard Bell

9425 Canoga Avenue  
Chatsworth, California 91311  
Telephone: (818) 773-4400  
Fax: (818) 773-2726  
Dun's Number: Not Available

*Date Founded: 1926*

---

### CORPORATE STRATEGIC DIRECTION

Packard Bell, a privately held company, was founded in 1926, as a manufacturer of radios. In 1930, the Company pioneered the development of color television, cartridge television, and four-channel audio sound systems. During the 1960s, Packard Bell's Hycomp Computing Systems assisted in the design of critical space vehicle guidance controls and trajectory plotting systems. Today, Packard Bell manufactures and supplies a broad range of PC-compatible systems and peripherals. In 1989, Dataquest ranked Packard Bell sixth in the US personal computer market, possessing 3.7 percent market share. In 1989, Packard Bell had revenue of \$300 million,\* Dataquest estimates.

The Company targets three major market segments: the home and home office; small, medium, and large businesses; and local and state governments. The Company reaches these market segments through a national network of distributors and retailers.

Packard Bell distributes consumer products nationwide for the home and home office through electronics retailers. These products are positioned as complete turnkey systems targeted at first-time computer system purchasers. Products for the business market are sold through computer specialty retail stores. Products for the government market are sold through selected value-added resellers (VARs) and systems integrators. In 1989, Packard Bell held contracts through resellers with several state governments, including Texas, Washington, Oregon, Tennessee, and New York. According to Dataquest, 80 percent of Packard Bell's 1989 revenue came from within the United States and the remaining 20 percent from international sales. Packard Bell employed an estimated 350 to 450 people in 1989.

Packard Bell provides its end users and dealers with free product support through a toll-free 800 number. The calls are directed to Company headquarters,

---

\*All dollar amounts are in US dollars.

where inquiries are handled by a Packard Bell product support team. Also, over 250 authorized Packard Bell service centers nationwide provide repair service for users with the promise of returning repaired equipment within 48 hours of receipt. All service centers employ at least two representatives who possess Packard Bell product expertise.

In 1989, Packard Bell formed Packard Bell Financial Services, which provides financial services to Packard Bell's authorized resellers and distributors. The new, wholly owned subsidiary offers inventory financing for resellers through Bell Atlantic-Tricon Leasing, Chrysler First Wholesale Credit, and Transamerica Commercial Finance. In addition, Packard Bell Financial Services provides commercial leasing services through Bell Atlantic-Tricon Leasing and First Interstate Leasing Services. Also, Packard Bell Financial Services offers a Packard Bell MasterCard through First Financial Savings Bank of Wisconsin.

No financial statements are included because Packard Bell is a privately held company.

---

### BUSINESS SEGMENT STRATEGIC DIRECTION

The Company offers a broad range of products in six major categories: personal computers, monitors, printer devices, modems, other peripherals, and facsimile machines.

#### Personal Computers

Packard Bell positions its PC products as complete turnkey solutions that customers can plug in and use immediately. Systems include detailed installation instructions and an instructional videotape. PCs include PC XT-compatible 8088 models and AT-compatible desktop and laptop computers based on 80286 and 80386 microprocessors.

### Monitors

Packard Bell offers 18 models of computer video monitors. These monitors range from monochrome to advanced color monitors. The Company provides compact 12- and 14-inch screens for everyday use, full-page display units for desktop publishing, and high-resolution monitors for high-quality graphics display and computer-assisted design (CAD) applications.

### Printer Devices

The Company offers a dot matrix and a laser printer, as well as a portable daisywheel electronic typewriter.

### Modems

Packard Bell offers one internal modem (2,400 baud) and four external modems, from 2,400 to 9,600 baud.

### Other Peripherals

Packard Bell offers a line of network products, enhancement boards, controller cards, and memory expansion boards. The PB LINK interface card provides LAN capabilities. It is compatible with PC XT/AT and 386 computers and is able to operate in workstations with EGA and VGA without memory conflict.

The Company offers several types of enhancement boards for upgrading and system expansion. These boards provide the capability to add parallel, serial, and game ports.

Also, Packard Bell offers a line of video controller cards for upgrading systems to alternate graphics modes. These cards enable software switching for use with a wide range of monochrome, color, and Hercules-compatible monitors.

In addition, Packard Bell offers XT- and AT-compatible memory expansion boards. These boards feature enhancement capabilities from 384K to 3MB. Each board is expandable in increments of 128K or 512K using 64K or 256K DRAM.

### Facsimile Machines

Packard Bell currently offers one type of facsimile machine.

### Further Information

For more information about the Company's business segments, please contact the appropriate Dataquest industry service.

---

### 1989 SALES OFFICE LOCATIONS

North America—6  
Europe—2  
Asia/Pacific—3

---

### MANUFACTURING LOCATIONS

#### *North America*

Chatsworth, California  
Toronto, Canada

#### *Europe*

London, England

#### *Asia/Pacific*

Hong Kong  
Tokyo, Japan

Packard Bell acquires its components from suppliers in the United States, Korea, Japan, and Taiwan. Components are assembled into integrated Packard Bell systems at Company facilities in the United States and the Far East. Domestically, Packard Bell performs final quality assurance and configuration testing at its headquarters in Chatsworth, California. Internationally, assembly and configuration testing are conducted at Packard Bell sites in Toronto, London, Tokyo, and Hong Kong.

---

### SUBSIDIARIES

#### *North America*

Packard Bell Financial Services Inc. (United States)  
Packard Bell (Canada)

#### *Europe*

Packard Bell (Europe) (England)

*Asia/Pacific*

Packard Bell (Far East) (Japan)

---

**ALLIANCES, JOINT VENTURES, AND  
LICENSING AGREEMENTS**

1990

**Ingram Micro D**

Packard Bell and Ingram Micro D entered into a distribution agreement under which Ingram Micro D will carry Packard Bell's complete line of compatible personal computer systems, including its new selection of 286, 386SX, and 386 personal computer systems and peripherals.

---

**MERGERS AND ACQUISITIONS**

Information is not available.

---

**KEY OFFICERS**

**Beny Alagem**  
Chief executive officer

**Brent Cohen**  
Chief financial officer

**Dennis Cox**  
Marketing director

---

**PRINCIPAL INVESTORS**

Information is not available.

---

**FOUNDERS**

Information is not available.

# PCO, Inc.

PCO, Inc.  
20200 Sunburst Street  
Chatsworth, CA 91311  
(818) 700-1233

Established 1984  
No. of Employees: 200

## **BACKGROUND**

PCO, Inc., started as a joint venture of Plessey and Corning Glass, called PlessCor, Inc., with shares owned by the two companies and by the founders. Recently, Corning became the parent company, and the Company renamed PCO, Inc. In 1983, the firm started marketing products developed by Plessey (U.K.) as well as its own designs. PCO has developed a silicon bipolar chip set for use in 200Mb fiber-optic links and is developing InP devices for higher links.

In January 1989, Plessey sold its 25 percent stake in PCO to IBM.

## **COMPANY EXECUTIVES**

- President/CEO--Michael K. Barnoski
- Vice President--Bob Walker
- Vice President, Marketing and Business development--Robert King
- Vice President and General Manager, Technology--Bor U. Chen
- Vice President, Special Programs--James Goell
- Vice President, Quality--David Law
- Controller and Treasurer--James Hetherman

## **FINANCIAL BACKING**

Corning Glass Works is the parent financial backing company and retains 65 percent ownership in PCO. IBM owns a 25 percent stake; the remaining 10 percent is held by PCO employees and other private investors.



# PCO, Inc.

## PROCESS TECHNOLOGY

- InP, GaAs, InGaAs, and other III-V processes

## PRODUCTS

- PLD series laser diodes modules
- ELD series fiber-optic transmitters and receivers including SONET modules for operation to and above video frequencies
- InGaAs PIN photodiodes
- Laser diodes
- ELEDs
- Digital interface modules
- LANs—token-ring and Ethernet
- Long-haul communications links
- Factory automation
- TV systems

## FACILITIES

The Company's operations are accomplished in three buildings located in Chatsworth, California, at the above address.

# PCO, Inc.

PCO, Inc.  
20200 Sunburst Street  
Chatsworth, CA 91311  
(818) 700-1233

Established 1984  
No. of Employees: 65

## **BACKGROUND**

PCO, Inc., started as a joint venture of Plessey and Corning Glass, called PlessCor, Inc., with shares owned by the two companies and by the founders. Recently, Corning became the parent company, and the Company was renamed PCO, Inc.

In 1983, the firm started marketing products developed by Plessey (UK) as well as its own designs. PCO has developed a silicon bipolar chip set for use in 200Mb fiber-optic links, and is developing InP devices for higher speed links.

## **COMPANY EXECUTIVES**

- President/CEO—Michael K. Barnowski
- Vice President, Marketing—William Babcock
- Vice President, Product Development—Bor U. Chen
- Vice President, Programs and Applications—James Goell
- Vice President, Manufacturing Engineering—David Law
- Marketing Manager—Michael J. Hartmann
- Controller and Treasurer—James Hetherman

## **STRATEGIC ALLIANCES**

Corning Glass Works is the parent firm.

## **PROCESS TECHNOLOGY**

- InP
- Silicon

# PCO, Inc.

## **PRODUCTS**

PCO produces fiber-optic transmitters and receivers.

## **Applications**

Its products are used in LANs and long-haul communications links.

---

# Perkin-Elmer Corporation

---

## Table of Contents

<u>Heading</u>	<u>Page</u>
Financial Summary	1
The Company	3
Background	3
Operations	4
International Operations	5
Marketing	6
Research and Development	6
Employees	6
Semiconductor Equipment Group	7
Materials and Surface Mount Group	12
Instrument Group	12
Concurrent Computer Corporation	13
Optical Group	14
Bodenseewerk Geraetetechnik (BGT)	14

<u>Tables</u>	<u>Title</u>	
Table 1	Operating Group Financial Data Fiscal Year Ending July 31	7
Table 2	Sales By Business Segment - Unaudited	9
Table 3	Orders By Business Segment - Unaudited	10
Table 4	Semiconductor Equipment Group Financial Data Fiscal Year Ending July 31	11
Table 5	Average Selling Prices	12

# The Perkin-Elmer Corporation

## **BACKGROUND AND OVERVIEW**

The Perkin-Elmer Corporation was founded in 1937 by Richard S. Perkin, an investment banker, and Charles W. Elmer, a retired publisher and court reporter. They shared an avid interest in astronomy and a conviction that a source for the design and production of ultra-precise optics should be established in the United States as, at that time, the field was dominated by a few European companies.

In the intervening 51 years, Perkin-Elmer has developed into a diversified high-technology company, international in scope and ranking among the 300 largest U.S. industrial corporations. In 1987, the Company reported worldwide sales of \$1.33 billion, with more than 50 percent derived from markets outside the United States.

In 1987, Perkin-Elmer employed some 14,100 persons worldwide with manufacturing plants in the United States, Liechtenstein, the Republic of Ireland, the United Kingdom, and West Germany. The Company supports its customers with sales and service offices throughout the industrialized world and through dealers in other countries.

## **Business Groups**

The Company segments its business into the following groups:

- **Instrument Group**—Accounts for about 31 percent of sales, and covers analytical instruments for use in industry, government, and science; includes high-speed automated analysis with computer-aided chemistry and robotics systems
- **Semiconductor Equipment Group**—Accounts for about 15 percent of sales, providing equipment for photolithography, maskmaking, etching, and sputtering in semiconductor manufacture
- **Materials and Surface Technology Group**—Accounts for 12 percent of sales; includes thermal spray technology and the development and application of specialized materials such as the emerging field of superconductivity
- **Bodenseewerk Geraetetechnik (BGT)**—Accounts for 12 percent of sales; an affiliated West Germany company that manufactures control and navigational systems for air and land vehicles
- **Optical Group**—Accounts for about 12 percent of total sales; produces electro-optical systems for collecting, measuring, and analyzing information, particularly in space science and defense systems
- **Concurrent Computer Corporation**—Accounts for 18 percent of sales; a subsidiary established in 1985, specializing in 32-bit superminicomputers with particular emphasis on parallel processing technology

# The Perkin-Elmer Corporation

## OPERATIONS

Perkin-Elmer's headquarters are in Norwalk, Connecticut, in the United States. U.S. operations are located in Connecticut, California, Minnesota, New Jersey, and New York. Elsewhere in the world manufacturing operations are located in the United Kingdom, West Germany, Liechtenstein, Japan, and the Republic of Ireland.

In Europe, semiconductor processing equipment is manufactured at Vaduz, Liechtenstein. Elsewhere in Europe, the Company has sales offices at Bron (Lyon), France, and at Gouda, the Netherlands.

In Japan, the Company's products are handled by Kanematsu Semiconductor Corporation, Tokyo.

## ACQUISITION

In January 1988, Perkin-Elmer and Nelson Analytical, Inc., of Cupertino, California, signed a letter of intent for Perkin-Elmer to acquire Nelson through a merger arrangement. Nelson is a leader in chromatography data-handling systems and will bring its state-of-the-art expertise in this field to Perkin-Elmer.

## FINANCIAL

Table 1 gives a summary of the Company's most recent financial information for the fiscal years ended July 31, 1985, 1986, and 1987.

The Company faced mixed economic conditions during 1987. While many of the world's economies showed moderate growth, the manufacturing sector of the U.S. economy continued to remain sluggish.

Net sales in 1987 increased 3 percent over 1986 to \$1.33 billion. The Instrument Group, Materials and Surface Technology Group, and BGT recorded sales increases of 15 percent, 12 percent, and 30 percent, respectively. These increases were, however, largely offset by the 19 percent reduction in sales for the Semiconductor Group and 12 percent for the Optical Group. Concurrent Computer Corporation's sales remained level with those of 1986.

Table 2 summarizes Perkin-Elmer's worldwide operating income (before taxes) by business group for the fiscal years 1985 through 1987.

The figures in Table 2 show that income before taxes declined from \$112 million in 1986 to \$7 million in 1987. The Company notes in its Annual Report that this figure comprises \$109 million in foreign pre-tax earnings and \$102 million in domestic pre-tax loss.

# The Perkin-Elmer Corporation

Table 1

**Perkin-Elmer Corporation  
Worldwide Net Sales by Business Group  
(Millions of U.S. Dollars)**

<u>Business Group</u>	<u>1985*</u>	<u>1986*</u>	<u>1987*</u>
Instrument Group	\$ 327	\$ 363	\$ 416
Semiconductor Equipment Group	316	250	203
Materials and Surface Technology Group	132	150	168
Bodenseewerk Geratetechnik	96	127	165
Optical Group	191	184	162
Concurrent Computer Corporation	<u>263</u>	<u>245</u>	<u>248</u>
Subtotal	\$1,325	\$1,319	\$1,362
Intergroup Sales	<u>(20)</u>	<u>(28)</u>	<u>(28)</u>
Total	\$1,305	\$1,291	\$1,334

Table 2

**Perkin-Elmer Corporation  
Worldwide Operating Income by Business Group  
(Millions of U.S. Dollars)**

<u>Business Group</u>	<u>1985*</u>	<u>1986*</u>	<u>1987*</u>
Instrument Group	\$ 33	\$ 35	\$ 44
Semiconductor Equipment Group	43	20	(76)
Materials and Surface Technology Group	14	22	28
Bodenseewerk Geratetechnik	15	24	41
Optical Group	17	25	7
Concurrent Computer Corporation	<u>22</u>	<u>10</u>	<u>10</u>
Subtotal	\$144	\$136	\$ 54
Intergroup Sales	<u>(1)</u>	<u>(1)</u>	<u>(2)</u>
Subtotal	\$143	\$135	\$ 52
Interest Income (Expense)--Net	(3)	(5)	(4)
General Corporate Expense	<u>(4)</u>	<u>(18)</u>	<u>(41)</u>
Total	\$136	\$112	\$ 7

\*Fiscal Year ending July 31

Source: Perkin-Elmer Corp.  
Annual Accounts 1988

# The Perkin-Elmer Corporation

When it announced the second quarter/six months' results on January 31, 1988, the Company was able to report a sales increase of 7 percent over the comparable six-month period of 1986. These figures are shown in Table 3. At the same time the Company stated that it was looking forward to improving profitability in 1988, with the prospects for aerospace and commercial activity looking better.

Table 3

**Perkin-Elmer Corporation**  
**Six Month Worldwide Net Sales by Business Group**  
**(Millions of U.S. Dollars)**

<u>Business Group</u>	<u>1987</u>	<u>1988</u>
Instrument Group	\$193	\$219
Semiconductor Equipment Group	108	95
Materials and Surface Technology Group	76	81
Bodenseewerk Geraetetechnik	74	91
Government Systems	81	70
Concurrent Computer Corporation	<u>115</u>	<u>133</u>
Subtotal	\$647	\$689
Intergroup Sales	<u>(14)</u>	<u>(12)</u>
Total	\$633	\$677*

\*Reflects six-month period ending January 31, 1988  
(unaudited)

Source: Perkin-Elmer Corp.  
Annual Accounts 1988



# The Perkin-Elmer Corporation

## RESEARCH AND DEVELOPMENT

Research and development (R&D) is the key to Perkin-Elmer's growth, and in 1987, the Company's R&D expenditure was 10.5 percent of total sales. In addition to its own funded programs, Perkin-Elmer performs R&D under government contracts.

While product development is conducted by the Company's operating units, its central focus of R&D is in the Applied Science and Technology sector. This group is devoted to the following applied research areas, which are important to the Company's long-range interests:

- Analytical techniques
- Optoelectronics
- Thin films
- Superconductivity
- Microfabrication and surface science

Further supporting the Company's scientific efforts are relationships Perkin-Elmer is pursuing with several leading universities. For example, the Company has a small group of scientists who are working at the forefront of artificial intelligence technology, located at Yale Science Park adjacent to Yale University.

Perkin-Elmer also sponsors its own internal technical symposium with papers on subjects of broad technical interest. This provides a valuable forum for an exchange of ideas among the Company's various technical staff.

## PRODUCTS

Perkin-Elmer supplies a diverse range of high-technology products that serve broad industrial, business, scientific, education, and government markets.

In the area of semiconductor equipment, Perkin-Elmer is the only company able to offer a complete line of integrated wafer fabrication equipment specifically designed to increase VLSI productivity. This equipment has features such as 6-inch wafer processing, high throughput, and pick-and-place wafer handling to minimize contamination.

### **AEBLE 150 (Advanced Electronic-Beam Lithography Equipment)**

The AEBLE 150 is a direct-write electron beam lithography system that processes as many as 30 4-inch wafers per hour; it is also capable of processing 5- and 6-inch wafers. It writes 0.5-micron features with an overlay accuracy of 0.1 micron and a

# The Perkin-Elmer Corporation

critical dimension control of 0.05 micron. Both optical and positive E-beam resists can be used. The AEBLE 150 is very accurate and can be used in mix-and-match lithography with existing optical tools and advanced X-ray systems.

## **MEBES III (Manufacturing Electron Beam Exposure System)**

The MEBES III system represents the latest state-of-the-art technology for the production of high-quality masks and reticles for VLSI devices. The MEBES III produces IX masks that meet the overlay requirements of the Micralign 300 and 500 projection mask aligners. Mask-to-mask overlay accuracy is 0.12 microns (3 sigma), and line-width control is 0.11 microns.

## **Micralign Series (Projector Mask Alignment System)**

The Micralign projection mask aligner is claimed to be the most productive photographic system available. The series consists of:

- Micralign Models 300 and 500, providing machine overlay accuracies to 0.5 microns, machine stabilities to 0.25 microns, and resolution capabilities from 0.9 microns to 1.26 microns
- Micralign 600 HT Series System, a new generation of clean environment projection mask aligners with a guaranteed specification for low particulates
- Micralign 600 Delta Series offers semiconductor manufacturers a lower-cost machine to meet current needs while providing a migration path to a higher-performance machine in the future

## **Micrastep I and II**

These step-and-repeat alignment systems come with an impressive set of features, including air gauge focusing and leveling at each exposure field, dark-field/bright-field site-by-site alignment, digital alignment signal processing and automatic calibration of alignment, focusing systems, and overall system magnification.

## **OMS 1**

The Perkin-Elmer OMSD 1 is the semiconductor industry's first dedicated automatic overlay system. It optimizes lithography tool performance through the quick and precise measurement of overlay on production wafers.

# The Perkin-Elmer Corporation

## **1600 Series FT-IR Spectrophotometer**

This single-beam scanning Michelson interferometer uses sealed and desiccated optics with Ge-coated Kbr beamsplitters.

## **Model 3280 Superminicomputer**

The 3280 is one of the range of 32-bit superminicomputers manufactured by Concurrent Computer Corporation. It is used in parallel processing in which two or more processors work simultaneously on the same task.

## **FUTURE PROSPECTS**

The Perkin-Elmer Corporation has a diverse range of high-technology products that serve broad markets. With its very substantial technological strength and marketing position, the Company views with confidence the long-term growth opportunities.

On nearly every operating front, the Company is involved in leading-edge technology. As the semiconductor industry enters the submicron era, Perkin-Elmer equipment meets the need to produce increasingly complex devices. The Company is well placed with its electron beam technology for writing integrated circuit patterns directly on silicon wafers at submicron line widths. In the area of semiconductor equipment, Perkin-Elmer will continue to bring to the market new products from its research and development activities and to strengthen its worldwide operations.

The Company is focusing on an interesting new area—superconductivity. This research area relies on Perkin-Elmer's instruments, materials, technology, and services.

# The Perkin-Elmer Corporation

## BACKGROUND AND OVERVIEW

The Perkin-Elmer Corporation (Perkin-Elmer) was founded in 1938 by Richard Perkin and Charles Elmer. Both founders shared an avid interest in astronomy and a conviction that a source for precision optics should be established in the United States. (At that time, precision optics was a field dominated by a few European companies.) From this initial scientific base, the Company has expanded over the past 48 years into a world leader in many important fields of technology. It ranks among the 300 largest U.S. industrial corporations and, in 1985, had sales in excess of \$1.3 billion. Of this amount, 40 percent was derived from markets outside the United States.

Perkin-Elmer employs an estimated 15,700 persons worldwide and, in addition to manufacturing facilities in the United States, has manufacturing plants in Liechtenstein, the Republic of Ireland, the United Kingdom, and West Germany. The Company supports its customers with sales and service offices throughout the industrialized world, and through dealers in other countries.

## Business Groups

In each country where Perkin-Elmer is present, it operates in the following business groups:

- Instrument Group--Supplies analytical instruments performing a wide range of tasks in industry, education, government, and science, including high-speed automated analysis with computer-aided chemistry and robotics systems
- Semiconductor Equipment Group--Provides equipment for photolithography, mask making, and etching and sputtering steps in semiconductor manufacture
- Data Systems Group--Supplies computer systems ranging from supermicrocomputers to multiprocessing superminicomputers, particularly suited to technical and business environments
- Optical Group--Produces electro-optical systems for collecting, measuring, and analyzing information, particularly in space science and defense systems

---

# The Perkin-Elmer Corporation

---

- Bodenseewerk Geraetetechnik (BGT)--An affiliated company in West Germany manufacturing control and navigational systems for air and land vehicles
- Metco--Manufactures thermal spray coating systems for surface enhancement against wear, heat, and corrosion (During 1986, Metco will be consolidated into the new Materials and Surface Technology Group.)

## Recent Significant Events

Fiscal year 1985 saw a period of rationalization and streamlining of the management structure at Perkin-Elmer, and each of the business groups is now using portfolio planning to evaluate the strength of its products in end-user markets. Quality business programs have been initiated in many areas and are yielding cost savings and enhanced product reliability.

During the first quarter of the 1986 fiscal period, Perkin-Elmer broke ground for construction of a large optics facility in Danbury, Connecticut. This will be the most advanced of its kind to produce special optics for astronomical and other space programs and is scheduled for completion in mid-1986.

In November 1985, Perkin-Elmer formed Concurrent Computer Corporation in the United States, with the object of increasing visibility in the computer industry. Concurrent Computer Corporation assumed the activities and net assets of Perkin-Elmer's Data Systems Group, which developed and produced 32-bit superminicomputers, and operates as a separate entity.

In December 1985, the Company announced the opening of a West Coast technical center in Hayward, California, adjacent to its Electron Beam Technology Division plant. The new center, with 10,000 square feet of floor space, includes production-quality clean room facilities capable of simulating actual semiconductor fabrication environments, for the demonstration of its complete line of high-technology equipment.

In Europe, Perkin-Elmer continues to build on the acquisition of Censor. Censor, a Liechtenstein company manufacturing semiconductor processing equipment, was acquired in 1984 for \$32.5 million. This was a major move in bringing the newest generation of step-and-repeat photolithography technology into the product line of Perkin-Elmer.

Further development in Europe is planned with the approval for expansion of the Company's facility at Ueberlingen, West Germany, which manufactures analytical and avionic instruments.

---

# The Perkin-Elmer Corporation

---

## OPERATIONS

The corporate headquarters of The Perkin-Elmer Corporation are located at Norwalk, Connecticut, U.S.A. To meet the worldwide demand for its products, the Company has manufacturing facilities with local distribution and sales offices in two principal geographic areas:

- United States
- Western Europe

## United States Operations

By business segment, manufacturing facilities locations are as follows:

- Analytical Instruments
  - Norwalk and Ridgefield, Connecticut
  - Oak Brook, Illinois
  - Eden Prairie, Minnesota
  - Mayaguez, Puerto Rico
- Computers and Data Systems
  - Oceanport, New Jersey
- Semiconductor Equipment
  - Hayward, California
  - Danbury and Wilton, Connecticut
- Electro-optical
  - Garden Grove and Pomona, California
  - Danbury, Connecticut
- Metco
  - Hicksville and Westbury, New York

---

# The Perkin-Elmer Corporation

---

## European Operations

In Europe, there are a number of manufacturing facilities and sales offices to meet the needs of the local industries. They are as follows:

- United Kingdom
  - Production of analytical instruments is carried out at Beaconsfield, Buckingham, and at Llantrisant in Wales.
  - Thermal spray products are produced at Chobham, near Woking, Surrey.
  - Sales are administered from Slough, Berkshire.
- West Germany
  - At Ueberlingen, both analytical instruments and avionic instruments are manufactured--the latter at Bodenseewerk Geratetechnik (BGT), an affiliate of Perkin-Elmer.
  - Sales headquarters are at Vatterstetten.
- Liechtenstein
  - Semiconductor processing equipment is manufactured at Vaduz.
- Republic of Ireland
  - Computers are manufactured at Cork.

Elsewhere in Europe, the Company has sales offices at Bron (Lyon) in France and Al Gouda in the Netherlands.

In Japan, the Company's products are handled by Kanematsu Semiconductor Corporation, Tokyo.

## FINANCIAL

Table 1 gives a summary of the Company's most recent financial information covering the fiscal years ended July 31, 1983, 1984, and 1985 together with the first quarter figures for fiscal 1985 and fiscal 1986.

# The Perkin-Elmer Corporation

Table 1

**Perkin-Elmer Corporation**  
**WORLDWIDE NET SALES REVENUES BY BUSINESS GROUP**  
 (Millions of U.S. Dollars)

<u>Business Group</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1st Quarter Fiscal</u>	
				<u>1985</u>	<u>1986</u>
Instruments	\$ 312	\$ 343	\$ 371	\$ 68**	\$ 75
Semiconductor Equipment	170	258	316	66	63
Data Systems	214	233	259	60	61
Optical	145	183	191	46	45
BGT	107	100	96	20	23
Metco*	<u>78</u>	<u>81</u>	<u>88</u>	<u>31**</u>	<u>32</u>
Subtotal	\$1,026	\$1,198	\$1,321	\$291	\$299
Intergroup	<u>(11)</u>	<u>(16)</u>	<u>(16)</u>	<u>(5)</u>	<u>(4)</u>
Total	\$1,015	\$1,182	\$1,305	\$286	\$295

\*Now called the Materials and Surface Technology Group (as of fiscal 1986) and the first quarter figures for fiscal 1985

\*\*Reflect transfers from the Instrument Group to the Materials and Surface Technology Group

Source: Perkin-Elmer Corporation,  
 Annual Accounts 1985  
 1st Quarter Report October 31, 1985  
 DATAQUEST  
 February 1986



---

## The Perkin-Elmer Corporation

---

The figures given in Table 1 show that overall net sales revenues for the year ended July 31, 1985, exceeded those of 1984 by 10 percent and that five of the Company's six business segments recorded sales increases in 1985.

The most significant growth was in the Semiconductor Equipment Group, recording a sales increase of \$58 million (22 percent) in 1985 compared with 1984. This significant growth was largely attributable to the very strong demand for the latest Micralign projection mask aligners as well as continuing demand for the Company's electron beam exposure systems. The Data Systems Group recorded an 11 percent growth in sales revenues in 1985 compared to 1984, led by solid growth in 32-bit minicomputers. Other groups showed satisfactory growth in 1985 except Bodenseewerk Geraetetechnik (BGT). In U.S. dollars, it declined 4 percent, compared to 1984. In German marks, however, BGT's sales increased 9 percent.

Total sales for the first quarter of fiscal year 1986 show an increase of \$9 million compared with the same period in 1985, although the Company reports that total orders for the period have been affected by the softness of the semiconductor industry and timing in government contract programs.

Table 2 summarizes worldwide operating income (before taxes) by business group for the fiscal years 1983, 1984, and 1985. It shows that the operating income before taxes for 1985 increased 47 percent compared to 1984. Particularly noticeable in the first three business groups are major revenue increases in 1985 compared to 1984. This has been attributed to recently introduced advanced products that have commanded high relative margins.

# The Perkin-Elmer Corporation

Table 2

Perkin-Elmer Corporation  
**WORLDWIDE OPERATING INCOME BY BUSINESS GROUP**  
 (Millions of U.S. Dollars)

<u>Business Group</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>
Instruments	\$ 32.8	\$ 31.5	\$ 46.3
Semiconductor Equipment	19.1	34.7	47.1
Data Systems	15.1	15.6	24.4
Optical	13.1	17.7	18.3
BGT	13.8	14.7	15.0
Metco	<u>7.9</u>	<u>9.4</u>	<u>8.9</u>
Subtotal	\$101.8	\$123.6	\$160.0
Intergroup	<u>(0.2)</u>	<u>(0.7)</u>	<u>(1.1)</u>
Subtotal	\$101.6	\$122.9	\$158.9
Interest income (expense)--net	3.4	0.3	(3.4)
General corporate expense	<u>(17.3)</u>	<u>(30.6)</u>	<u>(19.5)</u>
Total	\$ 87.7	\$ 92.6	\$136.0

Source: Perkin-Elmer Corporation,  
 Annual Accounts 1985  
 1st Quarter Report October 31, 1985  
 DATAQUEST  
 February 1986

# The Perkin-Elmer Corporation

In the first quarterly report from Perkin-Elmer for fiscal 1986, it is noted that gross margin increased by \$5.6 million on a sales revenue increase of \$9.0 million compared with the first quarter of 1985. After operating expenses, operating income was virtually unchanged at \$24.0 million between these quarters. However, income before taxes was reduced in the first quarter of 1986 to \$23.8 million from \$31.5 million in the first quarter of 1985. The difference of nearly \$8 million resulted from a patent infringement settlement of \$18 million and a provision for restructured operations (\$10 million) that took place in the first quarter of 1985.

Table 3 shows worldwide sales revenue and operating income before taxes by geographic area for the fiscal years 1983 through 1985.

Table 3

**Perkin-Elmer Corporation**  
**WORLDWIDE SALES REVENUE AND OPERATING INCOME BEFORE TAX**  
(Millions of U.S. Dollars)

	1983		1984		1985	
	Revenue	Operating Income	Revenue	Operating Income	Revenue	Operating Income
United States	\$ 637.9	\$58.4	\$ 808.7	\$81.3	\$ 899.1	\$101.6
Europe	328.3	41.1	323.7	36.1	353.6	61.7
Other Countries	49.2	1.7	49.9	1.8	51.9	5.0
Other*	-	(13.5)	-	(26.6)	-	(32.3)
<b>Total</b>	<b>\$1,015.4</b>	<b>\$87.7</b>	<b>\$1,182.3</b>	<b>\$92.6</b>	<b>\$1,304.6</b>	<b>\$136.0</b>

\*Other includes eliminations, interest income or expense, and general corporate expense.

Source: Perkin-Elmer Corporation,  
Annual Accounts 1985  
1st Quarter Report October 31, 1985  
DATAQUEST  
February 1986

---

# The Perkin-Elmer Corporation

---

The data in Table 3 show that approximately 68 percent of the total sales revenues in 1984 and 1985 was derived from sales in the United States, with sales in Europe accounting for 27 percent. Because various eliminations and expenses are not ascribed to geographic areas, operating income is less precise to interpret; but, in 1985, Europe appears to have been an important contributor with operating income increasing \$25.6 million compared to 1984 (71 percent), while sales revenue increased by \$29.9 million (^ percent) for the same period.

## RESEARCH AND DEVELOPMENT

Perkin-Elmer attaches the highest priority to research and development (R&D), as evidenced by expenditure. In 1985 an estimated \$114 million was spent on R&D, a 24 percent increase over the amount expended in 1984. This continued heavy investment was primarily directed toward new product development in the areas of Semiconductor Equipment and Data Systems. R&D is to the forefront of management's attention, and to this end the Company is raising the visibility of its R&D and technical staff through its Technical Advisory Council and All Perkin-Elmer Technical Symposiums.

In addition to basic R&D aimed at meeting the product requirements of the semiconductor industry for the next generation of semiconductor devices, Perkin-Elmer has technical centers on the West Coast of the United States at Hayward, California, and on the East Coast at Wilton, Connecticut, where they are able to demonstrate all their high-technology equipment. These locations provide technical service where customers are able to bring a circuit design and, in one visit, have a complete demonstration of Perkin-Elmer equipment for various steps in wafer processing, e.g., mask exposure, wafer patterning, etching, and coating.

## PRODUCTS

Perkin-Elmer supplies a diverse range of high-technology products that serve broad industrial, business, scientific, education, and government markets.

In the area of Semiconductor Equipment, Perkin-Elmer is the only company able to offer a complete line of integrated wafer fabrication equipment specifically designed to increase VLSI productivity. This equipment has features such as 6-inch wafer processing, high throughput, and pick-and-place wafer handling to minimize contamination.

# The Perkin-Elmer Corporation

## AEBLE 150 (Advanced Electron-Beam Lithography Equipment)

The AEBLE 150 is a direct-write electron beam lithography system that processes as many as 30 4-inch wafers per hour; it is also capable of processing 5- and 6-inch wafers. It writes 0.5-micron features with an overlay accuracy of 0.1 micron and a critical dimension control of 0.05 micron. Both optical and positive E-beam resists can be used. The AEBLE 150 is very accurate and can be used in mix-and-match lithography with existing optical tools and advanced X-ray systems.

## MEBES III (Manufacturing Electron Beam Exposure System)

The MEBES III system represents the latest state-of-the-art technology for the production of high-quality masks and reticles for VLSI devices. The MEBES III produces LX masks that meet the overlay requirements of the Micralign 300 and 500 projection mask aligners. Mask-to-mask overlay accuracy is 0.12 $\mu$ m (3 sigma), and line-width control is 0.1 $\mu$ m.

## Micralign Series (Projector Mask Alignment System)

The Micralign projection mask aligner is claimed to be the most productive photographic system available. The series consists of:

- Micralign Models 300 and 500, providing machine overlay accuracies to 0.5 $\mu$ m, machine stabilities to 0.25 $\mu$ m, and resolution capabilities from 0.9 $\mu$ m to 1.26 $\mu$ m
- Micralign 600 HT Series System, a new generation of clean environment projection mask aligners with a guaranteed specification for low particulates
  - Machine-to-machine overlay:  $\pm$ 0.35 $\mu$ m (98 percent of the data)
  - Throughput: 120 (100mm, 125mm) wafers per hour or 100 (150mm) wafers per hour
  - Wafer compatibility through 150mm
  - SECS-11 capability
  - Automatic setup and monitoring system

---

# The Perkin-Elmer Corporation

---

- Micralign 600 Delta Series, a recent addition to the Micralign 600 HT Series that offers semiconductor manufacturers a lower-cost machine to meet current needs while providing a migration path to a higher performance machine in the future

## SRA-9000 and SRA-100

These are step-and-repeat alignment systems that feature sub-micrometer resolution capability, the industry's highest throughput, 150mm wafer capability, and a backup laser stage/global alignment system. Optimized for mix-and-match lithography, SRA systems combine with Micralign systems to provide an efficient, accurate approach to wafer fabrication.

## Omni-Etch Dry Processing System

The Omni-Etch 10000 and 20000 are dry etching processing systems. Particulate contamination is minimized by a new pick-and-place wafer handling system with the elimination of all sliding friction during wafer movement.

The Omni-Etch 20000 etches a variety of materials anisotropically or isotropically at high throughputs. It incorporates cassette-to-cassette, single-wafer VLSI dry-etching technology with an easy-to-use microcomputer, automatic optical end-point detection, and built-in strippers.

## Models 4470/4480 Sputter Deposition System

Model 4470 is a dedicated dielectric sputter deposition system to handle bias sputtered quartz passivation and planarization for multilayer device fabrication.

Model 4480 allows sequential deposition of materials such as platinum, titanium/tungsten, and aluminum alloys. When equipped with a 5kW power supply, high-quality dielectric films can be produced. A dual-deposit sputter module allows the user to codeposit materials such as refractory metal silicides.

---

# The Perkin-Elmer Corporation

---

## FUTURE PROSPECTS

The Perkin-Elmer Corporation has a diverse range of high-technology products that serve broad markets. With its very substantial technological strength and marketing position, the Company views with confidence the long-term growth opportunities.

On nearly every operating front the Company is involved in leading-edge technology. As the semiconductor industry enters the submicron era, Perkin-Elmer equipment meets the need to produce increasingly complex devices. The Company is well placed with its electron beam technology for writing integrated circuit patterns directly on silicon wafers at submicron line widths. In the area of semiconductor equipment, Perkin-Elmer will continue to bring to the market new products from its research and development activities and to strengthen its worldwide operation.

As the activity in the semiconductor industry shows signs of improving, DATAQUEST is of the opinion that Perkin-Elmer is well positioned with its high-technology products to respond to the inevitable market upturn and to meet the advanced research needs of its customers.





## N.V. Philips Gloeilampenfabrieken

Groenewoudseweg 1  
5621 BA Eindhoven  
The Netherlands  
Telephone: (31-40) 786022  
Fax: (31-40) 785486  
Dun's Number: 40-455-3240

*Date Founded: 1891*

### CORPORATE STRATEGIC DIRECTION

N.V. Philips Gloeilampenfabrieken (Philips), incorporated in 1912, is a widely diversified multinational group of companies, engaged primarily in the manufacturing and distribution of electronic and electrical products, systems, and equipment. The legal entity, N.V. Gemeenschappelijk Bezit van Aandeelen Philips Gloeilampenfabrieken (Philips N.V.), operates solely as a holding company for share capital of N.V. Philips Gloeilampenfabrieken (Philips), of which it holds 99.99 percent. Philips Industries functions as the primary holding company for the company's numerous national organizations, which are wholly owned subsidiaries operating in over 60 countries. These subsidiaries' businesses vary from simple marketing organizations to fully integrated manufacturing and marketing concerns. Philips' product activities are grouped into five product sectors: Lighting, Consumer Products, Professional Products and Systems, Components, and Miscellaneous.

Fiscal year 1990 was a year of fundamental reappraisal for Philips. Persistently large losses on information systems and integrated circuits had been causing a drain on the company's equity and even threatening the continuation of healthy growth in other sectors. In Europe and the United States, the company's Lighting product sector had to contend with intense price competition, which could be only partly offset by improvements in efficiency. Furthermore, exchange rate movements and appreciable rises in interest rates had an adverse impact on both Philips' earnings and its competitiveness.

Against this backdrop, Philips decided that the measures taken in the past few years to enhance the company's maneuverability should be radically intensified and speeded up. A revitalization process was started with the aim of rapidly restoring the company

to lasting profitability and improving its financial structure. As part of this revitalization process, drastic restructuring measures were taken to put Philips' Components product sector and Information Systems Division on a sound footing. At the same time, it was decided to launch a worldwide campaign to improve efficiency in all organizational units. This efficiency drive is aimed at achieving substantial cost reductions within a short period of time and at promoting a permanent mindset toward profit and costs. The campaign is also aimed at intensifying quality and customer orientation.

The measures to turn around the Components product sector and the Information Systems Division, in addition to the worldwide campaign to improve efficiency, will result in a reduction of 45,000 to 55,000 jobs between September 1990 and the end of 1991. In addition, since the end of 1990, Philips has been reappraising the organization and composition of the businesses in which the company operates. This portfolio analysis will result in the divestment, closure, or drastic reorganization of some units, while in other cases it will give rise to a strengthening and expansion of operations or the creation of alliances.

A total of F 4.6 billion (US\$2.5 billion) was charged against operating income in fiscal 1990 for the implementation of the whole revitalization program. (Percentage changes refer only to F amounts; US\$ percentage changes will differ because of fluctuations in Dataquest exchange rates.) As a result, the year was concluded with a net loss of F 4.24 billion (US\$2.34 billion).

In fiscal 1990, net revenue decreased 3 percent to F 55.76 billion (US\$30.81 billion) from F 57.22 billion (US\$26.87 billion) in fiscal 1989. However, the 1989 sales figure included Philips' defense businesses in Europe, which have since been disposed of. A

number of other, smaller changes in consolidations took place as a result of the disposal and acquisition of other businesses. Disregarding the effects of these changes and of exchange rate movements, net sales on a comparable basis increased 5 percent in fiscal 1990.

Philips remains the world leader in lighting and color picture tubes and is second in size only to Matsushita, of which the company owns 35 percent, in consumer electronics revenue. On an overall basis, Philips' main revenue comes from the European market, which has accounted for approximately 60 percent of the company's total sales over the past five years.

The company's R&D expense decreased 4 percent to F 4.38 billion (US\$2.42 billion) in fiscal 1990 from F 4.56 billion (US\$2.14 billion) in fiscal 1989, but remained at approximately 8 percent of net revenue. This decline in R&D expenditure was entirely due to the divestment of Philips' defense businesses. Approximately 35,000 employees are engaged in product development and in the development of production methods and equipment. The responsibility for the development of products and production methods lies within each individual product division. The divisions have development laboratories at their disposal in 25 countries throughout the world.

More detailed information is available in Tables 1 and 2, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region. Information on revenue by distribution channel is not available. Tables 3 through 7, at the end of this background, present comprehensive financial information.

---

## BUSINESS SEGMENT STRATEGIC DIRECTION

### Professional Products and Systems Division

The Professional Products and Systems Division comprises Communications Systems, Information Systems, Medical Systems, Industrial and Electro-Acoustic Systems, and Defense and Control Systems, all serving the professional market. Sales in the Professional Products and Systems Division decreased 17 percent to F 13.06 billion (US\$7.21 billion) in 1990 and accounted for 23.4 percent of Philips' total revenue.

### Communications Systems

The company's Communications Systems products include private branch exchanges and key telephone systems, cable transmission and network access equipment, switching and network management systems, radio trunk transmissions and subscriber access systems, copper and fiber-optic cables, and optical fiber. The company also produces car and cordless telephones, mobile radio truncated networks, and wide area paging systems.

In September 1990, AT&T repurchased Philips' 15 percent stake in AT&T Network Systems International B.V., which was founded in 1983 as AT&T-Philips Telecommunications. At its founding, Philips held 50 percent of the company, which makes and markets AT&T switches overseas. Philips then cut back its stake to 40 percent, and later transferred another 25 percent back to AT&T.

### Information Systems

The company's Information Systems products include personal computers and workstations, document handling systems, optical media, peripherals, and dictation systems. In 1990, sales in this division declined as a result of sharp falls in prices affecting virtually all information systems products. As a result of reduced sales and low margins, appreciable losses were incurred in this division. According to Philips, radical restructuring measures are being carried out to remedy this situation.

Philips launched a number of new personal computer models in 1990 to help the company reach its new goals, which include a 5 percent market share by 1993. The company created two groups of PC products, one aimed at small businesses and home users and the other targeted at systems integrators, VARs, and corporate businesses. The company's new personal computers range from an entry-level 12-MHz 286-based system to a 25-MHz 486-based PC that features 4MB RAM and a hard disk drive expandable to 650MB.

During 1990, Philips introduced its first portable personal computer, the Magnavox Metalis/286, which has a 20MB hard drive and an internal 1.44MB 3.5-inch floppy drive. Targeted at the nonstop user, the Metalis/286 features battery life of up to four hours per charge, with full recharge in under four hours. It also features 1MB of RAM (expandable to 8MB), and is equipped with a backlit video graphics array (VGA) monitor.

The company's image processing system, Megadoc, is based on optical recording. During mid-1990, Philips introduced the Megadoc 10, a PC-based version of Megadoc that can be networked but will be offered mainly as a standalone system. The Megadoc 10 runs under MS-DOS, and conforms to UNIX System V.4 and Posix, enabling users to integrate existing software and add other applications more easily.

Smart cards, which are optical media products, are memory components that are the size of a credit card and contain an integrated circuit. Philips currently markets these cards for personal, business, and industrial applications. Sales have been slow for these cards because of cost/benefit factors.

### *Medical Systems*

The company's Medical Systems activities focus primarily on the production of diagnostic imaging systems, such as equipment based on X-radiation (including computer tomography), ultrasound, and magnetic resonance. Philips also produces systems for radiation therapy and provides consultancy services on the operational structure within hospitals and clinics. The company's medical products are sold to hospitals, other institutions, and governments directly and, in certain countries, through agents. The market for medical systems is subject to rapid change due to developments in technology and diagnostic effectiveness.

### *Industrial and Electro-Acoustic Systems*

The Industrial and Electro-Acoustic Systems Division concentrates on the production and marketing of products and systems for applications in research, industry, business, and government. A large range of electronic test and measuring equipment is produced, including oscilloscopes, logic analyzers, and automatic test equipment.

### *Defense and Control Systems*

The Defense and Control Systems Division develops and produces electronic systems, subsystems, equipment, and strategic components for shipborne, land-based, and airborne military applications and civil derivatives. Products manufactured by this division include radars, optoelectronics, sonars, and electronic warfare equipment, including electronic systems measures, electronic countermeasures, electronic counter countermeasures, and chaff/flare launchers.

During 1990, significant steps were taken to reduce Philips' defense activities. The company disposed of a major portion of its Western European defense business to the French company Thomson-CSF, selling an 80 percent interest in Philips' Dutch subsidiary Hollandse Signaalapparaten B.V., along with that subsidiary's interest in the Belgium company MBLE Defense, and a 99 percent stake in Philips' French company TRT Defense. In addition, Philips sold its British defense businesses to Thorn-EMI, and disposed of its German defense activities via a management buy-out.

### *Components Division*

The Philips Components Division is a supplier of components and subassemblies for both its own products and outside parties. Philips produces a broad range of components such as integrated circuits, discrete semiconductors, passive components, liquid crystal displays, and magnetic products. Component sales accounted for 14.6 percent of total net sales in 1990. Sales from this division fell 3.7 percent to F 8.16 billion (US\$4.51 billion) in fiscal 1990 from F 8.74 billion (US\$4.10 billion) in fiscal 1989.

### *Semiconductors*

In early 1991, Philips removed its semiconductor activities from its Components Products Division to form the Semiconductor Products Division, which will handle all of Philips' IC and discrete semiconductor business. The new division will also encompass Philips Components-Signetics, a subsidiary located in Sunnyvale, California. According to Philips, the move will allow the company to react better to the rapid changes in the semiconductor market. Under the new structure, approximately one-third of Philips' employees in its Components Products Division will work in the Semiconductor Products Division, with the remainder (approximately 50,000) working in the scaled-down Components Product Division.

Philips considers its semiconductors to be the heart of its electronics product business. The company's general IC goal is to strengthen its position as an applications-oriented supplier to the world markets. According to Dataquest, Philips moved up one place to rank as the ninth-largest vendor in the worldwide semiconductor market in 1990, based on estimated factory revenue of \$2.01 billion. Net sales for the company increased 17 percent, while as a whole, the semiconductor market grew at only 2 percent in

calendar 1990. Among European semiconductor companies, Philips continued to be the top-ranked manufacturer, with the company's main competition in this region coming from SGS-Thomson Microelectronics B.V. and Siemens AG.

In the worldwide analog integrated circuit market, Philips jumped from fourth place to the leading position, holding a 6.2 percent market share based on estimated factory revenue of \$653 million.

As part of the company's restructuring, an emphasis was placed on reducing losses in the Components Division. Along these lines, Philips pulled out of static RAM (SRAM) development and pilot production as one of several cost-cutting measures. The company also dropped out of the \$5 billion Joint European Submicron Silicon (JESSI) program, a consortium of European chip vendors. Other cost-cutting actions included the closing of Philips' IC Advanced Development and Manufacturing center (located in Eindhoven) and concentration of advanced application-specific integrated circuit (ASIC) development in Hamburg, Germany.

#### *Passive Components*

The company is the world's leading supplier of passive components with product lines consisting of a variety of capacitors and resistors in both leaded and SMD versions. A wide range of crystals and oscillators is available for professional, industrial, and consumer equipment.

#### *Consumer Products Division*

The Consumer Products Division includes the consumer electronics product division, PolyGram Records division, domestic appliances, and personal care products. Major categories in consumer electronics are audio, video, and home office equipment. Sales in 1990 in the Consumer Products Division accounted for 45.5 percent of the total net sales. Sales increased 8.0 percent to F 25.40 billion (US\$14.03 billion) in fiscal 1990 from F 23.58 billion (US\$11.07 billion) in fiscal 1989.

#### *Audio Products*

Audio products include portable radios, radio receivers, car radios, receivers, amplifiers, tuners, cassette recorders, turntables, and compact disc systems. Compact disc players and changers are still the fastest-growing products in the consumer electronic market.

#### *Video Products*

Video products include television sets (including receivers equipped for Teletext and stereo sound), video recorders, and camera recorders (cameras with a built-in video recorder), very high resolution monitors, and other displays. Products in this sector are sold primarily to the OEM market. Philips brand names in the United States include Philips, Magnavox, Sylvania, and Philco.

#### *Home Office Equipment*

Home office equipment products include personal computers, videotex terminals, and other peripheral equipment, which are marketed specifically toward the home market. For personal computers for business applications, see Communications Systems.

Philips' Compact Disk Interactive (CD-I) system is an interactive, fully digital, multimedia system that allows audio, video, text, and graphics to be stored and integrated on a single compact disk. CD-I is scheduled to be introduced in the consumer market in the United States and Japan during late 1991 and in Europe in 1992.

#### *PolyGram*

Another division of the Consumer Products Division is PolyGram Records Inc., which engages primarily in the acquisition, production, marketing, and distribution of recorded music.

#### *Domestic Appliances and Personal Care*

The domestic appliances and personal care division includes home comfort and kitchen appliances, shavers, and other personal care products. Philips' main product of this division is Philishave, based on rotary shaving technology. Along with the other personal care products and domestic appliances, Philishave is marketed under the Norelco brand in the United States.

#### *Lighting Division*

The company has been in the lighting business since its founding in 1891. The Lighting Division's products serve a broad range of applications, including general lighting service lamps, gas-discharge and special lamps, fixtures, special products, and batteries. Net sales of the Lighting Division accounted for 12.6 percent of total net sales, or F 7.03 billion (US\$3.88 billion). Lighting sales decreased 7 percent in fiscal 1990.

## Miscellaneous

Miscellaneous business activities, which are outside the company's basic range of products, include ancillary activities obtained as part of other acquisitions. Included in this sector are the operations in major domestic appliances in some countries that have not been transferred to Philips' joint venture with Whirlpool, begun in 1989. During 1990, Philips divested two of its larger U.S. subsidiaries incorporated in the Miscellaneous sector, Anchor Advanced

Products Inc. and Genie Manufacturing Inc. Miscellaneous sales accounted for 3.8 percent of total net revenue in 1990. Sales in this division grew 8.0 percent to F 2.12 billion (US\$1.17 billion).

## Further Information

For further information about the company's business segments, please contact the appropriate Dataquest industry service.

**Table 1**  
**Five-Year Corporate Highlights (Millions of U.S. Dollars)**

	1986	1987	1988	1989	1990
Five-Year Revenue	22,464.1	25,968.0	28,322.7	26,865.7	30,808.8
Percent Change	-	15.60	9.07	(5.14)	14.68
Capital Expenditure	1,904.9	2,342.9	2,093.4	1,483.6	1,569.1
Percent of Revenue	8.48	9.02	7.39	5.52	5.09
R&D Expenditure	1,706.9	2,149.8	2,334.8	2,139.4	2,418.8
Percent of Revenue	7.60	8.28	8.24	7.96	7.85
Number of Employees	343,800	336,700	310,300	304,800	272,800
Revenue (\$K)/Employee	65.34	77.12	91.28	88.14	112.94
Net Income	414.3	403.0	533.3	645.1	(2,342.5)
Percent Change	-	(2.73)	32.36	20.95	(463.15)
Exchange Rate (US\$1=F)	F 2.45	F 2.03	F 1.98	F 2.13	F 1.81
<b>1990 Fiscal Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	
Quarterly Revenue	7,080.7	7,480.1	7,247.0	9,001.1	
Quarterly Profit	185.6	20.4	(1,192.8)	(1,355.8)	

NA = Not available

Source: N.V. Philips Gloeilampenfabrieken  
Annual Reports and Forms 10-K  
Dataquest (October 1991)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1986	1987	1988	1989	1990
Europe	59.20	61.40	61.30	57.30	60.90
North America	24.30	22.40	22.20	24.10	21.20
Asia/Pacific	7.60	8.60	8.70	10.00	10.50
ROW	8.90	7.60	7.80	8.60	7.40

Source: N.V. Philips Gloeilampenfabrieken  
Annual Reports and Forms 10-K  
Dataquest (October 1991)

---

## 1990 SALES OFFICE LOCATIONS

Information is not available.

---

## MANUFACTURING LOCATIONS

### North America

Albuquerque, New Mexico  
Wafer fabrication of MOS ICs  
Orem, Utah  
Wafer fabrication of bipolar ICs, assembly and testing of logic and bipolar memory products  
Riviera Beach, Florida  
Passive components, discrete semiconductors  
Sunnyvale, California  
Wafer fabrication, MOS and bipolar ICs  
United States and Canada  
All principal products

### Europe

Barcelona, Spain  
Diodes, transistors  
Caen, France  
Bipolar digital, bipolar analog, and consumer ICs; discrete devices, power transistors, optoelectronic products  
Hamburg, Germany  
NMOS microprocessors, controllers, memories, bipolar analog consumer ICs, small-signal transistors, varicap diodes  
Netherlands  
All principal products  
Nijmegen, Netherlands  
CMOS devices  
Sittard, Netherlands  
Not available  
Southampton, United Kingdom  
NMOS ROMs, dedicated consumer logic  
Stadskanaal, Netherlands  
Diodes  
Stockport, United Kingdom  
Power transistors, power diodes  
Zurich, Switzerland  
ICs

### Japan

Tokyo, Japan  
Testing

### ROW

Africa  
Lighting, consumer electronics, professional products and systems  
Australia and New Zealand  
Lighting, professional products, systems, components  
Bangkok, Thailand  
Assembly and testing  
Hong Kong  
Transistors, diodes  
Kao-Hsiung, Taiwan  
ICs  
Latin America  
All principal products  
Manila, Philippines  
Transistors, diodes, optoelectronic products  
Recife, Brazil  
ICs  
Sao Paulo, Brazil  
Discrete devices  
Seoul, South Korea  
Assembly and testing

---

## SUBSIDIARIES

### North America

North American Philips Corporation (United States)  
Philips Canada Ltd. (Canada)  
Philips Components-Signetics (United States)  
PolyGram Records Inc. (United States)

### Europe

Bang & Olufsen A/S (Denmark)  
Compagnie Francaise Philips (France)  
Europe Mij Voor Fabricage en Verkoop Van Gloeilampenonderdelen (E.M.G.O.) (Belgium)  
Grundig Aktiengesellschaft (Germany)  
Ibertica de Alumbrado S.A. (Spain)  
Nederlands Philips Bedrijven B.V. (Netherlands)  
Norsk Atkieselskap Philips (Norway)  
Osterreichische Philips Industrie GesmbH (Austria)  
Oy Philips AB (Finland)  
Philips AG (Switzerland)  
Philips and Du Pont Optical Company (Netherlands)  
Philips Beteiligungs AG (Switzerland)  
Philips Communication Systems International B.V. (Netherlands)  
Philips Consumer Electronics International B.V. (Netherlands)  
Philips Danmark A/S (Denmark)

Philips Electronics Ireland Limited (Ireland)  
 Philips Export B.V. (Netherlands)  
 Philips GmbH (Germany)  
 Philips Iberica S.A.E. (Spain)  
 Philips Industrial S.A. Hellenique de Produits  
 Electrotechniques et Electroniques (Greece)  
 Philips Information Systems International B.V.  
 (Netherlands)  
 Philips International B.V. (Netherlands)  
 Philips International Finance S.A. (Luxembourg)  
 Philips Lighting Hellas Commercial and Industrial  
 S.A. (Greece)  
 Philips Lighting Holding B.V. (Netherlands)  
 Philips Luxembourg Consumer Products  
 (Luxembourg)  
 Philips Luxembourg Professional Systems  
 (Luxembourg)  
 Philips Matsushita Battery Corporation (Belgium)  
 Philips Medical Systems International B.V.  
 (Netherlands)  
 Philips Norden Aktiebolag (Sweden)  
 Philips Portuguesa S.A. (Portugal)  
 Philips S.A. (Belgium)  
 Philips S.A. Hellenique Commerciale de Produits  
 Electrotechniques (Greece)  
 Philips Sistemi Medicali S.p.A. (Italy)  
 Philips Societa per Azioni (Italy)  
 Philips Systemes Medicaux (France)  
 Philips U.K. Limited (United Kingdom)  
 PolyGram GmbH (Germany)  
 PolyGram Leisure Ltd. (United Kingdom)  
 PolyGram N.V. (Netherlands)  
 PolyGram S.A. (France)  
 Turk Philips Aydinlatma Sanayi ve Ticaret Anonim  
 Sirketi (Turkey)  
 Turk Philips Sanayi Anonim Sirketi (Turkey)  
 Turk Philips Ticaret Anonim Sirketi (Turkey)  
 Whirlpool International B.V. (Netherlands)

*Japan*

Japan New Media Systems Inc. (Japan)  
 Marantz Japan Inc. (Japan)  
 Matsushita Electronics Corporation (Japan)  
 Philips Japan Ltd. (Japan)  
 PNN Corporation (Japan)

*ROW*

Associated Electronic Products (Nigeria) Limited  
 (Nigeria)  
 Audio Electronics Sdn. Bhd. (Malaysia)  
 Bangladesh Electrical Industries Limited  
 (Bangladesh)

Bangladesh Lamps Limited (Bangladesh)  
 Beijing Philips Audio/Video Corporation (China)  
 Car Audio Electronics (China) Company Limited  
 (China)  
 Electrical Lamp Manufacturers Thailand Limited  
 (Thailand)  
 Elinthai Limited (Thailand)  
 El Nasr Company for Electrical and Electronic  
 Apparatus (Egypt)  
 Hua Fei Colour Display Systems Company Ltd.  
 (China)  
 Inbraphil-Industrias Brasileiras Philips Ltda. (Brazil)  
 Industria de Productos Electricos Centro-Americana,  
 S.A. de C.V. (El Salvador)  
 Industrias Bolivianas Philips S.A. (Bolivia)  
 Industrias Philips de Colombia S.A. (Colombia)  
 Industrias Philips del Uruguay S.A. (Uruguay)  
 Industrias Venezolanas Philips S.A. (Venezuela)  
 Malaysian Lamps Sendirian Berhad (Malaysia)  
 Manufacture Nationale pour la Refrigeration et  
 l'Electronique (Morocco)  
 PEC Investments Limited (South Africa)  
 Peico Electronics & Electricals Limited (India)  
 Philips Antillana N. V. (Netherlands Antilles)  
 Philips Argentina S.A. de Lamparas Electricas y  
 Radio (Argentina)  
 Philips Bangladesh Limited (Bangladesh)  
 Philips Chilena S.A. (Chile)  
 Philips China Hong Kong Group Company Limited  
 (Hong Kong)  
 Philips Components (Philippines) Inc. (Philippines)  
 Philips del Paraguay S.A. (Paraguay)  
 Philips do Brasil Ltda. (Brazil)  
 Philips Ecuador C.A. (Ecuador)  
 Philips Electrical Company of Pakistan Limited  
 (Pakistan)  
 Philips Electrical Company of Thailand Limited  
 (Thailand)  
 Philips Electrical Industries of Pakistan Limited  
 (Pakistan)  
 Philips Electrical Lamps Inc. (Philippines)  
 Philips Electrical (Private) Limited (Zimbabwe)  
 Philips Electrical Zambia Ltd. (Zambia)  
 Philips Electric Lamps (E.A.) Limited (Kenya)  
 Philips Electronic Building Elements Industries Ltd.  
 (Taiwan)  
 Philips Electronics Holdings Limited (South Africa)  
 Philips Electronics Industries Ltd. (Taiwan)  
 Philips Electronics Ltd. (South Korea)  
 Philips Electronics South-East Asia Holding B.V.  
 (China)  
 Philips Ethiopia (Ethiopia)  
 Philips Hong Kong Limited (Hong Kong)  
 Philips Industrial Development Inc. (Philippines)  
 Philips Industries Holdings Limited (Australia)



Philips Industries Ltd. (South Korea)  
 Philips Iran Ltd. (Iran)  
 Philips (Kenya) Limited (Kenya)  
 Philips Lighting Taiwan, Ltd. (Taiwan)  
 Philips Malaysia Sdn. Berhad (Malaysia)  
 Philips Maroc (Morocco)  
 Philips Mexicana, S.A. de C.V. (Mexico)  
 Philips Midden Oosten B.V. (Egypt)  
 Philips Midden Oosten B.V. (Iraq)  
 Philips Midden Oosten B.V. (United Arab Emirates)  
 Philips New Zealand Limited (New Zealand)  
 Philips Peruana S.A. (Peru)  
 Philips Semiconductor Corporation of Shanghai  
 (China)  
 Philips Singapore Private Limited (Singapore)  
 Philips Taiwan Ltd. (Taiwan)  
 P.T. Philips Development Corporation (Indonesia)  
 P.T. Philips-Ralin Electronics (Indonesia)  
 Shenzhen Shen Fei Laser Optical Systems Company  
 Limited (China)  
 Shenzhen Shen Fei Plastics and Metalware Company  
 Limited (China)  
 Signetics Korea Co. Ltd. (South Korea)  
 Signetics Thailand Co. Ltd. (Thailand)  
 Taiwan Lighting Industries Co. Ltd. (Taiwan)  
 Taiwan Semiconductor Manufacturing Company  
 Limited (Taiwan)  
 Thai Lamps Company Limited (Thailand)  
 Yangtze Optical Fibre and Cable Company Ltd.  
 (China)

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

1991

### Matsushita Electric Industrial Co. Ltd. and Sony Corporation

The three companies formed a consortium in Japan to launch and promote Philips' Compact Disk Interactive (CD-I) multimedia technology. The company will be called CD-I Consortium Japan.

### Sun Microsystems Inc.

Philips and Sun signed an agreement that will allow Philips to resell Sun's complete line of SPARCstations.

1990

### BSO/Bebeer B.V.

Philips service activities in the automation and information processing field were transferred to

ORIGIN, a joint venture with the Dutch software company BSO/Bebeer. That same year, the two companies formed a systems integration joint venture, called BSO/Pass International.

### European Development Center

Philips joined the European Development Center, which develops and supports computer-aided engineering and design tools and technology.

### Fujitsu Microelectronics

A second-source and joint development agreement was made for local area network circuits.

### Matsushita Electric Industrial Co. Ltd.

A joint venture was formed to develop, control, and maintain a chip standard for domestic audio and video systems.

### Motorola Incorporated

Philips and Motorola signed an OEM agreement under which Philips will add Motorola's reduced instruction-set computing systems to its product line.

### Silicon Systems Inc. (SSI)

Philips licensed its QUBIC BiCMOS process to SSI to serve as the basis for mixed signal designs. As part of the agreement, both companies have access to the other's foundry to augment capacity availability as QUBIC grows in acceptance.

### Teikoka Tsishin Kogyo

The two companies formed a joint venture for the manufacture of integrated control panels for consumer electronics equipment.

### Tesla Stranice and Hloubetin

Philips and Tesla, a Czechoslovakian electronics company, signed a cooperation agreement to improve the public telecommunications network in Czechoslovakia. The agreement will primarily focus on digital signal transmission equipment, which will facilitate multiple use of cable routes already laid.

### Texas Instruments Incorporated (TI)

TI and Philips entered into a joint sourcing agreement for the ABT high-performance bus interface logic family.

### VEB Kombinat Robotron

An agreement was reached concerning industrial measuring systems.

1989

**Catalyst Semiconductor Inc.**

Philips signed an agreement with Catalyst to supply Catalyst with its I2C protocol.

**Motorola Incorporated**

An agreement was made to develop very large scale integration (VLSI) integrated circuits.

**Seeq Technology Inc.**

The companies signed a five-year agreement calling for Philips to second-source and codevelop the Seeq 512Kb and 1Mb flash EPROMs. Seeq will get an alternate source for its flash EEPROM and foundry support for its 64Kb and 256Kb EEPROMs.

**Sun Microsystems Inc.**

The two companies signed a licensing agreement that will allow Philips components to design and market 32-bit RISC microprocessors based on Sun's SPARC architecture.

**Synercom Technology**

The two companies have entered into an OEM agreement for Synercom's INFORMAP and related application software.

**Whirlpool**

Philips and Whirlpool entered into a joint venture agreement concerning major domestic appliances.

1988

**ASM Lithography**

ASM Lithography agreed to manufacture lithography equipment used to produce semiconductors for Philips.

**AT&T**

AT&T agreed to develop, manufacture, and sell telecommunications network products for Philips.

**Canon Incorporated, Data General Corporation, Hewlett-Packard Company, Prime Computer Incorporated, and Unisys Corporation**

Philips and these companies formed a consortium to establish a common way to implement object-oriented software technology across a network of computers and servers.

**E.L. du Pont de Nemours and Sony Corporation**

The companies agreed to set CD-WORM standards.

**ES2**

Philips adopted E-beam direct-wire technology for ASICs; ES2 adopted a Philips' CMOS process. Customers can have devices manufactured by either company.

**Hitachi Ltd.**

Hitachi will produce and sell Philips' HD68562 and HD64941 LSI chips.

**Intel Corporation**

The companies made an agreement giving Philips access to Intel's CHMOS process and products and Intel access to Philips' serial buses.

**Intel Corporation**

Philips was chosen to second-source Intel's 8095 16-bit MCU and use Intel's 256K EPROM technology.

**Motorola Incorporated**

Philips was chosen to second-source Motorola's 68010 16-bit MPU.

**Plessey Co. plc**

The companies are manufacturing microchips for satellite broadcasting receiver systems.

**R. R. Donnelly & Sons and Toppan Printing Co. Ltd.**

The companies agreed to develop software for interactive disks.

**Robert Bosch GmbH**

The companies agreed to develop a standardized pan-European automobile telephone system.

**Siemens AG**

Siemens agreed to furnish Philips with submicron technology.

**SMH**

The companies completed a CMOS wafer-fab production agreement.

**Taiwan Semiconductor Manufacturing Co. (TSMC)**

TSMC agreed to manufacture customer-specific ICs for Philips.

**Texas Instruments Incorporated**

TI made an agreement with Philips to develop and manufacture an advanced CMOS logic family.

**Vitelec**

Vitelec licensed Philips' process technology so that Vitelec could produce CMOS SRAMs for use, license, and sale for both companies.

**VLSI Technology Inc.**

The companies made an agreement covering CAD design software, foundry services, cell libraries, and gate arrays under which VLSI would provide IC design software and Philips would provide foundry services.

**Yangtze Optical Fiber Cable Company**

The companies will manufacture and sell optical fiber cable in China.

**Jan D. Timmer**

President, chairman of the board, chairman of Group Management (GMC)

**W. Huisman**

Chairman, Communication Systems Division

**W. de Kleuver**

Chairman of Components Division, member of GMC

**Thierry Meyer**

Chairman of Consumer Electronics Division, member of GMC

**J.C. Tollenaar**

Chairman, Domestic Appliances and Personal Care Division

**F.A. de Bruijne**

Chairman, Industrial Electronics Division

**L.G. Nyberg**

Chairman, Information Systems Division

**E. Kloster**

Chairman of Lighting Division, member of GMC

**H. van Bree**

Chairman, Medical Systems Division

**H.W. Hagmeister**

Chairman, Semiconductors Division

**A.M.I. Levy**

Chairman, Polygram Records Division

---

**MERGERS AND ACQUISITIONS**

*1991*

**E.I. Du Pont de Nemours and Company**

Philips acquired Du Pont's interest in Philips & Du Pont Optical Company, a joint venture that was created in 1986 for the manufacture of optical disks.

*1990*

**Bang & Olufsen A/S**

Philips acquired a 25 percent interest in Bang & Olufsen, a Danish company that operates mainly at the top end of the audio and video market.

**Marantz Japan**

Philips acquired the majority shareholding in Marantz Japan and at the same time acquired rights to use the Marantz brand name in North America.

**Robert Bosch Group**

Philips' interest in the Broadcast Television Systems joint venture with Robert Bosch for the production of television studio equipment was increased from 50 percent to 75 percent.

*1989*

**Taiwan Semiconductor Manufacturing Co. (TSMC)**

Philips exercised its option to acquire 51 percent of TSMC's shares.

---

**PRINCIPAL INVESTORS**

Information is not available.

---

**FOUNDERS**

Gerard Philips

---

**KEY OFFICERS**

**Table 3**  
**Balance Sheet**  
**Fiscal Year Ending in December**  
**(Millions of U.S. Dollars)**

<b>Balance Sheet</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>
Cash	453.1	712.3	623.2	657.3	1,309.9
Receivables	4,956.7	5,870.0	6,749.5	6,565.3	6,469.6
Marketable Securities	69.8	175.9	97.0	69.0	81.8
Inventory	5,245.3	5,956.7	6,373.2	6,028.2	6,389.0
Other Current Assets	428.2	402.5	482.8	984.0	1,507.2
<b>Total Current Assets</b>	<b>11,153.1</b>	<b>13,117.2</b>	<b>14,325.8</b>	<b>14,303.8</b>	<b>15,757.5</b>
Net Property, Plants	7,447.8	9,106.9	9,372.7	8,730.5	9,222.7
Other Assets	2,064.5	2,376.4	2,992.9	2,777.5	3,525.4
<b>Total Assets</b>	<b>20,665.3</b>	<b>24,600.5</b>	<b>26,691.4</b>	<b>25,811.7</b>	<b>28,505.5</b>
Total Current Liabilities	7,531.8	9,159.6	9,739.9	10,046.0	10,965.7
Long-Term Debt	3,689.4	4,326.1	5,101.0	4,711.7	6,567.4
Other Liabilities	2,971.4	3,472.4	3,497.0	3,125.4	4,803.9
<b>Total Liabilities</b>	<b>14,192.7</b>	<b>16,958.1</b>	<b>18,337.9</b>	<b>17,883.1</b>	<b>22,337.0</b>
Common Stock	1,612.7	2,447.8	2,562.1	2,469.0	3,098.9
Other Equity	3,257.6	4,051.7	4,561.1	4,190.6	4,705.5
Currency Adjustment	(1,723.0)	(2,753.0)	(2,942.0)	(3,583.0)	(5,139)
Retained Earnings	3,325.7	3,896.1	4,172.2	4,852.1	3,503.3
<b>Total Shareholders' Equity</b>	<b>6,472.7</b>	<b>7,642.4</b>	<b>8,353.5</b>	<b>7,928.6</b>	<b>6,168.5</b>
<b>Total Liabilities and Shareholders' Equity</b>	<b>20,665.3</b>	<b>24,600.5</b>	<b>26,691.4</b>	<b>25,811.7</b>	<b>28,505.5</b>
Exchange Rate (US\$1=F)	F 2.45	F 2.03	F 1.98	F 2.13	F 1.81

Source: N.V. Philips Gloeilampenfabrieken  
Annual Reports and Forms 10-K  
Dataquest (October 1991)

**Table 4**  
**Consolidated Income Statement**  
**Fiscal Year Ending in December**  
**(Millions of U.S. Dollars, except Per Share Data)**

Consolidated Income Statement	1986	1987	1988	1989	1990
Revenue	22,464.1	25,968.0	28,322.7	26,865.7	30,808.8
U.S. Revenue	13,289.8	15,942.4	17,344.9	15,403.3	18,768.0
Non-U.S. Revenue	9,174.3	10,025.6	10,977.8	11,462.4	12,040.9
Cost of Sales	16,776.3	19,553.2	21,344.9	20,252.6	23,020.4
R&D Expense	1,706.9	2,149.8	2,334.8	2,139.4	2,418.8
SG&A Expense	4,636.7	5,432.0	5,910.6	5,657.3	6,624.9
Capital Expense	1,904.9	2,342.9	2,093.4	1,483.6	1,569.1
Pretax Income	799.2	368.0	409.1	594.8	(2,266.3)
Pretax Margin (%)	3.56	1.42	1.44	2.21	(7.36)
Effective Tax Rate (%)	42.00	28.00	39.00	41.20	8.40
Net Income	414.3	403.0	533.3	645.1	(2,342.5)
Shares Outstanding, Thousands	230,957	245,500	256,252	266,508	NA
<i>Per Share Data</i>					
Earnings	1.79	1.64	2.08	2.42	(8.22)
Dividend	0.82	0.99	1.01	0.94	-
Book Value	28.03	31.13	32.60	29.75	NA
Exchange Rate (US\$1=F)	F 2.45	F 2.03	F 1.98	F 2.13	F 1.81

Source: N.V. Philips Gloeilampenfabrieken  
 Annual Reports and Forms 10-K  
 Dataquest (October 1991)

**Table 5**  
**Balance Sheet**  
**Fiscal Year Ending in December**  
**(Millions of Guilders)**

Balance Sheet	1986	1987	1988	1989	1990
Cash	1,110.0	1,446.0	1,234.0	1,400.0	2,371.0
Receivables	12,144.0	11,916.0	13,364.0	13,984.0	11,710.0
Marketable Securities	171.0	357.0	192.0	147.0	148.0
Inventory	12,851.0	12,092.0	12,619.0	12,840.0	11,564.0
Other Current Assets	1,049.0	817.0	956.0	2,096.0	2,728.0
Total Current Assets	27,325.0	26,628.0	28,365.0	30,467.0	28,521.0
Net Property, Plants	18,247.0	18,487.0	18,558.0	18,596.0	16,693.0
Other Assets	5,058.0	4,824.0	5,926.0	5,916.0	6,381.0
Total Assets	50,630.0	49,939.0	52,849.0	54,979.0	51,595.0
Total Current Liabilities	18,453.0	18,594.0	19,285.0	21,398.0	19,848.0
Long-Term Debt	9,039.0	8,782.0	10,100.0	10,036.0	11,887.0
Other Liabilities	7,280.0	7,049.0	6,924.0	6,657.0	8,695.0
Total Liabilities	34,772.0	34,425.0	36,309.0	38,091.0	40,430.0
Common Stock	3,951.0	4,969.0	5,073.0	5,259.0	5,609.0
Other Equity	7,981.0	8,225.0	9,031.0	8,926.0	8,517.0
Currency Adjustment	(4,222.0)	(5,589.0)	(5,825.0)	(7,632.0)	(9,302.0)
Retained Earnings	8,148.0	7,909.0	8,261.0	10,335.0	6,341.0
Total Shareholders' Equity	15,858.0	15,514.0	16,540.0	16,888.0	11,165.0
Total Liabilities and Shareholders' Equity	50,630.0	49,939.0	52,849.0	54,979.0	51,595.0
Exchange Rate (US\$1=F)	F 2.45	F 2.03	F 1.98	F 2.13	F 1.81

Source: N.V. Philips Gloeilampenfabrieken  
Annual Reports and Forms 10-K  
Dataquest (October 1991)

**Table 6**  
**Consolidated Income Statement**  
**Fiscal Year Ending in December**  
**(Millions of Guilders, except Per Share Data)**

Consolidated Income Statement	1986	1987	1988	1989	1990
Revenue	55,037.0	52,715.0	56,079.0	57,224.0	55,764.0
European Revenue	32,560.0	32,363.0	34,343.0	32,809.0	33,970.0
Non-European Revenue	22,477.0	20,352.0	21,736.0	24,415.0	21,794.0
Cost of Sales	41,102.0	39,693.0	42,263.0	43,138.0	41,667.0
R&D Expense	4,182.0	4,364.0	4,623.0	4,557.0	4,378.0
SG&A Expense	11,360.0	11,027.0	11,703.0	12,050.0	11,991.0
Capital Expense	4,667.0	4,756.0	4,145.0	3,160.0	2,840.0
Pretax Income	1,958.0	747.0	810.0	1,267.0	(4,102.0)
Pretax Margin (%)	3.56	1.42	1.44	2.21	(7.36)
Effective Tax Rate (%)	42.00	28.00	39.00	41.20	8.40
Net Income	1,015.0	818.0	1,056.0	1,374.0	(4,240.0)
Shares Outstanding, Thousands	230,957	245,500	256,252	266,508	NA
<i>Per Share Data</i>					
Earnings	4.39	3.33	4.12	5.16	(14.88)
Dividend	2.00	2.00	2.00	2.00	-
Book Value	68.66	63.19	64.55	63.37	NA
Exchange Rate (US\$1=F)	2.45	2.03	1.98	2.13	1.81

NA = Not available

Source: N.V. Philips Gloeilampenfabrieken  
Annual Reports and Forms 10-K  
Dataquest (October 1991)

**Table 7**  
**Key Financial Ratios**  
**Fiscal Year Ending in December**

Key Financial Ratios	1986	1987	1988	1989	1985
<i>Liquidity</i>					
Current (Times)	1.48	1.43	1.47	1.42	1.44
Total Assets/Equity (%)	319.27	321.90	319.52	325.55	462.11
Current Liabilities/Equity (%)	116.36	119.85	116.60	126.71	177.77
Total Liabilities/Equity (%)	219.27	221.90	219.52	225.55	362.11
<i>Profitability (%)</i>					
Return on Assets	2.00	1.64	2.00	2.50	(8.22)
Return on Equity	6.40	5.27	6.38	8.14	(37.98)
Profit Margin	1.84	1.55	1.88	2.40	(7.60)
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	7.60	8.28	8.24	7.96	7.85
Capital Spending % of Revenue	8.48	9.02	7.39	5.52	5.09
Employees	343,800	336,700	310,300	304,800	272,800
Revenue (FK)/Employee	160.08	156.56	180.73	187.74	204.41
Capital Spending % of Assets	9.22	9.52	7.84	5.75	5.50
Exchange Rate (US\$1=F)	2.45	2.03	1.98	2.13	1.81

Source: N.V. Philips Gloeilampenfabrieken  
Annual Reports and Forms 10-K  
Dataquest (October 1991)

# N.V. Philips Gloeilampenfabrieken

N.V. Philips Gloeilampenfabrieken  
P.O. Box 218, 5600MD  
Eindhoven, The Netherlands  
(040) 738 749

Established 1891  
Number of Employees: N/A

## **BACKGROUND**

N.V. Philips Gloeilampenfabrieken (Philips) was founded by Gerard Philips in 1891 to make carbon-filament lamps. The Company established its Physical Research Laboratory in 1914. Philips performs basic research in many areas including III-V compound semiconductors. The Company supplies internal needs and participates in the merchant market for LEDs, lasers, MICs, MMICs, discrete FETs, and diodes.

The Company has an agreement with Cray Research involving GaAs SRAMs for supercomputer applications. This activity is under way at LEP (France). The effort has resulted in a 1K ECL-compatible design that operates at 2ns cycle time and dissipates 200mW.

Amperex, a wholly owned subsidiary of Philips that markets Philips semiconductors in the United States, recently changed its name to North American Philips Electronics Corporation.

## **STRATEGIC ALLIANCES**

Philips owns 35 percent of Matsushita; N.A. Philips Trust, which owns Signetics; LEP (France); and North American Philips Electronics Corporation.

## **PROCESS TECHNOLOGY**

- GaAs, GaAlAs, and other III-V MESFET and HEMT processes
- 0.7 $\mu$  DCFL GaAs MESFET

## **PRODUCTS**

- Small-signal and power GaAs FETs
- LEDs, including IR emitters and detectors



# N.V. Philips Gloeilampenfabrieken

- Laser diodes, CW and pulsed
- Optocouplers
- Opto discretes and OEICs
- GaAs ICs

## **Applications**

- Communications hardware
- Consumer products
- Instrumentation
- EDP systems

# N.V. Philips Gloeilampenfabrieken

Table 1

**N.V. Philips Gloeilampenfabrieken  
Signetics Corporation  
Estimated Worldwide Semiconductor Revenue by Product Line  
(Millions of Dollars)**

	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
Total Semiconductor	\$917	\$1,325	\$1,065	\$1,361	\$1,602	\$1,738
Total Integrated Circuit	\$694	\$1,090	\$ 808	\$1,028	\$1,186	\$1,281
Bipolar Digital (Technology)	\$344	\$ 589	\$ 372	\$ 389	\$ 405	\$ 413
TTL	320	551	337	363	380	393
ECL	22	37	34	22	25	20
Other Bipolar Digital	2	1	1	4	0	0
Bipolar Digital (Function)	\$344	\$ 589	\$ 372	\$ 389	\$ 405	\$ 413
Bipolar Digital Memory	89	121	80	61	61	58
Bipolar Digital Logic	255	468	292	328	344	355
MOS (Technology)	\$155	\$ 266	\$ 228	\$ 312	\$ 342	\$ 402
NMOS	103	187	138	179	178	175
CMOS	52	79	90	133	164	227
MOS (Function)	\$155	\$ 266	\$ 228	\$ 312	\$ 342	\$ 402
MOS Memory	27	32	35	14	18	35
MOS Microdevices	45	104	64	85	100	114
MOS Logic	83	130	129	213	224	253
Linear	\$195	\$ 235	\$ 208	\$ 327	\$ 439	\$ 466
Total Discrete	\$204	\$ 217	\$ 232	\$ 298	\$ 390	\$ 432
Transistor	124	131	142	169	233	248
Diode	74	78	81	119	137	159
Thyristor	5	6	9	7	10	12
Other Discrete	1	2	-	3	10	13
Total Optoelectronic	\$ 19	\$ 18	\$ 25	\$ 35	\$ 26	\$ 25
Exchange Rate (Yen per US\$1)	235	237	238	167	144	130

Source: Dataquest  
December 1989

# N.V. Philips Gloeilampenfabrieken

Table 2

**Philips-Signetics  
Worldwide Ranking by Semiconductor Markets  
(Sales in Millions of Dollars)**

	1988 Rank	1987 Rank	1988 Revenue	Revenue % Change 1987-1988	Industry % Change 1987-1988
Total Semiconductor	10	7	\$1,738	8.5%	33.0%
Total Integrated Circuit	11	10	\$1,281	8.0%	37.4%
Bipolar Digital (Function)	7	7	413	2.0%	9.2%
Bipolar Digital Memory	4	4	58	(4.9%)	11.0%
Bipolar Digital Logic	7	6	355	3.2%	9.0%
MOS (Function)	16	14	402	17.5%	54.5%
MOS Memory	30	33	35	94.4%	93.1%
MOS Microdevices	15	13	114	14.0%	39.9%
MOS Logic	10	9	253	12.9%	29.2%
Analog	5	4	466	6.2%	16.0%
Total Discrete	5	5	\$ 432	10.8%	14.4%
Total Optoelectronics	19	18	\$ 25	(3.8%)	27.5%

Source: Dataquest  
December 1989

# N.V. Philips Gloeilampenfabrieken

Table 3

**N.V. Philips Gloeilampenfabrieken  
Signetics Corporation  
Estimated Worldwide Semiconductor Revenue by Region—1988  
(Millions of Dollars)**

	<u>U.S.</u>	<u>Japan</u>	<u>Europe</u>	<u>ROW</u>	<u>Worldwide</u>
Total Semiconductor	\$375	\$62	\$1,018	\$283	\$1,738
Total Integrated Circuit	\$346	\$60	\$ 683	\$192	\$1,281
Bipolar Digital (Technology)	206	29	117	61	413
TTL	200	28	105	60	393
ECL	6	1	12	1	20
Other Bipolar Digital	--	--	--	--	--
Bipolar Digital (Function)	206	29	117	61	413
Bipolar Digital Memory	35	3	14	6	58
Bipolar Digital Logic	171	26	103	55	355
MOS (Technology)	72	7	285	38	402
NMOS	34	1	117	28	175
PMOS	--	--	--	--	--
CMOS	38	6	168	15	227
MOS (Function)	72	7	285	38	402
MOS Memory	16	3	14	2	35
MOS Microdevices	39	1	55	19	114
MOS Logic	17	3	216	17	253
Analog	68	24	281	93	466
Total Discrete	\$ 28	\$ 2	\$ 313	\$ 89	\$ 432
Total Optoelectronic	\$ 1	0	\$ 22	\$ 2	\$ 25

Source: Dataquest  
December 1989

# Plessey Semiconductor Ltd.

Table 1

**Estimated Worldwide Semiconductor Revenue by Calendar Year  
(Millions of Dollars)**

	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
Total Semiconductor	61	82	99	112	222	284
Total Integrated Circuit	58	75	89	96	183	237
Bipolar Digital (Function)	21	27	30	32	68	94
Bipolar Digital Memory						
Bipolar Digital Logic	21	27	30	32	68	94
MOS (Function)	19	26	35	37	51	76
MOS Memory						
MOS Microdevices						
MOS Logic	19	26	35	37	51	76
Analog	18	22	24	27	64	67
Total Discrete					22	25
Total Optoelectronic	3	7	10	16	17	22

Table 2

**Plessey Semiconductor Ltd.  
1988 Worldwide Ranking by Semiconductor Markets  
(Revenue in Millions of Dollars)**

	<u>1988</u>	<u>1987</u>	<u>1988</u>	<u>Sales</u>	<u>Industry</u>
	<u>Rank</u>	<u>Rank</u>	<u>Revenue</u>	<u>% Change</u>	<u>% Change</u>
				<u>1987-1988</u>	<u>1987-1988</u>
Total Semiconductor	32	32	\$284	27.9%	33.0%
Total Integrated Circuit	28	28	\$237	29.5%	37.4%
Bipolar Digital (Function)	11	12	\$ 94	38.2%	9.2%
Bipolar Digital Logic	11	12	94	38.2%	9.0%
MOS (Function)	45	44	\$ 76	49.0%	54.5%
MOS Logic	30	32	76	49.0%	29.2%
Analog	29	28	\$ 67	4.7%	16.0%
Total Discrete	34	34	\$ 25	13.6%	14.4%
Total Optoelectronic	21	21	\$ 22	29.4%	27.5%

Source: Dataquest  
December 1989

# Plessey Semiconductor Ltd.

Table 3

Plessey Semiconductor Ltd.  
Estimated 1988 Semiconductor Revenue by Geographic Region  
(Millions of Dollars)

	<u>U.S.</u>	<u>Japan</u>	<u>Europe</u>	<u>ROW</u>
Total Semiconductor	\$72	\$6	\$198	\$8
Total Integrated Circuit	\$63	\$6	\$160	\$8
Bipolar Digital (Function)	\$28	\$3	\$ 60	\$3
Bipolar Digital Memory				
Bipolar Digital Logic	28	3	60	3
MOS (Function)	\$22	\$1	\$ 51	\$2
MOS Memory				
MOS Microdevices				
MOS Logic	22	1	51	2
Analog	\$13	\$2	\$ 49	\$3
Total Discrete	\$ 7		\$ 18	
Total Optoelectronic	\$ 2		\$ 20	

Source: Dataquest  
December 1989

# N.V. Philips' Gloeilampenfabrieken

Table 1

**N.V. Philips' Gloeilampenfabrieken\***  
**Signetics Corporation**  
**Estimated Worldwide Semiconductor Revenue by Product Line**  
**(Millions of Dollars)**

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Total Semiconductor	\$797	\$917	\$1,325	\$1,065	\$1,361
Total Integrated Circuit	\$570	\$694	\$1,090	\$ 808	\$1,033
Bipolar Digital (Technology)	\$278	\$344	\$ 589	\$ 372	\$ 380
TTL	254	320	551	337	359
ECL	22	22	37	34	16
Other Bipolar Digital	2	2	1	1	5
Bipolar Digital (Function)	\$278	\$344	\$ 589	\$ 372	\$ 380
Bipolar Digital Memory	82	89	121	80	53
Bipolar Digital Logic	196	255	468	292	327
MOS (Technology)	\$ 99	\$155	\$ 266	\$ 228	\$ 311
NMOS	64	103	187	138	180
PMOS	24	-	-	-	-
CMOS	11	52	79	90	131
MOS (Function)	\$ 99	\$155	\$ 266	\$ 228	\$ 311
MOS Memory	26	27	32	35	11
MOS Microdevices	18	45	104	64	85
MOS Logic	55	83	130	129	215
Linear	\$193	\$195	\$ 235	\$ 208	\$ 342
Total Discrete	\$208	\$204	\$ 217	\$ 232	\$ 301
Transistor	\$126	\$124	\$ 131	\$ 142	\$ 180
Small Signal Transistor	86	85	88	93	122
Power Transistor	40	39	43	49	58
Diode	\$ 76	74	\$ 78	\$ 81	\$ 111
Small Signal Diode	44	43	44	46	44
Power Diode	26	25	27	28	49
Zener Diode	6	6	7	7	18

(Continued)

# N.V. Philips' Gloeilampenfabrieken

Table 1 (Continued)

N.V. Philips' Gloeilampenfabrieken  
Signetics Corporation  
Estimated Worldwide Semiconductor Revenue by Product Line  
(Millions of Dollars)

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Thyristor	\$ 5	\$ 5	\$ 6	\$ 9	\$ 8
Other Discrete	\$ 1	\$ 1	\$ 2	\$ 2	\$ 3
Total Optoelectronic	\$ 19	\$ 19	\$ 18	\$ 25	\$ 27
LED Lamps	6	6	6	8	-
LED Displays	4	4	4	6	7
Optical Couplers	5	5	4	5	4
Other Optoelectronics	4	4	4	6	16

Source: Dataquest  
March 1988

\*Includes Signetics



# N.V. Philips' Gloeilampenfabrieken

N.V. Philips' Gloeilampenfabrieken  
Groenewoudseweg 1  
5621 Ba Eindhoven  
The Netherlands

N.V. Philips' Gloeilampenfabrieken is a European company. Although not privately owned, balance sheet and income statement data are unavailable.

# N.V. Philips' Gloeilampenfabrieken

## THE COMPANY

### Summary

N.V. Philips' Gloeilampenfabrieken consists of a widely diversified group of companies, engaged primarily in the manufacture and distribution of electronic and electrical products, systems, and equipment. Philips was founded in 1891 in Eindhoven, The Netherlands, and has grown from a small incandescent lamp factory to a leading worldwide manufacturer of consumer and industrial products. Philips ranks 28th among the international Fortune 500.

### Organization

The management of Philips' worldwide operations is centered in Eindhoven and is structured as follows: N.V. Gemeenschappelijk Bezit van Aandeelen Philips Gloeilampenfabrieken (Philips N.V.) operates solely as the holding company for share capital of N.V. Philips Gloeilampenfabrieken (Philips Industries). It holds 99.99 percent of shares and currently has 232.5 million common shares outstanding. There are also 10 priority shares, the majority of which are held by the Dr. A.F. Philips-Stichting, an entity incorporated and established in the Netherlands Antilles.

N.V. Philips' Gloeilampenfabrieken (Philips Industries) functions as the primary holding company for the Philips group of companies. Responsibility for management of the Philips group lies with the Board of Management. The Board of Management is supported by Philips International B.V., which comprises the management and international policy-making departments of the product divisions together with corporate staff departments.

Until December 1986, Philips' operations in the United States were conducted by U.S. Philips Trust. In December 1986, the U.S. Philips Trust was terminated and its assets and liabilities were transferred to Philips Industries in accordance with the Trust Indenture. The operations and businesses previously conducted by the U.S. Philips Trust--principally a 58 percent interest in North American Philips Corporation and a 100 percent interest in Signetics Corporation--are now held by Philips Industries. Signetics is a wholly owned subsidiary of U.S. Philips Corp., which acquired Signetics in 1975.

Four months after assuming control of the American operations, Philips listed shares on the New York Stock Exchange under the symbol PHG. In May 1987, 20.75 million shares were issued and sold at NLG 48.60 and in the United States at \$24.00.

In April 1986, Wisse Dekker, the president of Philips' Board of Management, was succeeded by Cor Van Der Klugt, vice president of the board since 1982. Mr. Dekker became chairman of Philips' supervisory board.

# N.V. Philips' Gloeilampenfabrieken

## OPERATIONS

Philips' current activities are organized by six major product sectors that produce a wide range of products. The product sectors are:

- Lighting
- Consumer Electronics
- Domestic Appliances
- Professional Products and Systems
- Components
- Miscellaneous

These six sectors are used by Philips for financial reporting. Sales by product sector are shown in Table 1.

Table 1

**N.V. Philips' Gloeilampenfabrieken**  
**ESTIMATED REVENUE BY PRODUCT SECTOR**  
**(Millions of Guilders)**

<u>Product Sector</u>	<u>Fiscal Year Ending December 31</u>				
	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Lighting	F 4,661	F 6,348	F 7,471	F 7,910	F 6,771
Consumer Electronics	11,725	11,639	12,417	16,732	16,831
Domestic Appliances	5,151	5,090	6,114	6,639	6,291
Professional Products and Systems	13,721	14,386	15,931	17,520	15,686
Components	5,512	6,257	8,550	8,069	7,379
Miscellaneous	<u>2,221</u>	<u>2,795</u>	<u>3,321</u>	<u>3,175</u>	<u>2,079</u>
Total Revenue	F42,991	F46,515	F53,804	F60,045	F55,037

Source: N.V. Philips' Gloeilampenfabrieken  
Annual Reports  
Dataquest  
October 1987

# N.V. Philips' Gloeilampenfabrieken

Since January 1, 1985, Philips has been organized operationally into product divisions within the six major product sectors. The product divisions are:

- Lighting
- Consumer Electronics
- Major Domestic Appliances
- Domestic Appliances and Personal Care
- Telecommunications and Data Systems
- Defense and Control Systems
- Medical Systems
- ELCOMA (semiconductor and passive components operation)
- Industrial and Electro-acoustic Systems (I & E)

On December 1986, Philips employed approximately 344,200 people. Philips recruited 9,000 people in 1986; however, due to consolidations, 8,000 employees were let go. Of the 9,000 recruited, 4,000 work in Europe, primarily due to a demand for Philips' consumer electronics products and the expansion of Philips' research and development activities, especially in integrated circuits.

## International Operations

Philips operates in more than 100 countries. The Company has its own operations in more than 65 countries and operates through agents in the others. Table 2 presents estimates of Philips' sales by geographic area in 1986.

Philips is structured as a matrix organization. Each of the national organizations is divided into product divisions and several main supply groups (as listed on page 4 under "Operations"). These national organizations and product divisions operate together as equal partners, but they exercise substantial autonomy for maximum marketing adaptability.

# N.V. Philips' Gloeilampenfabrieken

Table 2

N.V. Philips' Gloeilampenfabrieken  
ESTIMATED SALES BY GEOGRAPHIC AREA  
(Millions of Guilders)

	1986	
	<u>Sales</u>	<u>% Growth</u>
The Netherlands	F 3,676	(5%)
Europe excl. Netherlands	28,884	4%
Africa	1,104	(19%)
Asia	3,617	(12%)
Australia and New Zealand	1,314	(26%)
Latin America	3,070	(17%)
North America	<u>13,372</u>	(23%)
Total Sales	F55,037	(8%)

Source: N.V. Philips' Gloeilampenfabrieken  
Annual Reports  
Dataquest  
October 1987

Philips is currently engaged in several cooperative activities worldwide. Some of its cooperative activities that are not consolidated are:

- AT&T International--A joint venture with with AT&T International to develop, produce, and market digital public telephone exchanges and coaxial and optical transmission lines for sale in Europe and in certain countries outside the United States. The venture is called AT&T and Philips Telecommunications (APT).
- Grundig AG--Philips holds 31.6 percent of the capital stock in of Grundig AG, a producer of consumer electronic products. Grundig is a major customer of Philip Components sector. Effective August 1984, Philips agreed to provide funds for financing Grundig's losses, if any, and to guarantee the payments of dividends. Accordingly, Philips includes all of Grundig's results in its financial statements.

## N.V. Philips' Gloeilampenfabrieken

- Matsushita Electronics Corporation--Philips has a 35 percent interest in Matsushita Electronics Corporation (MEC), which produces electronic components and lighting products in Japan. The other 65 percent is held by Matsushita Electric Industrial Company Ltd. of Japan.
- E.I. Du Pont de Nemours & Company--In 1986, Philips and Du Pont Optical Company (PDO) was formed as a joint venture with E.I. Du Pont de Nemours & Company of the United States with each partner having a 50 percent interest. PDO manufactures and markets optical media for consumer and professional applications. Worldwide headquarters for PDO are in The Netherlands.
- R.R. Donnelly & Sons Company--Philips entered joint ventures with R.R. Donnelly & Sons Company (United States) and Toppan Printing Company Ltd. (Japan) to promote the development of software for interactive compact disks.
- Willi Studer AG--Philips has a joint venture with Willi Studer AG (Switzerland) to research and develop professional compact disk systems for radio and television studios.
- Robert Bosch GmbH--Philips formed a joint venture with Robert Bosch GmbH (Federal Republic of Germany) to establish the BTS-Broadcast Television Systems GmbH in which Philips has a 30 percent interest.

### Semiconductor Facilities

Philips and Signetics have semiconductor plants worldwide, located as listed in Table 3.

# N.V. Philips' Gloeilampenfabrieken

Table 3

**N.V. Philips' Gloeilampenfabrieken  
SEMICONDUCTOR PLANT LOCATIONS**

<u>Location</u>	<u>Size (Sq. Ft.)</u>	<u>Products and Technologies</u>
<b><u>Philips</u></b>		
Brazil		
Recife	N/A	Assembly and testing of ICs
Sao Paulo	N/A	Assembly and testing of discretes
France		
Caen	N/A	Integrated circuits: bipolar digital (ECL, TTL), bipolar analog, consumer; discrete devices: power transistors; optoelectronic products
Hong Kong	N/A	Assembly and testing of transistors and diodes
Philippines		
Manila	N/A	Assembly and testing of transistors, diodes, and optoelectronic products
Spain		
Barcelona	N/A	Assembly and testing of small signal diodes and small signal transistors
Switzerland		
Zurich	N/A	ICs: CMOS for clocks, watches, telecommunications, CMOS memories, CLIPS; assembly for small outline packaging
Taiwan		
Kaosiung	N/A	Assembly and testing of ICs

(Continued)

# N.V. Philips' Gloeilampenfabrieken

Table 3 (Continued)

N.V. Philips' Gloeilampenfabrieken  
SEMICONDUCTOR PLANT LOCATIONS

<u>Location</u>	<u>Size (Sq. Ft.)</u>	<u>Products and Technologies</u>
<u>Philips (Continued)</u>		
The Netherlands Nijmegen	N/A	CMOS standard logic families, custom/ semicustom, and analog; bipolar analog; consumer; HF and power transistors; small signal diodes; lasers; assembly for ICs
Sittard	N/A	N/A
Stadskanaal	N/A	Diodes
United Kingdom Southampton	N/A	NMOS ROMs; dedicated consumer logic
Stockport	N/A	Power transistors, power diodes
<u>Signetics</u>		
Japan Tokyo	15,600	Testing only
Korea Seoul	148,700	Assembly and testing
Thailand Bangkok	107,600	Assembly and testing
United States California--Sunnyvale	1,107,300	Wafer fabrication; MOS and bipolar ICs
New Mexico--Albuquerque	238,300	Wafer fabrication; MOS ICs

(Continued)



# N.V. Philips' Gloeilampenfabrieken

Table 3 (Continued)

N.V. Philips' Gloeilampenfabrieken  
SEMICONDUCTOR PLANT LOCATIONS

<u>Location</u>	<u>Size (Sq. Ft.)</u>	<u>Products and Technologies</u>
<u>Signetics</u> (Continued)		
United States Utah--Orem	171,000	Wafer fabrication-bipolar ICs, assembly. Testing of logic and bipolar memory products
West Germany Hamburg	N/A	NMOS microprocessors, controllers, memories; bipolar analog consumer ICs; small signal transistors, Varicap diodes

N/A = Not Available

Source: Dataquest  
October 1987

## Capital Spending

In 1986, expenditures for property, plants, and equipment amounted to F4,667 million, approximately 8 percent of total sales. Table 4 illustrates investment by product sector.

Capital investment by geographic area is shown in Table 5.

# N.V. Philips' Gloeilampenfabrieken

Table 4

**N.V. Philips' Gloeilampenfabrieken  
CAPITAL INVESTMENT BY PRODUCT SECTOR  
(Millions of Guilders)**

<u>Product Sector</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Lighting	F 239	F 368	F 523	F 486
Consumer Electronics	358	570	843	860
Domestic Appliances	129	216	268	314
Professional Products and Systems	528	677	722	865
Components	710	1,341	1,509	1,393
Miscellaneous	177	234	199	215
Not Allocated to Product Sectors	<u>350</u>	<u>437</u>	<u>477</u>	<u>534</u>
Gross Investments	F2,491	F3,843	F4,541	F4,667
Retired and Sold	<u>(383)</u>	<u>(386)</u>	<u>(325)</u>	<u>(375)</u>
Net Acquisitions	F2,108	F3,457	F4,216	F4,292

Source: N.V. Philips' Gloeilampenfabrieken  
Annual Report  
Dataquest  
October 1987

# N.V. Philips' Gloeilampenfabrieken

Table 5

N.V. Philips' Gloeilampenfabrieken  
CAPITAL INVESTMENT BY GEOGRAPHIC AREA  
(Millions of Guilders)

<u>Region</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
The Netherlands	F 597	F 799	F1,245	F1,410
Europe excl. Netherlands	1,024	1,573	2,070	2,093
Africa	20	25	26	16
Asia	119	212	268	275
Australia and New Zealand	56	87	52	25
Latin America	115	121	113	157
North America	<u>560</u>	<u>1,026</u>	<u>767</u>	<u>691</u>
Total Investment	F2,491	F3,843	F4,541	F4,667

Source: N.V. Philips' Gloeilampenfabrieken  
Annual Report  
Dataquest  
October 1987

## Research and Development

Philips spent F4,182 million, or 7.6 percent of sales, on R&D in 1986. Allocation of the research budget to finance the research organization is through a straight levy on each product division's sales. The research organization reports directly to the Board of Management. The research organization sets its own program and is free to undertake diverse, in-depth projects. In the short term, the product divisions have little influence over the research organization. However, research forms the long-term basis for the process of renewing products and methods of production.

The Philips Research Laboratories, in Eindhoven, carries out most of the Company's research activities. This laboratory houses half of the total research staff of approximately 4,000 people. In addition, the Company has major research laboratories in the following locations:

- Philips Research Labs--Redhill, Surrey, England
- Laboratoires d'Electronique et de Physique Appliquee (LEP)--Limeil-Brevannes, France

## N.V. Philips' Gloeilampenfabrieken

- Philips Forschungslaboratorium (PFA)--Aachen, West Germany
- Philips Forschungslaboratorium (PFA)--Hamburg, West Germany
- Philips Research Laboratory Brussels (PRLB)--Brussels, Belgium
- Philips Laboratories--Briarcliff Manor, New York, United States
- Philips Research Laboratories Sunnyvale (PRLS)--Sunnyvale, California, United States

A small research group in Belgium specializes in software research.

### Semiconductor-Related R&D

Philips R&D projects in the semiconductor area include continuing research into gallium arsenide products. This involves methods for growing gallium arsenide and indium-phosphide ingots; methods for depositing thin layers such as vapor-phase, liquid-phase, molecular beam epitaxy, and metal organic chemical vapor deposition; ion implantation techniques; and aids for design and characterization of devices.

Under the auspices of the ESPRIT program, Philips is cooperating with other European companies and universities.

The Megaproject is a five-year, \$470 million joint research project with Siemens. The goal is to develop a submicron CMOS process for use in the manufacture of 1-Mbit SRAMs and 4-Mbit DRAMs. The products are expected to be ready for the commercial market by the end of 1988 or early 1989. It will be partly financed by both the Dutch and West German governments (\$140 million).

A special R&D center, built at Eindhoven for the Megaproject program, was opened in December 1986. The new center was built at a cost of more than \$220 million and includes both design and technology facilities.

Philips and four Dutch universities launched a \$12 million research project in December 1986, to develop a prototype of a parallel processing computer. The four-year program will receive a \$2 million government subsidy, with the balance coming from Philips. About 20 researchers will be employed on the project.

Philips has also formed a \$2.9 million R&D company, Silicon Software Systems, Ltd., in Dublin, Ireland. The new company will develop digital signal processing and image processing ICs and software for use in consumer products and for worldwide sale.

# N.V. Philips' Gloeilampenfabrieken

## SEMICONDUCTOR ACTIVITIES

Philips' semiconductor and passive components operation, ELCOMA, is part of the industrial supplies sector. Within ELCOMA, semiconductor manufacturing activities are divided into ICs and discretes. ELCOMA coordinates its activities with Signetics Corporation.

### Signetics Corporation

Signetics Corporation manufactures ICs for a wide range of applications, including many that meet military specifications. It employs more than 8,000 people and maintains its headquarters in Sunnyvale, California.

Signetics maintains a very close relationship to Philips even though Signetics is a separate organization in a legal sense. Philips Research Laboratory Sunnyvale (PRLS), California, comes under the auspices of Philips' research in Eindhoven, although it is part of Signetics. PRLS also works closely with other research establishments in the United States, namely Stanford University and the University of California at Berkeley.

From 1979 to 1981, Signetics' capital spending rose from \$50 million to \$115 million as it expanded its Orem, Utah facility. The Company's North American capital spending rose sharply from 1982 and 1983 figures of \$55 million and \$58 million, respectively, to \$133 million in 1984. In 1986, Signetics spent \$60 million, 20 percent more than 1985's \$50 million. Approximately 83 percent, or \$50 million, of its 1986 expenditures was for equipment. Dataquest expects Signetics' capital spending to increase 67 percent from 1986 to about \$100 million in 1987. The focus of its 1987 spending will be to bring Fab 23 in Albuquerque, New Mexico, on line in 1988. This new fab will run 6-inch CMOS, 1-micron wafers. SMD will be another focus of capital spending for Philips-Signetics in 1987.

Signetics maintains its own marketing network that includes 34 sales offices in Canada, Japan, and the United States as well as 30 representatives and authorized distributors in 150 locations. In addition, 60 Philips national sales organizations market Signetics circuits in various countries around the world.

### Semiconductor Product Markets

Combined, Philips-Signetics is the sixth largest worldwide semiconductor manufacturer. Revenue for 1986 was \$1,361 million, 28 percent more than in 1985. Table 6 shows Dataquest's estimates of the combined worldwide semiconductor revenue for Philips and Signetics.

# N.V. Philips' Gloeilampenfabrieken

Table 6

**N.V. Philips' Gloeilampenfabrieken  
Signetics Corporation  
ESTIMATED WORLDWIDE SEMICONDUCTOR REVENUE BY PRODUCT LINE  
(Millions of Dollars)**

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
<b>Total Semiconductor</b>	<b>\$797</b>	<b>\$917</b>	<b>\$1,325</b>	<b>\$1,065</b>	<b>\$1,361</b>
<b>Total Integrated Circuit</b>	<b>\$570</b>	<b>\$694</b>	<b>\$1,090</b>	<b>\$ 808</b>	<b>\$1,033</b>
<b>Bipolar Digital (Technology)</b>	<b>\$278</b>	<b>\$344</b>	<b>\$ 589</b>	<b>\$ 372</b>	<b>\$ 380</b>
TTL	254	320	551	337	359
ECL	22	22	37	34	16
Other Bipolar Digital	2	2	1	1	5
<b>Bipolar Digital (Function)</b>	<b>\$278</b>	<b>\$344</b>	<b>\$ 589</b>	<b>\$ 372</b>	<b>\$ 380</b>
Bipolar Digital Memory	82	89	121	80	53
Bipolar Digital Logic	196	255	468	292	327
<b>MOS (Technology)</b>	<b>\$ 99</b>	<b>\$155</b>	<b>\$ 266</b>	<b>\$ 228</b>	<b>\$ 311</b>
NMOS	64	103	187	138	180
PMOS	24	-	-	-	-
CMOS	11	52	79	90	131
<b>MOS (Function)</b>	<b>\$ 99</b>	<b>\$155</b>	<b>\$ 266</b>	<b>\$ 228</b>	<b>\$ 311</b>
MOS Memory	26	27	32	35	11
MOS Microdevices	18	45	104	64	85
MOS Logic	55	83	130	129	215
<b>Linear</b>	<b>\$193</b>	<b>\$195</b>	<b>\$ 235</b>	<b>\$ 208</b>	<b>\$ 342</b>
<b>Total Discrete</b>	<b>\$208</b>	<b>\$204</b>	<b>\$ 217</b>	<b>\$ 232</b>	<b>\$ 301</b>
<b>Transistor</b>	<b>\$126</b>	<b>\$124</b>	<b>\$ 131</b>	<b>\$ 142</b>	<b>\$ 180</b>
Small Signal Transistor	86	85	88	93	122
Power Transistor	40	39	43	49	58
<b>Diode</b>	<b>\$ 76</b>	<b>74</b>	<b>\$ 78</b>	<b>\$ 81</b>	<b>\$ 111</b>
Small Signal Diode	44	43	44	46	44
Power Diode	26	25	27	28	49
Zener Diode	6	6	7	7	18

(Continued)

# N.V. Philips' Gloeilampenfabrieken

Table 6

N.V. Philips' Gloeilampenfabrieken  
Signetics Corporation  
ESTIMATED WORLDWIDE SEMICONDUCTOR REVENUE BY PRODUCT LINE  
(Millions of Dollars)

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Thyristor	\$ 5	\$ 5	\$ 6	\$ 9	\$ 8
Other Discrete	\$ 1	\$ 1	\$ 2	\$ 2	\$ 3
Total Optoelectronic	\$ 19	\$ 19	\$ 18	\$ 25	\$ 27
LED Lamps	6	6	6	8	-
LED Displays	4	4	4	6	7
Optical Couplers	5	5	4	5	4
Other Optoelectronics	4	4	4	6	16

Source: Dataquest  
October 1987

Philips-Signetics showed increases exceeding the industry growth rate in the MOS digital, linear, and total discrete markets. The most significant increase was in linear devices, where it showed an increase of 64 percent as opposed to the industry growth of 30 percent. Table 7 shows the ranking for Philips-Signetics based on Dataquest's estimates of semiconductor revenue.

# N.V. Philips' Gloeilampenfabrieken

Table 7

**Philips-Signetics  
Worldwide Ranking by Semiconductor Markets  
(Sales in Millions of Dollars)**

	<u>1986 Rank</u>	<u>1985 Rank</u>	<u>1986 Sales</u>	<u>Sales % Change 1985-1986</u>	<u>Industry % Change 1985-1986</u>
Total Semiconductor	6	6	\$1,361	28%	25%
Total IC	7	9	\$1,033	28%	24%
Bipolar Digital	3	3	380	2%	14%
MOS Digital	12	13	311	36%	25%
Linear	6	9	342	64%	30%
Total Discrete	5	5	\$ 301	30%	25%
Total Optoelectronics	17	17	\$ 27	8%	37%

Source: Dataquest  
October 1987

Table 8 shows Philips-Signetics' semiconductor revenue by geographic region.



# N.V. Philips' Gloeilampenfabrieken

Table 8

**N.V. Philips' Gloeilampenfabrieken  
Signetics Corporation  
ESTIMATED 1986 WORLDWIDE SEMICONDUCTOR REVENUE BY REGION  
(Millions of Dollars)**

	<u>Europe</u>	<u>Japan</u>	<u>U.S.</u>	<u>ROW</u>	<u>World</u>
Total Semiconductor	\$820	\$35	\$341	\$165	\$1,361
Total Integrated Circuit	\$562	\$35	\$325	\$111	\$1,033
Bipolar Digital (Technology)	97	21	229	33	380
MOS	38	4	254	15	311
Linear	211	10	58	63	342
Total Discrete	\$234	-	\$ 14	\$ 53	\$ 301
Transistor	142	-	8	30	180
Diode	83	-	6	22	111
Thyristor	7	-	-	1	8
Other Discrete	3	-	-	-	3
Total Optoelectronic	\$ 24	-	\$ 2	\$ 1	\$ 27

Source: Dataquest  
October 1987

## Semiconductor Products and Technologies

Signetics offers a wide range of products in the following product areas:

- Digital logic--TTL/LSIs, FAST, ALS, 10K/100K/100S ECL, 4000 Series, HC/HCT, ACL, LSI
- Microcomponents--NMOS/CMOS/bipolar microcontrollers, I2C micro-controllers, 68000, microperipherals
- Memory--PROMs, EPROMs, bipolar RAMs
- ASICS--programmable logic, ECL gate array, CMOS SystemCell
- Linear--amplifiers, communication and video devices, power conversion, interface/data conversion, I2C, automotive

## N.V. Philips' Gloeilampenfabrieken

The following are some 1986 and 1987 highlights of Philips' semiconductor activities:

- In July 1987, Philips and the Societe Suisse de Microelectronique d'Horlogerie (SMH), a Swiss watchmaker, agreed in principle to merge their Swiss semiconductor operations into a joint venture. SMH will hold a majority stake in the new company, which will include assets of its own Technology Division and Philips Faselec AG affiliate. The joint venture will focus on circuits for the watch industry and pursue niche markets for low-power telephony and consumer electronics circuits.
- In July 1987, Philips announced that it had produced a functional submicron 1-Mbit SRAM in its research facilities in The Netherlands, achieving its first major goal under the Megaproject. The device, which was produced using a CMOS process with a six-transistor cell, has an access time of 25ns at 20 MHz.
- In June 1987, the ELCOMA division and Plessey Semiconductors Ltd. of Britain announced that they are collaborating on a I2C bus-controlled phase-locked loop (PLL) synthesizer circuit for TV tuning. Philips developed the I2C bus, which offers a highly modular system approach. Plessey will design the front-end prescaler and provide its know-how in TV applications. Both companies will make the device but will market it independently.
- In February 1987, Philips, European Silicon Structures (ES2), and Texas Instruments (TI) agreed to extend prototyping services for the SystemCell range of CMOS standard cells. In addition to high-volume manufacturing and standard prototyping, Philips and TI will also offer accelerated prototyping in cooperation with ES2.

Philips and TI already have a second-sourcing agreement from early 1985 on the firms' twin-well, 3-micron CMOS processes, which was extended in early 1986 to include 2-micron standard cell technology.

- In December 1986, Philips announced it was building a \$50 million, highly automated, liquid crystal display production center in Heerlen, The Netherlands.
- In December 1986, Philips and Matsushita agreed to join forces to launch a new family of 8-bit CMOS microcontrollers. Under the agreement, Matsushita will manufacture and market the PCF84Cxx family designed by Philips.

# N.V. Philips' Gloeilampenfabrieken

- In November 1986, Philips offered its first EEPROM, the PCF8582. The 2K CMOS device, organized 256x8, is designed in a floating-gate technology and targets data processing, automotive, and battery-powered consumer product applications.
- In November 1986, Philips offered the 27C256, a 256K CMOS EPROM. It joined a 64K CMOS UV EPROM that was offered in July 1986. Philips plans to use the newly acquired CMOS EPROM technology, the result of a technology agreement with Intel, to develop other products in its Programmable Products group.
- In November 1986, Philips announced that it will take a 27.5 percent share in the \$150 million Taiwan Semiconductor Manufacturing Corp. The new company, located Taiwan, was formed to be a foundry operation intended to produce a wide variety of ICs.
- In April 1986, memory start-up Vitelic Corporation signed a deal with Philips for the exchange of design and process expertise. Vitelic will design a family of fast CMOS SRAMs for Philips; both companies will have the right to sell them. Vitelic also acquired access to Philips process technology.
- In April 1986, Philips moved its Philips Electronic Building Elements Industries Ltd. (PEBEI) operations in Taiwan from Kaohsiung Export Processing Zone into a new factory in the Nantze Export Processing Zone as part of a plan to step up production of both ICs and passive components. PEBEI now consists of three divisions: IC Assembly and Test, Passive Components Division, and a recently launched IC Design Center.

## NONSEMICONDUCTOR PRODUCTS SUMMARY

Philips product sectors offer a wide range of products, which are summarized below, along with other highlights.

### Lighting

The Lighting and Batteries sector produces incandescent lamps, high- and low-pressure gas discharge lamps, luminaires, lighting projects, appliances for photographic purposes and photoflash lamps, batteries and solar collectors, glass, diamond drawing dies, wires, and other components.

# N.V. Philips' Gloeilampenfabrieken

## Consumer Electronics

The Consumer Electronics sector includes the Consumer Electronics product division, the Home Interactive Systems group, and Polygram B.V. Major product categories in this sector are television and radio receivers, video and audio recorders, playback equipment for sound and vision, projection television, video cameras, video games, magnetic tape, home computers, and hearing aids.

## Domestic Appliances

The Domestic Appliances sector comprises the Major Appliance division and the Domestic Appliances and Personal Care division. Products include washing machines and dryers, dishwashers, refrigerators and freezers, cooking appliances, vacuum cleaners, floor polishers, electric irons, food preparation machines, mixers and other small kitchen appliances, microwave ovens, coffee makers, toasters and grills, heating appliances and fans, clocks, electric shavers, solarium, and other personal care products.

## Professional Products and Systems

The Professional Products and Systems sector comprises the Medical Systems division, Industrial and Electroacoustic Systems division, Telecommunication and Data Systems division, and Defense and Control Systems division. In 1986, Philips sold Felton & Guillaume Energietechnik GmbH and significantly reduced its interests in Unidare p.l.c. and NKF Kabel B.V. Products of this sector include telecommunications systems, cable products and systems, defense systems, small computer systems, electronic office equipment, medical systems for diagnosis and therapy, instruments for laboratories and industry, television studio and transmitting equipment and cable television, audiovisual communication and security systems, machines, instruments, and tools.

## Components

The activities in the Components sector are conducted by the Subsystems and Peripherals group in addition to the ELCOMA division. The nonsemiconductor products include CD-ROMs, digital optical recording systems, picture tubes, and magnetic tape drives.

# N.V. Philips' Gloeilampenfabrieken

## Miscellaneous

Companies included in the Miscellaneous sector are Anchor Brush Company, Inc., a producer of toothbrushes and packaging for the cosmetics and pharmaceutical industry, and The Selmer Company, a manufacturer of band and orchestral instruments. In 1986, Baker Knapp and Tubbs Inc., operating in the North American furniture business and previously included in this sector, was divested.

# N.V. Philips Gloeilampenfabrieken

## THE COMPANY

### Background

N.V. Philips Gloeilampenfabrieken (Philips) was founded by Gerard Philips in 1891, as a small factory in Eindhoven, The Netherlands, to manufacture carbon-filament lamps. Gerard's younger brother, Anton Philips, joined the struggling company in early 1895, and by 1903, Philips was the third-largest European lamp manufacturer.

At the outbreak of World War I, Philips was the largest incandescent lamp producer in Europe. After 1918, while lighting was undergoing great development, Philips entered the electronics field, the Dutch government having asked the Company to make thermionic valves (radio valves) for telecommunications.

Philips' Physical Research Laboratory, established in 1914, had already conducted some basic research on electronics. In the early 1920s, Philips began producing X-ray tubes and radio valves on a commercial scale, paving the way for the Medical Systems Division and the Electronic Components and Materials Division (ELCOMA).

In 1927, the first complete Philips radio receiver appeared at the Utrecht Trade Fair. This unit was the culmination of Philips' early corporate policy to maintain a leading position in the developing components market, and it laid the foundation for Philips' activities in the electronics field.

During the 1930s, Philips further developed its lighting, components, and radio products, partly through the Company's ongoing research activities and partly as a consequence of the experience gained in component development in the 1920s. The introduction of the Philips electric shaver in 1939 opened up a new field of application for the small electric motor and, subsequently, the domestic appliances sector.

World War II seriously hindered expansion of Philips' product range. However, by the end of 1946, production was back to the prewar level. Since then, the Company's product range and geographic area of operations have continued to expand. Philips now conducts operations in more than 100 countries and is one of the world's largest producers of electronics, communications, and lighting equipment.

# N.V. Philips Gloeilampenfabrieken

## Operations

As of the end of 1986, Philips' current activities centered on six major product sectors serving different industry segments. The main product sectors include:

- Lighting and batteries
- Home electronics for sound and vision
- Domestic appliances and personal care products
- Products and systems for professional applications
- Industrial supplies (includes semiconductor activities)
- Miscellaneous activities (includes musical instruments, furniture, sports articles)

Sales by product sector are shown in Table 1. These six sectors are used by Philips for financial reporting.

Since January 1, 1985, Philips has been organized operationally into product divisions within the six major product sectors. The product divisions are as follows:

- |   |   |
|---|---|
| • Lighting  | • Defense and control systems                         |
| • Consumer electronics  | • Data systems  |
| • Small domestic appliances   | • Medical systems                                     |
| • Major domestic appliances   | • ELCOMA  |
| • Telecommunications systems<br>(merged with Data Systems<br>later in 1985) | • Industrial and electro-<br>acoustic systems (I & E) |

## International Operations

Philips operates in more than 100 countries. The Company has its own operations in more than 65 countries and operates through agents in the others. Table 2 presents estimates of Philips' sales by geographic area in 1986.

# N.V. Philips Gloeilampenfabrieken

Table 1

**N.V. Philips Gloeilampenfabrieken**  
**ESTIMATED REVENUE BY PRODUCT SECTOR**  
**(Millions of Guilders)**

<u>Product Sector</u>	<u>Fiscal Year Ending December 31</u>				
	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Lighting and Batteries	F 4,661	F 6,348	F 7,471	F 7,910	F 6,771
Home Electronics for Sound and Vision	11,725	11,639	12,417	16,732	16,831
Domestic Appliances and Personal Care Products	5,151	5,090	6,114	6,639	6,291
Products and Systems for Professional Applications	13,721	14,386	15,931	17,520	15,686
Industrial Supplies	5,512	6,257	8,550	8,069	7,379
Miscellaneous Activities	<u>2,221</u>	<u>2,795</u>	<u>3,321</u>	<u>3,175</u>	<u>2,079</u>
Total Revenue	F42,991	F46,515	F53,804	F60,045	F55,037

Source: N.V. Philips  
Gloeilampenfabrieken  
Annual Reports  
Dataquest  
June 1987



# N.V. Philips Gloeilampenfabrieken

Table 2

**N.V. Philips Gloeilampenfabrieken**  
**ESTIMATED SALES BY GEOGRAPHIC AREA**  
(Billions of Guilders)

Area	1986	
	Sales	% Growth
The Netherlands	F 3,676	7%
Europe (excluding Netherlands)	28,884	52
North America	13,372	24
Latin America	3,070	6
Africa	1,104	2
Asia	3,617	7
Australia and New Zealand	<u>1,314</u>	<u>2</u>
Total Sales	F55,037	100%

Source: N.V. Philips  
Gloeilampenfabrieken  
Annual Reports  
Dataquest  
June 1987

## Research and Development

Philips' research and development (R&D) headquarters are in Eindhoven, which houses half of the total research staff of approximately 4,300 people. In addition, the Company has major research laboratories in Redhill, the United Kingdom; Aachen and Hamburg, West Germany; Paris, France; Briarcliff Manor, New York, and Sunnyvale, California, United States. A small research group in Belgium specializes in software research.

Philips spent F 4,182 million on R&D in 1986 up 4 percent over 1985. Allocation of the research budget to finance the research organization is through a straight levy on each product division's sales. The research organization reports directly to the Board of Management. The research organization sets its own program and has the freedom to undertake diverse, in-depth projects. In the short term, the product divisions have little influence over the research organization. However, research forms the long-term basis for the process of renewing products and methods of production.

# N.V. Philips Gloeilampenfabrieken

Semiconductor-related R&D includes:

- Continuing research into gallium arsenide products, including methods for growing gallium arsenide and indium-phosphide ingots; methods for depositing thin layers such as vapor-phase, liquid-phase, molecular beam epitaxy, and metal organic chemical vapor deposition; ion implantation techniques; and aids for design and characterization of devices
- Cooperation with other European companies and universities under the auspices of the ESPRIT program
- The Megaproject--a five-year agreement with Siemens (see the section called "Prior-Year" Highlights)
- The opening of a technology center in Sunnyvale, California, to further R&D in IC technology
- Research into different types of displays, such as cathode ray tubes, flat screen

## Company Structure

Since 1980, Philips has restructured a number of product lines (e.g., audio equipment, television receivers, capacitors, lighting products, electronic valves, professional tubes, and glass). This restructuring has reduced the number of employees and improved the Company's profitability. At the end of 1986, total employees numbered 344,200, a net increase of 3 percent over 1985. A breakdown of the number of employees by category is shown in Table 3.

Philips is structured as a matrix organization. Each of the national organizations is divided into 12 product divisions and several main supply groups (as listed under Operations). These national organizations and product divisions operate together as equal partners, but they exercise substantial autonomy for maximum marketing adaptability.

# N.V. Philips Gloeilampenfabrieken

Table 3

**N.V. Philips Gloeilampenfabrieken  
NUMBER OF EMPLOYEES BY CATEGORY  
(Average 1986)**

<u>Category</u>	<u>Number</u>
Research and Development	41,033
Production	199,981
Other	<u>105,875</u>
<b>Total</b>	<b>346,889</b>

Source: N.V. Philips  
Gloeilampenfabrieken  
Annual Reports  
Dataquest  
June 1987

In 1981, the Company decided to change the organization of its activities in The Netherlands by dissolving the two corporate bodies that headed the organization (N.V. Gemeenschappelijk Bezit van Aandeelen Philips and N.V. Philips Gloeilampenfabrieken) and forming a new legal entity. The head of the national organizations and product divisions is the new N.V. Philips Gloeilampenfabrieken, which operates as the international holding company from which the Board of Management performs its functions. N.V. Philips Gloeilampenfabrieken has two new subsidiary companies in The Netherlands:

- Philips International B.V., a service company in which world product policy is decided and preparation and support of total company policy takes place
- Nederlandse Philips Bedrijven B.V., an operating company that incorporates operational activities in The Netherlands and from which services are supplied to The Netherlands and abroad

In addition to the wholly owned national operations, there is the United States Philips Trust. It is purely a holding company, and holds more than 60 percent of quoted shares in North American Philips Corporation and in a number of other companies in the United States. (North American Philips is the operating company to which all the U.S. operating companies belong except for Signetics, which belongs to the Trust through the U.S. Philips Corporation.) The main purpose of the United States Philips Trust is to preserve and advance N.V. Philips' business operations in the United States.

# N.V. Philips Gloeilampenfabrieken

At the outbreak of World War II, trusts were set up in all countries where Philips had a presence, to ensure that the Company did not fall into the hands of the Third Reich. The trusts were legally independent bodies, and membership stipulated that at least one member be a Dutch Philips executive. After the war, all the trusts were dissolved except for the United States Philips Trust, which can only be dissolved by mutual consent or upon the death of the last relative who was alive when the Trust was formed in 1939.

## Capital Expenditures

In 1986, expenditures for property, plants, and equipment amounted to F 4,667 million, approximately 8.4 percent of total sales. Table 4 illustrates investment by product sector.

Table 4

**N.V. Philips Gloeilampenfabrieken  
CAPITAL INVESTMENT BY PRODUCT SECTOR  
(Millions of Guilders)**

<u>Product Sector</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Lighting and Batteries	F 239	F 368	F 523	F 486
Home Electronics for Sound and Vision	358	570	843	860
Domestic Appliances and Personal Care Products	129	216	268	314
Products and Systems for Professional Applications	528	677	722	865
Industrial Supplies	710	1,341	1,509	1,393
Miscellaneous Activities	177	234	199	215
Not Allocated to Product Sectors	<u>350</u>	<u>437</u>	<u>477</u>	<u>534</u>
Gross Investments	F2,491	F3,843	F4,541	F4,667
Retired and Sold	<u>(383)</u>	<u>(386)</u>	<u>(325)</u>	<u>(375)</u>
Net Acquisitions	F2,108	F3,457	F4,216	F4,292

Source: N.V. Philips  
Gloeilampenfabrieken  
1986 Annual Report  
Dataquest  
June 1987

# N.V. Philips Gloeilampenfabrieken

## MAJOR ACTIVITIES

Philips manufactures a wide range of products, including the following:

- Lighting and batteries--Incandescent lamps, high- and low-pressure gas discharge lamps, luminaires, lighting projects, appliances for photographic purposes and photoflash lamps, batteries and solar collectors, glass, diamond drawing dies, wires, and other components
- Home electronics for sound and vision--Television and radio receivers, video and audio recorders, playback equipment for sound and vision, projection television, video cameras, video games, magnetic tape, and hearing aids
- Domestic appliances and personal care products--Washing machines and dryers, dishwashers, refrigerators and freezers, cooking appliances, vacuum cleaners, floor polishers and electric irons, food preparation machines, mixers and other small kitchen appliances, microwave ovens, coffee makers, toasters and grills, heating appliances and fans, clocks, electric shavers, solararia, and other personal care products
- Products and systems for professional applications--Telecommunications systems, cable products and systems, defense systems, small computer systems, electronic office equipment, medical systems for diagnosis and therapy, instruments for laboratories and industry, television studio and transmitting equipment and cable television, audiovisual communication and security systems, machines, instruments, and tools
- Industrial supplies--Picture tubes and television glass, integrated circuits, transistors and diodes, passive components, corrugated cardboard, welding products
- Miscellaneous activities--Musical instruments, brush products and plastics products, furniture, bus line operations, bicycles, sporting goods, retail activities, and other activities

## Outlook

Dataquest foresees Philips' future involvement in the following:

- Philips is committed to creating greater industrial and, eventually, political integration in Europe. The innovative products of the 1980s and 1990s in telecommunications, office automation, data processing, and consumer electronics will require larger markets and financial resources than those currently available to any corporation in Europe.

# N.V. Philips Gloeilampenfabrieken

- The Company's worldwide aim is to do 30 percent of its business in each of three "centers of competence"--Europe, North America, and the Pacific Basin--within the next 10 years.

The following are some 1985 highlights of Philips' semiconductor activities:

- In May 1985, Philips signed an agreement with Sharp for the supply of automated manufacturing equipment and technology for a liquid crystal display plant planned to be built in Heerlen, The Netherlands, at a cost of \$29 million.
- In July 1985, Philips previewed its M7000 cellular car phone. The model will be manufactured at Philips' factory in Sweden, where there is already a mobile phone systems factory.
- In July 1985, Philips started shipments to Digital Equipment Corporation of its CM100 professional CD-ROM drives, for inclusion in the MicroVAX II. Each CD-ROM disk provides up to 600 Mbytes of memory. Philips expects shipments of 1,000 CM100 drives during 1985 and volume sales in 1986.
- In July 1985, Philips was one of four largest European electronics firms (with GEC, Siemens, and Thomson) to give support to the Eureka project. The four companies announced that they would submit a plan for Eureka the end of 1985.
- In August 1985, Philips reported a steep decline in fiscal 1985 profits, particularly in North America through Signetics.
- In August 1985, Philips Research Laboratories in France announced the development of the first European 1-Kbit SRAM in gallium arsenide.
- In September 1985, Philips announced that it was collaborating with Siemens in the development of a product that will combine both bipolar and CMOS transistors. The study is called the BICMOS project, and it is funded by the ESPRIT program. The universities of Dublin and Stuttgart are also involved.
- In September 1985, Philips announced plans to begin producing VHS video cassette recorders (VCRs) in Japan. Planned production capacity is 100,000 VCRs a year. Another VCR plant, with a capacity of between 400,000 and 500,000, is being built in South Korea.

## N.V. Philips Gloeilampenfabrieken

- In April 1986, Taiwanese start-up Vitelic signed a deal with Philips for the exchange of design and process expertise. Vitelic will design a family of FAST CMOS static RAMs for Philips; both companies will have the right to sell them. Vitelic also acquired access to Philips process technology.
- In June 1986, Philips launched a joint venture agreement with Gold Peak Industries of Hong Kong to produce and market car audio equipment for the Far East.
- In July 1986, Philips and Siemens agreed on a common architecture for their ISDN chips.
- In February 1987, Philips invested £9 million in the expansion of its Bishopsbriggs plant in Glasgow, to prepare for the U.K. launch of its digital private telephone exchange.

# N. V. Philips Gloeilampenfabrieken

Table I

**N.V. Philips Gloeilampenfabrieken**  
**ESTIMATED SEMICONDUCTOR REVENUE**  
(Millions of Dollars)

	1978	1979	1980	1981	1982	1983	1984	1985
Total Semiconductor	405	496	551	462	457	482	560	598
Total Integrated Circuit	141	215	255	224	230	259	325	338
Bipolar Digital (Technology)	15	24	33	30	34	29	19	20
TTL	1	7	18	16	21	18	5	5
ECL	8	12	13	12	11	9	13	14
Other Bipolar Digital	6	5	2	2	2	2	1	1
Bipolar Digital (Function)	15	24	33	30	34	29	19	20
Memory		0	0	0	0	0	1	0
Logic		24	33	30	34	29	18	20
MOS Digital (Technology)	30	48	70	64	61	100	161	163
NMOS		14	27	29	26	48	82	73
PMOS		24	27	24	24	0	0	0
CMOS		10	16	11	11	52	79	90
MOS Digital (Function)	30	48	70	64	61	100	161	163
Memory		1	2	3	2	2	2	5
Micro Devices		3	3	3	4	15	29	29
Logic		44	65	58	55	83	130	129
Linear	96	143	152	130	135	130	145	155
Total Discrete	246	260	273	219	208	204	217	235
Transistor	148	156	155	132	126	124	131	142
Small Signal Transistor	103	107	102	88	86	85	88	93
Power Transistor	45	49	53	44	40	39	43	49
Diode	89	94	109	80	76	74	78	81
Small Signal Diode	57	59	69	47	44	43	44	46
Power Diode	25	28	32	27	26	25	27	28
Zener Diode	7	7	8	6	6	6	7	7
Thyristor	8	8	8	6	5	5	6	9
Other Discrete	1	2	1	1	1	1	2	3
Total Optoelectronic	18	21	23	19	19	19	18	25
LED Lamps	6	8	7	6	6	6	6	8
LED Displays	7	5	5	4	4	4	4	6
Optical Couplers	2	4	6	5	5	5	4	5
Other Optoelectronic	3	4	5	4	4	4	4	6

Source: DATAQUEST  
November 1986



# N. V. Philips Gloeilampenfabrieken

Table 2

**N.V. Philips and Signetics Corporation**  
**ESTIMATED SEMICONDUCTOR REVENUE**  
**(Millions of Dollars)**

	1978	1979	1980	1981	1982	1983	1984	1985
Total Semiconductor	619	761	935	828	797	917	1325	1068
Total Integrated Circuit	355	480	639	590	570	694	1090	808
Bipolar Digital (Technology)	147	199	319	298	278	344	589	372
TTL	123	170	288	272	254	320	551	337
ECL	14	21	25	23	22	22	37	34
Other Bipolar Digital	10	8	6	3	2	2	1	1
Bipolar Digital (Function)	147	199	319	298	278	344	589	372
Memory		51	127	120	82	89	121	80
Logic		148	192	178	196	255	468	292
MOS Digital (Technology)	62	83	110	100	99	155	266	228
NMOS		39	60	63	64	103	187	138
PMOS		34	34	26	24	0	0	0
CMOS		10	16	11	11	52	79	90
MOS Digital (Function)	62	83	110	100	99	155	266	228
Memory		21	30	24	26	27	32	35
Micro Devices		12	13	17	18	45	104	64
Logic		50	67	59	55	83	130	129
Linear	146	198	210	192	193	195	235	208
Total Discrete	246	260	273	219	208	204	217	235
Transistor	148	156	155	132	126	124	131	142
Small Signal Transistor	103	107	102	88	86	85	88	93
Power Transistor	45	49	53	44	40	39	43	49
Diode	89	94	109	80	76	74	78	81
Small Signal Diode	57	59	69	47	44	43	44	46
Power Diode	25	28	32	27	26	25	27	28
Zener Diode	7	7	8	6	6	6	7	7
Thyristor	8	8	8	6	5	5	6	9
Other Discrete	1	2	1	1	1	1	2	3
Total Optoelectronic	18	21	23	19	19	19	18	25
LED Lamps	6	8	7	6	6	6	6	8
LED Displays	7	5	5	4	4	4	4	6
Optical Couplers	2	4	6	5	5	5	4	5
Other Optoelectronic	3	4	5	4	4	4	4	6

Source: DATAQUEST  
November 1986

# N. V. Philips Gloeilampenfabrieken

## THE COMPANY

### Background

N.V. Philips Gloeilampenfabrieken (Philips) was founded by Gerard Philips in 1891, as a small factory in Eindhoven, The Netherlands, to manufacture carbon-filament lamps. Gerard's younger brother, Anton Philips, joined the struggling company in early 1895, and by 1903, Philips was the third-largest European lamp manufacturer.

At the outbreak of World War I, Philips was the largest incandescent lamp producer in Europe. After 1918, while lighting was undergoing great development, Philips entered the electronics field, the Dutch government having asked the Company to make thermionic valves (radio valves) for telecommunications.

Philips' Physical Research Laboratory, established in 1914, had already conducted some basic research on electronics. In the early 1920s, Philips began producing X-ray tubes and radio valves on a commercial scale, paving the way for the Medical Systems Division and the Electronic Components and Materials Division (ELCOMA).

In 1927, the first complete Philips radio receiver appeared at the Utrecht Trade Fair. This unit was the culmination of Philips' early corporate policy to maintain a leading position in the developing components market, and it laid the foundation for Philips' activities in the electronics field.

During the 1930s, Philips further developed its lighting, components, and radio products, partly through the Company's ongoing research activities and partly as a consequence of the experience gained in component development in the 1920s. The introduction of the Philips electric shaver in 1939 opened up a new field of application for the small electric motor and, subsequently, the domestic appliances sector.

World War II seriously hindered expansion of Philips' product range. However, by the end of 1946, production was back to the prewar level. Since then, the Company's product range and geographic area of operations have continued to expand. Philips now conducts operations in more than 100 countries and is one of the world's largest producers of electronics, communications, and lighting equipment.

# N. V. Philips Gloeilampenfabrieken

## Operations

As of the end of 1984, Philips' current activities centered on six major product sectors serving different industry segments. The main product sectors include:

- Lighting and batteries
- Home electronics for sound and vision
- Domestic appliances and personal care products
- Products and systems for professional applications
- Industrial supplies (includes semiconductor activities)
- Miscellaneous activities (includes musical instruments, furniture, sports articles)

Sales by product sector are shown in Table 1. These six sectors are used by Philips for financial reporting.

Since January 1, 1985, Philips has been organized operationally into product divisions within the six major product sectors. The product divisions are as follows:

- |   |   |
|---|---|
| ● Lighting  | ● Defense and control systems                         |
| ● Consumer electronics  | ● Data systems  |
| ● Small domestic appliances   | ● Medical systems                                     |
| ● Major domestic appliances   | ● ELCOMA  |
| ● Telecommunications systems<br>(merged with Data Systems<br>later in 1985) | ● Industrial and electro-<br>acoustic systems (I & E) |

# N. V. Philips Gloeilampenfabrieken

Table 1

N.V. Philips Gloeilampenfabrieken  
ESTIMATED REVENUE BY PRODUCT SECTOR  
(Millions of Guilders)

<u>Product Sector</u>	<u>Fiscal Year Ending December 31</u>				
	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>
Lighting and Batteries	F 4,458	F 4,661	F 6,348	F 7,471	F 7,910
Home Electronics for Sound and Vision	11,837	11,725	11,639	12,417	16,732
Domestic Appliances and Personal Care Products	5,086	5,151	5,090	6,114	6,639
Products and Systems for Professional Applications	12,548	13,721	14,386	15,931	17,520
Industrial Supplies	5,656	5,512	6,257	8,550	8,069
Miscellaneous Activities	<u>2,826</u>	<u>2,221</u>	<u>2,795</u>	<u>3,321</u>	<u>3,175</u>
Total Revenues	F42,411	F42,991	F46,515	F53,804	F60,045

Source: N.V. Philips Gloeilampenfabrieken  
Annual Reports  
DATAQUEST  
May 1986

## International Operations

Philips operates in more than 100 countries. The Company has its own operations in more than 65 countries and operates through agents in the others. Table 2 presents estimates of Philips' sales by geographic area in 1985.

# N. V. Philips Gloeilampenfabrieken

Table 2

N.V. Philips Gloeilampenfabrieken  
ESTIMATED SALES BY GEOGRAPHIC AREA  
(Millions of Guilders)

	1985	
	<u>Sales</u>	<u>% Growth</u>
The Netherlands	F 3,864	14%
Europe excl. Netherlands	27,741	16%
North America	17,463	5%
Latin America	3,706	12%
Africa	1,366	(5%)
Asia	4,125	20%
Australia and New Zealand	<u>1,780</u>	(2%)
Total Sales	F60,045	12%

Source: N.V. Philips Gloeilampenfabrieken  
Annual Reports  
DATAQUEST  
May 1986

## Research and Development

Philips' research and development (R&D) headquarters are in Eindhoven, which houses half of the total research staff of approximately 4,000 people. In addition, the Company has major research laboratories in Redhill, the United Kingdom; Aachen and Hamburg, West Germany; Paris, France; Briarcliff Manor, New York, and Sunnyvale, California, United States. A small research group in Belgium specializes in software research.

Philips spent F4,011 million, or 6.7 percent of sales, on R&D in 1985. Allocation of the research budget to finance the research organization is through a straight levy on each product division's sales. The research organization reports directly to the Board of Management. The research organization sets its own program and has the freedom to undertake diverse, in-depth projects. In the short term, the product divisions have little influence over the research organization. However, research forms the long-term basis for the process of renewing products and methods of production.

# N. V. Philips Gloeilampenfabrieken

Semiconductor-related R&D includes:

- Continuing research into gallium arsenide products, including methods for growing gallium arsenide and indium-phosphide ingots; methods for depositing thin layers such as vapor-phase, liquid-phase, molecular beam epitaxy, and metal organic chemical vapor deposition; ion implantation techniques; and aids for design and characterization of devices
- Cooperation with other European companies and universities under the auspices of the ESPRIT program
- The Megaproject--a five-year agreement with Siemens (see the section called Prior-Year Highlights)
- The opening of a technology center in Sunnyvale, California, to further R&D in IC technology
- Research into different types of displays, such as cathode ray tubes, flat screen

## Company Structure

Since 1980, Philips has restructured a number of product lines (e.g., audio equipment, television receivers, capacitors, lighting products, electronic valves, professional tubes, and glass). This restructuring has reduced the number of employees and improved the Company's profitability. At the end of 1985, total employees numbered 347,207, a marginal increase over the 1984 total of 341,765. A breakdown of the number of employees by category is shown in Table 3.

Philips is structured as a matrix organization. Each of the national organizations is divided into 12 product divisions and several main supply groups (as listed under Operations). These national organizations and product divisions operate together as equal partners, but they exercise substantial autonomy for maximum marketing adaptability.

# N. V. Philips Gloeilampenfabrieken

Table 3

N.V. Philips Gloeilampenfabrieken  
NUMBER OF EMPLOYEES BY CATEGORY  
December 1985

	<u>Number</u>	<u>% Growth</u>
Research and Development	39,089	6%
Production	200,646	(2%)
Other	<u>107,472</u>	8%
Total	347,207	2%

Source: N.V. Philips Gloeilampenfabrieken  
Annual Reports  
DATAQUEST  
May 1986

In 1981, the Company decided to change the organization of its activities in The Netherlands by dissolving the two corporate bodies that headed the organization (N.V. Gemeenschappelijk Bezit van Aandeelen Philips and N.V. Philips Gloeilampenfabrieken) and forming a new legal entity. The head of the national organizations and product divisions is the new N.V. Philips Gloeilampenfabrieken, which operates as the international holding company from which the Board of Management performs its functions. N.V. Philips Gloeilampenfabrieken has two new subsidiary companies in The Netherlands:

- Philips International B.V., a service company in which world product policy is decided and preparation and support of total company policy takes place
- Nederlandse Philips Bedrijven B.V., an operating company that incorporates operational activities in The Netherlands and from which services are supplied to The Netherlands and abroad

In addition to the wholly-owned national operations, there is the United States Philips Trust. It is purely a holding company, and holds more than 60 percent of quoted shares in North American Philips Corporation and in a number of other companies in the United States. (North American Philips is the operating company to which all the U.S. operating companies belong except for Signetics, which belongs to the

## N. V. Philips Gloeilampenfabrieken

Trust through the U.S. Philips Corporation.) The main purpose of the United States Philips Trust is to preserve and advance N.V. Philips' business operations in the United States.

At the outbreak of World War II, trusts were set up in all countries where Philips had a presence, to ensure that the Company did not fall into the hands of the Third Reich. The trusts were legally independent bodies, and membership stipulated that at least one member be a Dutch Philips executive. After the war, all the trusts were dissolved except for the United States Philips Trust, which can only be dissolved by mutual consent or upon the death of the last relative who was alive when the Trust was formed in 1939.

### Capital Expenditure

In 1985, expenditures for property, plants, and equipment amounted to F4,541 million, approximately 8 percent of total sales. Table 4 illustrates investment by product sector.

Table 4

#### N.V. Philips Gloeilampenfabrieken CAPITAL INVESTMENT BY PRODUCT SECTOR (Millions of Guilders)

<u>Product Sector</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>
Lighting and batteries	F 239	F 368	F 523
Home electronics for sound and vision	358	570	843
Domestic appliances and personal care products	129	216	268
Products and systems for professional applications	528	677	722
Industrial supplies	710	1,341	1,509
Miscellaneous activities	177	234	199
Not allocated to product sectors	<u>350</u>	<u>437</u>	<u>477</u>
Gross investments	F2,491	F3,843	F4,541
Retired and sold	<u>(383)</u>	<u>(386)</u>	<u>(325)</u>
Net acquisitions	F2,108	F3,457	F4,216

Source: N.V. Philips Gloeilampenfabrieken  
1985 Annual Report  
DATAQUEST  
May 1986



# N. V. Philips Gloeilampenfabrieken

The main growth area for investment in 1985 was The Netherlands. Capital investment by geographic area is shown in Table 5.

Table 5

**N.V. Philips Gloeilampenfabrieken  
CAPITAL INVESTMENT BY GEOGRAPHIC AREA  
(Millions of Guilders)**

<u>Region</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>
The Netherlands	F 597	F 799	F1,245
Europe excl. Netherlands	1,024	1,573	2,070
North America	560	1,026	767
Latin America	115	121	113
Africa	20	25	26
Asia	119	212	268
Australia and New Zealand	56	87	52
Total Investment	<u>F2,491</u>	<u>F3,843</u>	<u>F4,541</u>

Source: N.V. Philips Gloeilampenfabrieken  
1985 Annual Report  
DATAQUEST  
May 1986

## Semiconductor Facilities

Philips and Signetics have the following worldwide semiconductor plant locations:

### Philips:

Recife, Brazil

Size: N/A  
Number of employees: N/A  
Year established: N/A  
Products/technologies: Assembly and testing of ICs

## N. V. Philips Gloeilampenfabrieken

### Sao Paulo, Brazil

Size: N/A  
Number of employees: N/A  
Year established: N/A  
Products/technologies: Assembly and testing of discretes

### Caen, France

Size: N/A  
Number of employees: N/A  
Year established: 1955  
Products/technologies: Integrated circuits: Bipolar digital (ECL, TTL), bipolar analog, consumer. Discrete devices: power transistors. Optoelectronic products  
Wafer capacity: 1,450/day (excluding optoelectronic crystals that number 500 million/year)  
Size of wafer: 3 and 5 inches

### Hong Kong

Size: N/A  
Number of employees: N/A  
Year established: N/A  
Products/technologies: Assembly and testing of transistors and diodes

### Tokyo, Japan

Size: 15,600 sq. ft.  
Number of employees: 40  
Year established: N/A  
Products/technologies: Testing only

# N. V. Philips Gloeilampenfabrieken

## Seoul, Korea

Size: 148,700 sq. ft.  
Number of employees: 2,530  
Year established: N/A  
Products/technologies: Assembly and testing

## Nijmegen, The Netherlands

Size: N/A  
Number of employees: N/A  
Year established: 1955  
Products/technologies: CMOS standard logic families, CMOS custom/semicustom, CMOS analog. Bipolar analog. Consumer. HF transistors, power transistors. Small signal diodes. Lasers. Assembly for ICs  
Wafer capacity: 3,900/day  
Size of wafer: 3, 4, and 5 inches

## Sittard, The Netherlands

Size: N/A  
Number of employees: N/A  
Year established: N/A  
Products/technologies: N/A  
Wafer capacity: N/A  
Size of wafer: N/A

## Stadskanaal, The Netherlands

Size: N/A  
Number of employees: N/A  
Year established: N/A  
Products/technologies: Diodes  
Wafer capacity: 1,600/day  
Size of wafer: 3 inches

## N. V. Philips Gloeilampenfabrieken

### Manila, Philippines

Size: N/A  
Number of employees: N/A  
Year established: N/A  
Products/technologies: Assembly and testing of transistors, diodes,  
and optoelectronic products

### Barcelona, Spain

Size: N/A  
Number of employees: N/A  
Year established: N/A  
Products/technologies: Assembly and testing of small signal diodes  
and small signal transistors

### Zurich, Switzerland

Size: N/A  
Number of employees: N/A  
Year established: 1966  
Products/technologies: ICs: CMOS for clocks, watches, telecommu-  
nications, CMOS memories, CLIPS. Assembly  
for small outline packaging  
Wafer capacity: 400/day  
Size of wafer: 4 inches

### Kao-Hsiung, Taiwan

Size: N/A  
Number of employees: N/A  
Year established: N/A  
Products/technologies: Assembly and testing of ICs

### Bangkok, Thailand

Size: 107,600 sq. ft.  
Number of employees: 3,200  
Year established: N/A  
Products/technologies: Assembly and testing

# N. V. Philips Gloeilampenfabrieken

## Southampton, United Kingdom

Size: N/A  
Number of employees: N/A  
Year established: N/A  
Products/technologies: NMOS ROMs. Dedicated consumer logic  
Wafer capacity: 800/day  
Size of wafer: 4 inches

## Stockport, United Kingdom

Size: N/A  
Number of employees: N/A  
Year established: N/A  
Products/technologies: Power transistors, power diodes  
Wafer capacity: 1,000/day  
Size of wafer: 3 inches

## Albuquerque, New Mexico, United States

Size: 238,300 sq. ft.  
Number of employees: 480  
Year established: N/A  
Products/technologies: Wafer fabrication. MOS ICs

## Orem, Utah, United States

Size: 171,000 sq. ft.  
Number of employees: 1,850  
Year established: N/A  
Products/technologies: Wafer fabrication, assembly. Testing of logic and bipolar memory products  
Wafer capacity: N/A  
Size of wafer: N/A

# N. V. Philips Gloeilampenfabrieken

## Signetics:

Sunnyvale, California, United States

Size:	1,107,300 sq. ft.
Number of employees:	4,090
Year established:	N/A
Products/technologies:	Wafer fabrication. ICs (except logic)
Wafer capacity:	N/A
Size of wafer:	N/A

Hamburg, West Germany

Size:	N/A
Number of employees:	N/A
Year established:	1955
Products/technologies:	NMOS microprocessors, controllers, memories. Bipolar analog consumer ICs. Small signal transistors. Varicap diodes
Wafer capacity:	2,400/day
Size of wafer:	3, 4, and 5 inches

## Prior-Year Highlights

In 1984, Philips' sales in the United States increased greatly. The Company also almost doubled its investment there, from F560 million in 1983, to F1,026 million in 1984.

Perhaps the most widely publicized semiconductor-related event was the Megaproject, a five-year, \$470 million joint research project with Siemens. The goal is to develop a submicron CMOS process for use in the manufacture of 1-Mbit SRAMs and 4-Mbit DRAMs. The products should be ready for the commercial market by the end of 1988 or early 1989. It will be partly financed by both the Dutch and West German governments (\$140 million). A special R&D center has been built at Eindhoven, The Netherlands.

In April 1985, the President of Philips' Board of Management, Wisse Dekker, announced that he would step down in April 1986. He will be succeeded by Cor Van Der Klugt, Vice President of the Board since 1982. Mr. Dekker will become Chairman of Philips' supervisory board.

# N. V. Philips Gloeilampenfabrieken

## Outlook

DATAQUEST foresees Philips' future involvement in the following:

- Philips' president, Wisse Dekker, is committed to creating greater industrial and, eventually, political integration in Europe. The innovative products of the 1980s and 1990s in telecommunications, office automation, data processing, and consumer electronics will require larger markets and financial resources than those currently available to any corporation in Europe.
- The Company's worldwide aim is to do 30 percent of its business in each of three "centers of competence"--Europe, North America, and the Pacific Basin--within the next 10 years.

## MAJOR ACTIVITIES

Philips manufactures a wide range of products, including the following:

- Lighting and batteries--Incandescent lamps, high- and low-pressure gas discharge lamps, luminaires, lighting projects, appliances for photographic purposes and photoflash lamps, batteries and solar collectors, glass, diamond drawing dies, wires, and other components
- Home electronics for sound and vision--Television and radio receivers, video and audio recorders, playback equipment for sound and vision, projection television, video cameras, video games, magnetic tape, and hearing aids
- Domestic appliances and personal care products--Washing machines and dryers, dishwashers, refrigerators and freezers, cooking appliances, vacuum cleaners, floor polishers and electric irons, food preparation machines, mixers and other small kitchen appliances, microwave ovens, coffee makers, toasters and grills, heating appliances and fans, clocks, electric shavers, solarium, and other personal care products
- Products and systems for professional applications--Telecommunications systems, cable products and systems, defense systems, small computer systems, electronic office equipment, medical systems for diagnosis and therapy, instruments for laboratories and industry, television studio and transmitting equipment and cable television, audio-visual communication and security systems, machines, instruments, and tools

## N. V. Philips Gloeilampenfabrieken

- Industrial supplies--Picture tubes and television glass, integrated circuits, transistors and diodes, passive components, corrugated cardboard, welding products
- Miscellaneous activities--Musical instruments, brush products and plastics products, furniture, bus line operations, bicycles, sporting goods, retail activities, and other activities

### Semiconductor Activities

Philips' semiconductor and passive components operation, ELCOMA, is part of the industrial supplies sector. Within ELCOMA, semiconductor manufacturing activities are divided into ICs and discretes.

Tables 6 and 7 illustrate Philips' worldwide and European semiconductor revenues, respectively, by product line.

Table 6

N.V. Philips Gloeilampenfabrieken\*  
ESTIMATED WORLDWIDE SEMICONDUCTOR REVENUES BY PRODUCT LINE  
(Millions of Dollars)

	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>
Total Semiconductor	\$462	\$457	\$482	\$560	\$598
Total Integrated Circuit	\$224	\$230	\$259	\$325	\$338
Bipolar Digital	30	34	29	19	20
MOS	64	61	100	161	163
Linear	130	135	130	145	155
Total Discrete	\$219	\$208	\$204	\$217	\$235
Transistor	132	126	124	131	142
Diode	80	76	74	78	81
Thyristor	6	5	5	6	9
Other	1	1	1	2	3
Total Optoelectronic	\$ 19	\$ 19	\$ 19	\$ 18	\$ 25

\*Excluding Signetics

Source: DATAQUEST  
May 1986



# N. V. Philips Gloeilampenfabrieken

Table 7

**N.V. Philips Gloeilampenfabrieken\***  
**ESTIMATED EUROPEAN SEMICONDUCTOR REVENUES BY PRODUCT LINE**  
 (Millions of Dollars)

	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>
Total Semiconductor	\$389	\$377	\$401	\$456	\$492
Total Integrated Circuit	\$196	\$193	\$220	\$261	\$284
Bipolar Digital	20	18	13	11	11
MOS	56	55	90	140	151
Linear	120	120	117	110	122
Total Discrete	\$176	\$167	\$164	\$179	\$185
Transistor	103	100	99	107	111
Diode	67	62	60	65	66
Thyristor	5	4	4	5	6
Other	1	1	1	2	2
Total Optoelectronic	\$ 17	\$ 17	\$ 17	\$ 16	\$ 23

\*Excluding Signetics

Source: DATAQUEST  
May 1986

The following are some 1985 highlights of Philips' semiconductor activities:

- In November 1985, Matsushita announced that it will second-source Philips' 68070 microprocessor. The device contains a CPU, a memory management unit, a direct memory access control, a I2C Bus, an RS-232-C interface, and three counters/timers, all on the same chip.
- In September 1985, Philips announced that it was collaborating with Siemens in the development of a product that will combine both bipolar and CMOS transistors. The study is called the BICMOS project, and it is funded by the ESPRIT program. The universities of Dublin and Stuttgart are also involved.

## N. V. Philips Gloeilampenfabrieken

- In September 1985, Philips announced plans to begin producing VHS video cassette recorders (VCRs) in Japan. Planned production capacity is 100,000 VCRs a year. Another VCR plant, with a capacity of between 400,000 and 500,000, is being built in South Korea.
- In August 1985, Intel signed an agreement with Signetics and Philips, as alternate sources for Intel's 8096 16-bit single chip microcontroller. The agreement also calls for Signetics and Philips to build the entire MCS-96 family.
- In August 1985, Philips reported a steep decline in fiscal 1985 profits, particularly in North America through Signetics.
- In August 1985, Philips charged Advanced Micro Devices (AMD) with infringement of patents governing local oxidation of silicon. Philips has asked a court to enjoin AMD from further production of ICs employing this process.
- In August 1985, Philips Research Laboratories in France announced the development of the first European 1-Kbit SRAM in gallium arsenide with a functioning memory point.
- In July 1985, the AT&T-Philips joint venture announced a financial loss of \$17.5 million in 1984. This was mainly due to the 5ESS digital switching system, which was acquired from AT&T, and whose high development costs caused a loss of profit.
- In July 1985, Philips previewed its M7000 cellular car phone. The model will probably be manufactured at Philips' factory in Sweden, where there is already a mobile phone systems factory.
- In July 1985, Philips started shipments to Digital Equipment Corporation of its CM100 professional CD-ROM drives, for inclusion in the MicroVAX II. Each CD-ROM disk provides up to 600 Mbytes of memory. Philips expects shipments of 1,000 CM100 drives during 1985 and volume sales in 1986.
- In July 1985, Philips was one of four largest European electronics firms (with GEC, Siemens, and Thomson) to give support to the Eureka project. The four companies have announced that they will submit a plan for Eureka by year end.
- In June 1985, Philips and Daisy Systems announced a cooperation agreement whereby Philips will make its semicustom (standard cell and gate array) design libraries available on Daisy workstations.

## N. V. Philips Gloeilampenfabrieken

- In May 1985, Philips signed an agreement with Sharp for the supply of automated manufacturing equipment and technology for a liquid crystal display plant planned to be built in Heerlen, The Netherlands, at a cost of \$29 million.
- In May 1985, Philips announced volume deliveries of its cathode-ray-tube controller circuit. The NMOS circuit is called the European ROM (Eurom) and will handle all the display functions stipulated by the Conférence Européene de Postes et Télécommunications (CEPT) videotex standard.
- In April 1985, Philips and RCA extended their CMOS logic alternate-sourcing agreement to include a further 45 devices, bringing the total to 278.
- In March 1985, Philips announced a cooperation agreement with Taiwan's Electronics Research and Service Organization (ERSO) in the development of design and production capability for Integrated Circuits. Philips is to invest \$2.2 million in the project.

### SIGNETICS

In 1975, the North American Philips Trust acquired the California-based Signetics Corporation. The relationship between Signetics and Philips is very close, even though Signetics is a separate organization in a legal sense. Philips Research Laboratory Sunnyvale (PRLS), California, comes under the auspices of Philips' research in Eindhoven, although it is part of Signetics. PRLS also works closely with other research establishments in the United States, namely Stanford University and the University of California at Berkeley.

Signetics' estimated worldwide and European semiconductor revenues, respectively, are shown in Tables 8 and 9.

# N. V. Philips Gloeilampenfabrieken

Table 8

Signetics Corporation  
**ESTIMATED WORLDWIDE SEMICONDUCTOR REVENUES BY PRODUCT LINE**  
 (Millions of Dollars)

	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>
Total Semiconductor	\$366	\$340	\$435	\$765	\$470
Total Integrated Circuit	\$366	\$340	\$435	\$765	\$470
Bipolar Digital	268	244	315	570	352
MOS	36	38	55	105	65
Linear	62	58	65	90	53
Total Discrete	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
Transistor	0	0	0	0	0
Diode	0	0	0	0	0
Thyristor	0	0	0	0	0
Other	0	0	0	0	0
Total Optoelectronic	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0

Source: DATAQUEST  
May 1986

# N. V. Philips Gloeilampenfabrieken

Table 9

Signetics Corporation  
ESTIMATED EUROPEAN SEMICONDUCTOR REVENUES BY PRODUCT LINE  
(Millions of Dollars)

	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>
Total Semiconductor	\$ 68	\$ 59	\$ 53	\$ 90	\$104
Total Integrated Circuit	\$ 68	\$ 59	\$ 53	\$ 90	\$104
Bipolar Digital	51	43	39	71	79
MOS	2	1	1	7	11
Linear	15	15	13	12	14
Total Discrete	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
Transistor	0	0	0	0	0
Diode	0	0	0	0	0
Thyristor	0	0	0	0	0
Other	0	0	0	0	0
Total Optoelectronic	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0

Source: DATAQUEST  
May 1986

Signetics' products are sold under the Signetics label in Europe exclusively through Philips' sales outlets.

Table 10 gives DATAQUEST estimates of the combined European revenues for Philips and Signetics.

# N. V. Philips Gloeilampenfabrieken

Table 10

N.V. Philips Gloeilampenfabrieken  
Signetics Corporation  
ESTIMATED EUROPEAN SEMICONDUCTOR REVENUES BY PRODUCT LINE  
(Millions of Dollars)

	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>
Total Semiconductor	\$458	\$437	\$456	\$546	\$596
Total Integrated Circuit	\$265	\$253	\$275	\$351	\$388
Bipolar Digital	71	61	52	82	90
MOS	59	57	93	147	162
Linear	135	135	130	122	136
Total Discrete	\$176	\$167	\$164	\$179	\$185
Transistor	103	100	99	107	111
Diode	67	62	60	65	66
Thyristor	5	4	4	5	6
Other	1	1	1	2	2
Total Optoelectronic	\$ 17	\$ 17	\$ 17	\$ 16	\$ 23

Source: DATAQUEST  
May 1986

# N.V. Philips' Gloeilampenfabrieken

N.V. Philips' Gloeilampenfabrieken  
5621 CT  
Eindhoven, Netherlands  
Telephone: 011-31-40-723212 Telex: 3500  
(Millions of Guilders Except Per Share Data)

## Balance Sheet (December 31)

	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
Working Capital	f 8,758	f 8,780	f 9,296	f 9,473	f 9,550
Long-Term Debt	f 8,851	f 8,719	f10,192	f 9,443	f10,033
Shareholders' Equity	f10,693	f10,886	f11,651	f11,551	f12,591
After-Tax Return on Average Equity (%)	5.6	6.0	5.0	3.0	3.0

## Operating Performance (Fiscal Year Ending December 31)

	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
Revenue	f31,164	f32,658	f33,238	f36,536	f42,411
Dutch Revenue	f 3,126	f 3,254	f 3,018	f 3,008	f 2,831
Non-Dutch Revenue	f28,038	f29,404	f30,220	f33,528	f39,580
Cost of Revenue	f22,543	f22,929	f24,835	f27,633	f32,209
R&D Expense	f 2,057	f 2,255	f 2,426	f 2,755	f 2,907
SG&A Expense	f 4,353	f 3,875	f 4,181	f 4,304	f 5,102
Pretax Income	f 1,186	f 1,256	f 959	f 996	f 551
Pretax Margin (%)	3.8	3.8	2.9	2.7	1.3
Effective Tax Rate (%)	41.4	41.8	36.3	45.4	32.8
Net Income	f 583	f 651	f 564	f 345	f 357
Average Shares Outstanding (Millions)	170.6	171.0	171.4	171.5	181.6
Per Share of f10					
Earnings	f 3.42	f 3.81	f 3.29	f 2.01	f 1.97
Dividends	f 1.70	f 1.80	f 1.80	f 0.75	f 1.60
Book Value	f 62.68	f 63.66	f 67.98	f 75.74	f 77.96
Price Range	N/A	N/A	N/A	N/A	N/A
Total Employees	384,000	388,000	379,000	372,600	348,100
Capital Expenditures	f1,576	f1,744	f 2,379	f 2,400	f 2,252
Exchange rate (US\$ per f)	0.50	0.51	0.53	0.47	0.41

Source: N.V. Philips' Gloeilampenfabrieken  
Annual Reports  
DATAQUEST

# N.V. Philips' Gloeilampenfabrieken

Table 1

N.V. Philips' Gloeilampenfabrieken  
ESTIMATED REVENUE BY INDUSTRY SEGMENT  
(Millions of Guilders)

	Fiscal Year Ending December 31				
	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
Products and Systems for Professional Applications	f 7,707	f 8,407	f 9,415	f11,136	f12,548
Lighting and Batteries	3,123	3,267	3,720	3,874	4,458
Home Electronics for Sound and Vision	9,638	10,321	9,207	9,556	11,837
Domestic Appliances and Personal Care Products	3,300	3,480	3,790	4,302	5,086
Industrial Supplies	3,998	4,033	3,920	4,783	5,656
Miscellaneous Activities	<u>3,398</u>	<u>3,150</u>	<u>3,186</u>	<u>2,885</u>	<u>2,826</u>
Total Revenues	f31,164	f32,658	f33,238	f36,536	f42,411
Exchange Rate (US\$ per f)	<u>0.50</u>	<u>0.51</u>	<u>0.53</u>	<u>0.47</u>	<u>0.41</u>
Total Revenues (Millions of US\$)	\$15,852	\$16,656	\$17,616	\$17,172	\$17,389

Source: N.V. Philips' Gloeilampenfabrieken  
Annual Reports  
DATAQUEST



# N.V. Philips' Gloeilampenfabrieken

Table 2

N.V. Philips' Gloeilampenfabrieken  
ESTIMATED SEMICONDUCTOR REVENUES  
(Millions of Dollars)

	1974	1975	1976	1977	1978	1979	1980	1981
<b>TOTAL SEMICONDUCTOR</b>	<b>340</b>	<b>275</b>	<b>325</b>	<b>355</b>	<b>431</b>	<b>500</b>	<b>553</b>	<b>428</b>
<b>Total Integrated Circuit</b>	<b>60</b>	<b>75</b>	<b>100</b>	<b>111</b>	<b>165</b>	<b>215</b>	<b>253</b>	<b>240</b>
Bipolar Digital	4	3	4	4	5	7	15	30
TTL	0	0	0	0	0	0	0	4
DTL	0	0	0	0	0	0	0	0
ECL	4	3	4	4	5	7	10	20
Other	0	0	0	0	0	0	5	6
Bipolar Digital (Recap)						7	15	30
Memory						0	0	0
Logic						7	15	30
MOS				5	30	48	80	70
NMOS								
PMOS								
CMOS								
MOS (Recap)						48	80	70
Memory						1	4	2
Microprocessor						1	4	4
Logic						46	72	64
Linear	56	72	96	102	130	160	158	140
<b>Total Discrete</b>	<b>280</b>	<b>200</b>	<b>220</b>	<b>234</b>	<b>246</b>	<b>260</b>	<b>273</b>	<b>164</b>
Transistor						156	164	87
Small Signal						105	110	45
Power Transistor						51	54	42
Diode						94	99	69
Small Signal						55	57	35
Power						29	30	24
Zener						10	12	10
Thyristor						10	10	8
Other						0	0	0
<b>Total Optoelectronic</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>10</b>	<b>20</b>	<b>25</b>	<b>27</b>	<b>24</b>
LED Lamps					4	5	6	6
LED Displays					6	7	7	6
Optical Couplers					7	9	10	8
Other					3	4	4	4

Source: DATAQUEST

# N.V. Philips' Gloeilampenfabrieken

N.V. Philips Gloeilampenfabrieken  
5621 CT  
Eindhoven, Netherlands  
Telephone: 011-31-40-723212 Telex: 3500  
(Millions of Guilders Except Per Share Data)

## Balance Sheet (December 31)

	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
Working Capital	f 8,758	f 8,780	f 9,296	f 9,473	f 9,550
Long-Term Debt	f 8,851	f 8,719	f10,192	f 9,443	f10,033
Shareholders' Equity	f10,693	f10,886	f11,651	f11,551	f12,591
After-Tax Return on Average Equity (%)	5.6	6.0	5.0	3.0	3.1

## Operating Performance (Fiscal Year Ending December 31)

	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
Revenue	f31,164	f32,658	f33,238	f36,536	f42,411
Dutch Revenue	f 3,126	f 3,254	f 3,018	f 3,008	f 2,831
Non-Dutch Revenue	f28,038	f29,404	f30,220	f33,528	f39,580
Cost of Revenue	f22,543	f22,929	f24,835	f27,879	f32,209
R&D Expense	f 2,057	f 2,255	f 2,426	f 2,755	f 2,907
SG&A Expense	f 4,353	f 3,875	f 4,181	f 4,304	f 5,102
Pretax Income	f 1,186	f 1,256	f 959	f 996	f 551
Pretax Margin (%)	3.8	3.5	2.9	2.7	1.3
Effective Tax Rate (%)	41.4	41.8	36.3	45.4	32.8
Net Income	f 583	f 651	f 564	f 345	f 357
Average Shares Outstanding (Millions)	170.6	171.0	171.4	171.5	181.6
Per Share					
Earnings	f 3.42	f 3.81	f 3.29	f 2.01	f 1.97
Dividends	f 1.70	f 1.80	f 1.80	f 0.75	f 1.60
Book Value	f 62.68	f 63.66	f 67.98	f 75.74	f 77.96
Price Range	N/A	N/A	N/A	N/A	N/A
Total Employees	384,000	388,000	379,000	372,600	348,100
Capital Expenditures	f1,576	f1,744	f 2,379	f 2,400	f 2,252
Exchange rate (US\$ per f)	0.50	0.51	0.53	0.47	0.41

Source: N.V. Philips Gloeilampenfabrieken Annual Reports  
DATAQUEST, Inc.

# N.V. Philips' Gloeilampenfabrieken

Table 1

N.V. Philips Gloeilampenfabrieken  
ESTIMATED REVENUE BY INDUSTRY SEGMENT  
(Millions of Guilders)

	Fiscal Year Ending December 31				
	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
Products and Systems for Professional Applications	£ 7,707	£ 8,407	£ 9,415	£11,136	£12,548
Lighting and Batteries	3,123	3,267	3,720	3,874	4,458
Home Electronics for Sound and Vision	9,638	10,321	9,207	9,556	11,837
Domestic Appliances and Personal Care Products	3,300	3,480	3,790	4,302	5,086
Industrial Supplies	3,998	3,033	3,920	4,783	5,656
Miscellaneous Activities	<u>3,398</u>	<u>3,150</u>	<u>3,186</u>	<u>2,885</u>	<u>2,826</u>
Total Revenues (Guilders)	£31,164	£32,658	£33,238	£36,536	£42,411
Exchange Rate (US\$ per f)	0.50	0.51	0.53	0.47	0.41
Total Revenues (Millions of U.S. Dollars)	\$15,852	\$16,656	\$17,616	\$17,172	\$17,389

Source: N.V. Philips Gloeilampenfabrieken Annual Reports  
DATAQUEST, Inc.

# N.V. Philips' Gloeilampenfabrieken

Table 2

## N.V. PHILIPS SEMICONDUCTOR REVENUES (Millions of Dollars)

	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
TOTAL SEMICONDUCTOR	340	275	325	355	431	500	553	480
Total Integrated Circuit	60	75	100	111	165	215	253	240
Bipolar Digital	4	3	4	4	5	7	15	14
TTL	0	0	0	0	0	0	0	0
DTL	0	0	0	0	0	0	0	10
ECL	4	3	4	4	5	7	10	4
Other	0	0	0	0	0	0	5	0
Bipolar Digital (Recap)						7	15	14
Memory						0	0	0
Logic						7	15	14
MOS	0	0	0	5	30	48	80	76
NMOS								
PMOS								
CMOS								
MOS (Recap)						48	80	76
Memory						1	4	2
Microprocessor						1	4	4
Logic						46	72	70
Linear	56	72	96	102	130	160	158	150
Total Discrete	280	200	220	234	246	260	273	218
Transistor						156	164	132
Small Signal						105	110	89
Power Transistor						51	54	43
Diode						94	99	79
Small Signal						40	42	34
Power						29	30	24
Zener						25	27	21
Thyristor						10	10	7
Other						0	0	0
Total Optoelectronic	0	0	5	10	20	25	27	22
LED Lamps					4	5	6	5
LED Displays					6	7	7	6
Optical Couplers					7	9	10	8
Other					3	4	4	3

Source: DATAQUEST, Inc.

# N.V. Philips' Gloeilampenfabrieken

Table 2

## N.V. Philips' Gloeilampenfabrieken ESTIMATED SEMICONDUCTOR REVENUES (Millions of Dollars)

	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
<b>TOTAL SEMICONDUCTOR</b>	340	275	325	355	431	500	533	482	494
<b>Total Integrated Circuit</b>	60	75	100	111	165	215	253	240	269
<b>Bipolar Digital</b>	4	3	4	4	5	7	15	30	57
TTL	0	0	0	0	0	0	0	4	10
DTL	0	0	0	0	0	0	0	0	0
ECL	4	3	4	4	5	7	10	20	41
Other	0	0	0	0	0	0	5	6	6
<b>Bipolar Digital (Recap)</b>						7	15	30	57
Memory						0	0	0	1
Logic						7	15	30	56
<b>MOS</b>	0	0	0	5	30	48	80	70	90
NMOS									
PMOS									
CMOS									
<b>MOS (Recap)</b>						48	80	70	90
Memory						1	4	2	3
Microprocessor						1	4	4	6
Logic						46	72	64	81
<b>Linear</b>	56	72	96	102	130	160	158	140	122
<b>Total Discrete</b>	280	200	220	234	246	260	273	218	204
<b>Transistor</b>						156	164	130	122
Small Signal						105	110	88	89
Power						51	54	42	33
<b>Diode</b>						94	99	80	75
Small Signal						55	57	46	46
Power						29	30	24	18
Zener						10	12	10	11
<b>Thyristor</b>						10	10	8	7
<b>Other</b>						0	0	0	0
<b>Total Optoelectronic</b>	0	0	5	10	20	25	27	24	21
LED Lamps					4	5	6	6	5
LED Displays					6	7	7	6	5
Optical Couplers					7	9	10	8	7
Other					3	4	4	4	4

Source: DATAQUEST  
March 1983

# N.V. Philips' Gloeilampenfabrieken

N.V. Philips' Gloeilampenfabrieken  
5621 CT  
Eindhoven, Netherlands  
Telephone: 011-31-40-723212 Telex: 3500  
(Millions of Guilders Except Per Share Data)

## Balance Sheet (December 31)

	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
Working Capital	f 8,758	f 8,780	f 9,296	f 9,473	f 9,550
Long-Term Debt	f 8,851	f 8,719	f10,192	f 9,443	f10,033
Shareholders' Equity	f10,693	f10,886	f11,651	f11,551	f12,591
After-Tax Return on Average Equity (%)	5.6	6.0	5.0	3.0	3.0

## Operating Performance (Fiscal Year Ending December 31)

	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
Revenue	f31,164	f32,658	f33,238	f36,536	f42,411
Dutch Revenue	f 3,126	f 3,254	f 3,018	f 3,008	f 2,831
Non-Dutch Revenue	f28,038	f29,404	f30,220	f33,528	f39,580
Cost of Revenue	f22,543	f22,929	f24,835	f27,633	f32,209
R&D Expense	f 2,057	f 2,255	f 2,426	f 2,755	f 2,907
SG&A Expense	f 4,353	f 3,875	f 4,181	f 4,304	f 5,102
Pretax Income	f 1,186	f 1,256	f 959	f 996	f 551
Pretax Margin (%)	3.8	3.8	2.9	2.7	1.3
Effective Tax Rate (%)	41.4	41.8	36.3	45.4	32.8
Net Income	f 583	f 651	f 564	f 345	f 357
Average Shares Outstanding (Millions)	170.6	171.0	171.4	171.5	181.6
Per Share of f10					
Earnings	f 3.42	f 3.81	f 3.29	f 2.01	f 1.97
Dividends	f 1.70	f 1.80	f 1.80	f 0.75	f 1.60
Book Value	f 62.68	f 63.66	f 67.98	f 75.74	f 77.96
Price Range	N/A	N/A	N/A	N/A	N/A
Total Employees	384,000	388,000	379,000	372,600	348,100
Capital Expenditures	f1,576	f1,744	f 2,379	f 2,400	f 2,252
Exchange rate (US\$ per f)	0.50	0.51	0.53	0.47	0.41

Source: N.V. Philips' Gloeilampenfabrieken  
Annual Reports  
DATAQUEST

# N.V. Philips' Gloeilampenfabrieken

Table 1

N.V. Philips' Gloeilampenfabrieken  
ESTIMATED REVENUE BY INDUSTRY SEGMENT  
(Millions of Guilders)

	Fiscal Year Ending December 31				
	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
Products and Systems for Professional Applications	£ 7,707	£ 8,407	£ 9,415	£11,136	£12,548
Lighting and Batteries	3,123	3,267	3,720	3,874	4,458
Home Electronics for Sound and Vision	9,638	10,321	9,207	9,556	11,837
Domestic Appliances and Personal Care Products	3,300	3,480	3,790	4,302	5,086
Industrial Supplies	3,998	4,033	3,920	4,783	5,656
Miscellaneous Activities	<u>3,398</u>	<u>3,150</u>	<u>3,186</u>	<u>2,885</u>	<u>2,826</u>
Total Revenues	£31,164	£32,658	£33,238	£36,536	£42,411
Exchange Rate (US\$ per £)	<u>0.50</u>	<u>0.51</u>	<u>0.53</u>	<u>0.47</u>	<u>0.41</u>
Total Revenues (Millions of US\$)	\$15,852	\$16,656	\$17,616	\$17,172	\$17,389

Source: N.V. Philips' Gloeilampenfabrieken  
Annual Reports  
DATAQUEST

# N.V. Philips' Gloeilampenfabrieken

Table 2

N.V. Philips' Gloeilampenfabrieken  
ESTIMATED SEMICONDUCTOR REVENUES  
(Millions of Dollars)

	1974	1975	1976	1977	1978	1979	1980	1981
<b>TOTAL SEMICONDUCTOR</b>	<b>340</b>	<b>275</b>	<b>325</b>	<b>355</b>	<b>431</b>	<b>500</b>	<b>553</b>	<b>428</b>
Total Integrated Circuit	60	75	100	111	165	215	253	240
Bipolar Digital	4	3	4	4	5	7	15	30
TTL	0	0	0	0	0	0	0	4
DTL	0	0	0	0	0	0	0	0
ECL	4	3	4	4	5	7	10	20
Other	0	0	0	0	0	0	5	6
Bipolar Digital (Recap)						7	15	30
Memory						0	0	0
Logic						7	15	30
MOS				5	30	48	80	70
NMOS								
PMOS								
CMOS								
MOS (Recap)						48	80	70
Memory						1	4	2
Microprocessor						1	4	4
Logic						46	72	64
Linear	56	72	96	102	130	160	158	140
<b>Total Discrete</b>	<b>280</b>	<b>200</b>	<b>220</b>	<b>234</b>	<b>246</b>	<b>260</b>	<b>273</b>	<b>164</b>
Transistor						156	164	87
Small Signal						105	110	45
Power Transistor						51	54	42
Diode						94	99	69
Small Signal						55	57	35
Power						29	30	24
Zener						10	12	10
Thyristor						10	10	8
Other						0	0	0
<b>Total Optoelectronic</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>10</b>	<b>20</b>	<b>25</b>	<b>27</b>	<b>24</b>
LED Lamps					4	5	6	6
LED Displays					6	7	7	6
Optical Couplers					7	9	10	8
Other					3	4	4	4

Source: DATAQUEST



# N.V. Philips' Gloeilampenfabrieken

N.V. Philips Gloeilampenfabrieken  
5621 CT  
Eindhoven, Netherlands  
Telephone: 011-31-40-723212 Telex: 3500  
(Millions of Guilders Except Per Share Data)

## Balance Sheet (December 31)

	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
Working Capital	f 8,758	f 8,780	f 9,296	f 9,473	f 9,550
Long-Term Debt	f 8,851	f 8,719	f10,192	f 9,443	f10,033
Shareholders' Equity	f10,693	f10,886	f11,651	f11,551	f12,591
After-Tax Return on Average Equity (%)	5.6	6.0	5.0	3.0	3.1

## Operating Performance (Fiscal Year Ending December 31)

	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
Revenue	f31,164	f32,658	f33,238	f36,536	f42,411
Dutch Revenue	f 3,126	f 3,254	f 3,018	f 3,008	f 2,831
Non-Dutch Revenue	f28,038	f29,404	f30,220	f33,528	f39,580
Cost of Revenue	f22,543	f22,929	f24,835	f27,879 <sup>(*)</sup>	f32,209
R&D Expense	f 2,057	f 2,255	f 2,426	f 2,755	f 2,907
SG&A Expense	f 4,353	f 3,875	f 4,181	f 4,304	f 5,102
Pretax Income	f 1,186	f 1,256	f 959	f 996	f 551
Pretax Margin (%)	3.8	3.538	2.9	2.7	1.3
Effective Tax Rate (%)	41.4	41.8	36.3	45.4	32.8
Net Income	f 583	f 651	f 564	f 345	f 357
Average Shares Outstanding (Millions)	170.6	171.0	171.4	171.5	181.6
Per Share <sup>f10</sup>					
Earnings	f 3.42	f 3.81	f 3.29	f 2.01	f 1.97
Dividends	f 1.70	f 1.80	f 1.80	f 0.75	f 1.60
Book Value	f 62.68	f 63.66	f 67.98	f 75.74	f 77.96
Price Range	N/A	N/A	N/A	N/A	N/A
Total Employees	384,000	388,000	379,000	372,600	348,100
Capital Expenditures	f1,576	f1,744	f 2,379	f 2,400	f 2,252
Exchange rate (US\$ per f)	0.50	0.51	0.53	0.47	0.41

Source: N.V. Philips Gloeilampenfabrieken Annual Reports  
DATAQUEST, Inc.

# N.V. Philips' Gloeilampenfabrieken

Table 1

N.V. Philips Gloeilampenfabrieken  
ESTIMATED REVENUE BY INDUSTRY SEGMENT  
(Millions of Guilders)

	<u>Fiscal Year Ending December 31</u>				
	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
Products and Systems for Professional Applications	f 7,707	f 8,407	f 9,415	f11,136	f12,548
Lighting and Batteries	3,123	3,267	3,720	3,874	4,458
Home Electronics for Sound and Vision	9,638	10,321	9,207	9,556	11,837
Domestic Appliances and Personal Care Products	3,300	3,480	3,790	4,302	5,086
Industrial Supplies	3,998	3,033	3,920	4,783	5,656
Miscellaneous Activities	<u>3,398</u>	<u>3,150</u>	<u>3,186</u>	<u>2,885</u>	<u>2,826</u>
Total Revenues (Guilders)	f31,164	f32,658	f33,238	f36,536	f42,411
Exchange Rate (US\$ per f)	0.50	0.51	0.53	0.47	0.41
Total Revenues (Millions of U.S. Dollars)	\$15,852	\$16,656	\$17,616	\$17,172	\$17,389

Source: N.V. Philips Gloeilampenfabrieken Annual Reports  
DATAQUEST, Inc.

# N.V. Philips' Gloeilampenfabrieken

Table 2

**N.V. PHILIPS SEMICONDUCTOR REVENUES**  
(Millions of Dollars)

*See ESIS #'s.*

	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
<b>TOTAL SEMICONDUCTOR</b>	340	275	325	355	431	500	553	480
<b>Total Integrated Circuit</b>	60	75	100	111	165	215	253	240
Bipolar Digital	4	3	4	4	5	7	15	14
TTL	0	0	0	0	0	0	0	0
DEL	0	0	0	0	0	0	0	10
ECL	4	3	4	4	5	7	10	4
Other	0	0	0	0	0	0	5	0
Bipolar Digital (Recap)						7	15	14
Memory						0	0	0
Logic						7	15	14
MOS	0	0	0	5	30	48	80	76
NMOS								
PMOS								
CMOS								
MOS (Recap)						48	80	76
Memory						1	4	2
Microprocessor						1	4	4
Logic						46	72	70
Linear	56	72	96	102	130	160	158	150
<b>Total Discrete</b>	280	200	220	234	246	260	273	218
Transistor						156	164	132
Small Signal						105	110	89
Power Transistor						51	54	43
Diode						94	99	79
Small Signal						40	42	34
Power						29	30	24
Zener						25	27	21
Thyristor						10	10	7
Other						0	0	0
<b>Total Optoelectronic</b>	0	0	5	10	20	25	27	22
LED Lamps					4	5	6	5
LED Displays					6	7	7	6
Optical Couplers					7	9	10	8
Other					3	4	4	3

Source: DATAQUEST, Inc.

## 12.03 Pioneer-Standard Electronics, Inc.

Pioneer Standard Electronics, Inc.  
4800 E. 131st Street  
Cleveland, Ohio 44105  
(216) 587-3600

(Millions of Dollars Except per Share Data)

### Balance Sheet (March 31)

	<u>1979</u>	<u>1980</u>	<u>Percent Change</u> <u>1979-1980</u>
Working Capital	\$12.9	\$19.6	51.8%
Long Term Debt	\$ 1.2	\$ 7.5	538.0%
Shareholders' Equity	\$15.6	\$19.2	23.4%
Equity as a Percent of Assets (%)	56.1%	50.9%	
After-Tax Return on Average Equity (%)	19.8%	22.7%	

### Operating Performance (Fiscal Year Ending March 31)

	<u>1979</u>	<u>1980</u>	<u>Percent Change</u> <u>1979-1980</u>
Revenue	\$66.7	\$87.5	31.1%
Cost of Goods	\$49.0	\$63.8	30.0%
Marketing, Warehousing SG&A Expense	\$12.3	\$15.9	29.5%
Pretax Income	\$ 4.9	\$ 6.9	41.2%
Pretax Margin (%)	7.4%	7.9%	
Net Income	\$ 2.8	\$ 3.9	40.0%
Per Share Data			
Earnings <sup>1</sup>	\$ 1.08	\$ 1.50	38.9%
Dividends	\$ 0.107	\$ 0.133	24.3%
Book Value	\$ 5.94	\$ 7.28	22.6%
Average Shares Outstanding (Millions)	2.61	2.63	0.7%
Capital Expenditures	\$ 0.9	\$ 1.6	90.2%
Sales/Average Assets	2.74	2.68	(2.3%)
Sales/Average Inventory	5.25	5.29	0.7%
Total Employees	580	680	17.2%

<sup>1</sup>Fully diluted

Source: Pioneer-Standard Annual Reports  
DATAQUEST, Inc.

# 12.03 Pioneer-Standard Electronics, Inc.

Table 12.03-1

Pioneer-Standard Electronics, Inc.  
FINANCIAL STATEMENT HISTORY 1973-80  
(Millions of Dollars)

	Fiscal Year Ending March 31								TRENDS	CMPD. GR.
	1973	1974	1975	1976	1977	1978	1979	1980		
<b>BALANCE SHEET</b>										
1 CASH & LIQUID SECURITIES	0.16	0.22	0.10	0.38	0.11	0.23	0.25	0.39	0.02	10.36
3 RECEIVABLES	2.57	3.05	3.53	4.35	5.40	6.55	9.42	11.10	1.21	23.80
4 INVENTORY	4.89	7.98	7.48	8.52	9.43	11.40	14.11	19.02	1.69	17.75
5 OTHER CURRENT ASSETS	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	(20.08)
6 PREPAID EXPENSES	0.02	0.03	0.02	0.04	0.02	0.07	0.10	0.14	0.02	33.86
7 EXCESS FUNDS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8 TOTAL CURRENT ASSETS	7.64	11.28	11.13	13.45	14.95	18.26	23.89	30.65	2.94	19.65
9 GROSS P P E	1.61	1.76	1.86	1.79	1.95	2.11	2.87	4.39	0.31	12.54
10 ACCUMULATED DEPRECIATION	0.54	0.64	0.74	0.70	0.80	0.88	1.03	1.24	0.09	11.29
11 NET P P E	1.08	1.12	1.12	1.09	1.15	1.22	1.84	3.14	0.22	13.03
12 MISC ASSETS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13 INVESTMENTS	0.49	0.80	0.93	0.92	1.15	1.50	1.97	3.93	0.38	27.91
15 *TOTAL ASSETS*	9.21	13.20	13.19	15.46	17.26	20.98	27.70	37.72	3.54	19.66
16 NOTES PAYABLE	0.30	1.20	1.00	0.00	0.00	0.40	3.00	0.50	0.10	6.65
17 ACCOUNTS PAYABLE	2.09	3.82	2.82	3.82	3.40	4.08	5.72	7.44	0.61	15.53
18 ACCRUED TAXES	0.32	0.48	0.57	0.57	0.72	0.82	0.82	1.28	0.11	17.64
19 ACCRUED LIABILITIES	0.43	0.26	0.22	0.24	0.34	0.40	0.47	0.84	0.05	12.56
20 CURR MAT LONG TERM DEBT	0.02	0.02	0.02	0.02	0.12	0.32	0.32	0.13	0.04	60.45
21 ACCRUED COMPENSATION	0.00	0.27	0.38	0.38	0.47	0.49	0.63	0.84	0.10	489.39
22 TOTAL CURR LIABILITIES	3.15	6.05	4.80	5.03	5.05	6.51	10.97	11.03	1.01	16.26
23 LONG TERM DEBT	0.55	0.53	0.51	1.29	1.37	1.50	1.18	7.50	0.65	35.51
24 DEFERRED TAXES	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25 MISC LIABILITIES	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27 DEFICIT FUNDS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28 TOTAL LIABILITIES	3.70	6.58	5.31	6.32	6.42	8.01	12.14	18.53	1.66	20.38
29 PREFERRED STOCK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30 COMMON STOCK	1.53	1.53	1.53	1.54	2.30	2.31	3.49	5.27	0.47	18.76
31 CAPITAL SURPLUS	0.83	0.86	0.89	0.92	0.95	0.97	1.00	1.02	0.03	3.02
32 RETAINED EARNINGS	3.15	4.23	5.45	6.68	7.59	9.69	11.06	12.90	1.38	21.75
34 TOTAL EQUITY	5.50	6.62	7.88	9.13	10.84	12.97	15.55	19.19	1.87	19.10
35 *TOTAL LIAB & EQUITY*	9.21	13.20	13.19	15.46	17.26	20.98	27.70	37.72	3.54	19.66
36 NET WORKING CAPITAL	4.48	5.23	6.33	8.42	9.91	11.75	12.92	19.62	1.93	22.24
<b>INCOME &amp; EXPENSE</b>										
38 SALES	22.03	27.90	33.00	36.52	46.29	52.27	66.73	87.54	8.57	20.48
40 COST OF GOODS	15.80	20.09	23.50	26.60	34.25	37.93	49.03	63.75	6.32	20.86
41 GROSS PROFIT	6.23	7.80	9.50	9.92	12.04	14.34	17.70	23.79	2.25	19.41
42 S G & A EXPENSE	4.21	5.32	6.44	6.90	8.14	9.71	12.31	15.94	1.53	19.44
43 R & D EXPENSE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45 OPERATING PROFIT	2.02	2.49	3.06	3.02	3.90	4.62	5.39	7.85	0.72	19.33
46 DEPRECIATION	0.10	0.12	0.13	0.13	0.15	0.17	0.21	0.27	0.02	13.57
47 LEASE PAYMENTS	0.14	0.15	0.21	0.24	0.32	0.37	0.43	0.63	0.06	23.98
48 INTEREST EXPENSE (INCOME)	0.06	0.11	0.22	0.16	0.16	0.18	0.37	0.74	0.07	31.12
49 MISC EXPENSE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
51 MISC INCOME	0.13	0.20	0.16	0.18	0.26	0.37	0.55	0.73	0.08	27.42
53 PRETAX PROFIT	1.85	2.31	2.66	2.66	3.53	4.28	4.92	6.95	0.65	19.20
54 INCOME TAXES	0.90	1.11	1.30	1.28	1.69	1.95	2.10	3.00	0.26	16.87
56 NET PROFIT	0.95	1.20	1.36	1.38	1.85	2.33	2.82	3.95	0.39	21.20
57 EPS AFTER PFD DIVIDENDS	0.37	0.46	0.53	0.53	0.71	0.90	1.08	1.50	0.15	20.93
68 COMMON DIV PER SHARE	0.03	0.05	0.05	0.06	0.07	0.09	0.11	0.13	0.01	19.71

Source: Pioneer-Standard Annual Reports  
DATAQUEST, Inc.

# 12.03 Pioneer-Standard Electronics, Inc.

Table 12.03-2

**Pioneer-Standard Electronics, Inc.**  
**FINANCIAL STATEMENT HISTORY 1973-80**  
**(Percent)**

	Fiscal Year Ending March 31								TRENDS	COMP GR
	1973	1974	1975	1976	1977	1978	1979	1980		
<b>BALANCE SHEET</b>										
1 CASH & LIQUID SECURITIES	1.71	1.68	0.77	2.45	0.61	1.12	0.90	1.04	(0.11)	(7.77)
3 RECEIVABLES	27.95	23.13	26.79	28.15	31.31	31.23	34.02	29.42	0.97	3.46
4 INVENTORY	53.13	60.43	56.69	55.14	54.64	54.34	50.95	50.41	(0.88)	(1.60)
5 OTHER CURRENT ASSETS	0.00	0.00	0.00	0.97	0.00	0.00	0.00	0.00	(0.01)	(21.83)
6 PREPAID EXPENSES	0.16	0.22	0.18	0.28	0.09	0.36	0.36	0.37	0.03	11.87
7 EXCESS FUNDS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8 TOTAL CURRENT ASSETS	82.95	85.46	84.42	86.99	86.66	87.05	86.24	81.25	(0.01)	(0.01)
9 GROSS P P E	17.50	13.31	14.13	11.55	11.29	10.05	10.37	11.63	(0.81)	(5.96)
10 ACCUMULATED DEPRECIATION	5.81	4.83	5.61	4.51	4.64	4.22	3.73	3.29	(0.32)	(7.00)
11 NET P P E	11.69	8.48	8.52	7.04	6.65	5.83	6.64	8.34	(0.49)	(5.84)
12 MISC ASSETS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13 INVESTMENTS	5.37	6.05	7.06	5.96	6.69	7.13	7.12	10.42	0.50	6.89
15 *TOTAL ASSETS*	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00	0.00
16 NOTES PAYABLE	3.26	9.09	7.58	0.00	0.00	1.91	10.83	1.33	(0.26)	(10.76)
17 ACCOUNTS PAYABLE	22.69	28.96	19.83	24.72	19.72	19.47	20.65	19.72	(0.81)	(3.45)
18 ACCRUED TAXES	3.50	3.65	4.31	3.69	4.15	3.88	2.97	3.39	(0.06)	(1.69)
19 ACCRUED LIABILITIES	4.64	1.93	1.69	1.55	1.94	1.93	1.70	2.23	(0.20)	(5.93)
20 CURR MAT LONG TERM DEBT	0.17	0.13	0.14	0.13	0.70	1.54	1.17	0.34	0.13	34.08
21 ACCRUED COMPENSATION	0.00	2.08	2.85	2.45	2.72	2.31	2.27	2.23	0.18	500.85
22 TOTAL CURR LIABILITIES	34.28	45.84	36.40	32.54	29.24	31.04	38.60	29.24	(1.02)	(2.84)
23 LONG TERM DEBT	5.96	4.04	3.90	8.38	7.96	7.15	4.24	19.88	1.28	13.24
24 DEFERRED TAXES	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25 MISC LIABILITIES	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27 DEFICIT FUNDS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28 TOTAL LIABILITIES	40.22	49.88	40.30	40.91	37.20	38.19	43.84	48.12	0.26	0.60
29 PREFERRED STOCK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30 COMMON STOCK	16.57	11.58	11.63	9.94	13.35	11.01	12.61	13.98	(0.14)	(0.76)
31 CAPITAL SURPLUS	8.99	6.51	6.76	5.96	5.49	4.83	3.61	2.70	(0.78)	(13.91)
32 RETAINED EARNINGS	34.21	32.03	41.31	43.19	43.96	46.17	39.94	34.20	0.65	1.74
34 TOTAL EQUITY	59.78	50.12	59.70	59.09	62.80	61.81	56.16	50.88	(0.26)	(0.47)
35 *TOTAL LIAB & EQUITY*	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00	0.00
36 NET WORKING CAPITAL	48.69	39.63	48.02	54.45	57.42	56.00	46.65	52.00	1.01	2.15
<b>INCOME &amp; EXPENSE</b>										
38 SALES	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00	0.00
40 COST OF GOODS	71.73	72.02	71.22	72.84	73.99	72.57	73.48	72.83	0.24	0.33
41 GROSS PROFIT	28.27	27.98	28.78	27.16	26.01	27.43	26.52	27.17	(0.24)	(0.87)
42 S G & A EXPENSE	19.09	19.06	19.50	18.89	17.58	18.58	18.45	18.21	(0.16)	(0.84)
43 R & D EXPENSE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45 OPERATING PROFIT	9.19	8.92	9.28	8.27	8.43	8.85	8.07	8.97	(0.08)	(0.94)
46 DEPRECIATION	0.47	0.43	0.40	0.36	0.33	0.33	0.32	0.31	(0.02)	(5.72)
47 LEASE PAYMENTS	0.62	0.52	0.63	0.65	0.70	0.70	0.65	0.71	0.02	2.92
48 INTEREST EXPENSE(INCOME)	0.28	0.40	0.64	0.44	0.35	0.34	0.55	0.85	0.04	8.85
49 MISC EXPENSE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
51 MISC INCOME	0.57	0.71	0.48	0.48	0.57	0.70	0.82	0.84	0.04	5.78
53 PRETAX PROFIT	8.39	8.28	8.05	7.29	7.63	8.18	7.37	7.93	(0.08)	(1.05)
54 INCOME TAXES	4.09	3.98	3.94	3.51	3.64	3.72	3.15	3.43	(0.11)	(2.97)
56 NET PROFIT	4.31	4.30	4.11	3.78	3.99	4.46	4.22	4.51	0.03	0.62
57 EPS AFTER PFD DIVIDENDS	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00	0.00
58 COMMON DIV PER SHARE	9.53	10.15	10.09	11.06	9.13	9.91	9.92	8.87	(0.10)	(1.01)

Sources: Pioneer-Standard Annual Reports  
DATAQUEST, Inc.

## 12.03 Pioneer-Standard Electronics, Inc.

Table 12.03-3

Pioneer-Standard Electronics, Inc.  
FUNDS FLOW HISTORY 1974-80  
(Millions of Dollars)

	Fiscal Year Ending March 31							TRENDS	CUMUL. GR
	1974	1975	1976	1977	1978	1979	1980		
<b>SOURCES</b>									
56 NET PROFIT	1.20	1.36	1.38	1.85	2.33	2.82	3.95	0.43	21.94
46 DEPRECIATION	0.12	0.13	0.13	0.15	0.17	0.21	0.27	0.02	14.20
61 NEW LONG TERM DEBT	0.00	0.00	0.80	0.20	0.45	0.00	6.45	0.68	150.74
62 NEW EQUITY	0.03	0.04	0.03	0.03	0.03	0.05	0.04	0.00	3.88
63 INCR OTHER LIABILITIES	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
66 TOTAL SOURCES	1.35	1.53	2.35	2.22	2.99	3.08	10.71	1.14	32.35
<b>USES</b>									
67 P P E EXPENDITURES	0.16	0.14	0.10	0.21	0.25	0.83	1.58	0.21	50.10
68 REPAYMENT LONG TERM DEBT	0.02	0.02	0.02	0.02	0.12	0.32	0.32	0.06	81.65
69 PREFERRED DIVIDENDS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70 COMMON DIVIDENDS	0.12	0.14	0.15	0.17	0.23	0.28	0.35	0.04	19.59
72 INCR WORKING CAPITAL	0.75	1.10	2.09	1.59	2.04	1.17	6.50	0.62	26.49
71 INCR OTHER ASSETS	0.31	0.13	(0.01)	0.23	0.34	0.48	1.96	0.21	*****
74 TOTAL USES	1.35	1.53	2.35	2.22	2.99	3.08	10.71	1.14	32.35
75 EXCESS/DEFICIT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
76 CUMULATIVE SUR/DEF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Source: Pioneer-Standard Annual Reports  
DATAQUEST, Inc.

# 12.03 Pioneer-Standard Electronics, Inc.

Table 12.03-4

## Pioneer-Standard Electronics, Inc. FINANCIAL RATIO HISTORY 1973-80

	Fiscal Year Ending March 31								ST AV	MTD AVG
	1973	1974	1975	1976	1977	1978	1979	1980		
<b>LIQUIDITY</b>										
1 CURRENT RATIO	2.421	1.864	2.319	2.674	2.964	2.804	2.178	2.778	2.500	2.581
2 QUICK RATIO	0.866	0.541	0.757	0.941	1.092	1.042	0.882	1.042	0.695	0.950
3 CASH RATIO	0.050	0.037	0.021	0.075	0.021	0.036	0.023	0.036	0.037	0.035
4 WORKING CAPITAL/SALES	0.203	0.188	0.192	0.230	0.214	0.225	0.194	0.224	0.209	0.212
6 DAYS RECEIVABLES	42.628	39.944	39.074	43.493	42.611	45.757	51.536	46.269	43.914	45.339
7 DAYS INVENTORY	112.997	144.925	116.112	116.951	100.487	109.727	105.042	106.873	114.389	110.724
<b>LEVERAGE</b>										
8 LONG TERM DEBT/CAPITALIZ	0.091	0.075	0.061	0.124	0.112	0.104	0.070	0.281	0.115	0.135
11 LONG TERM DEBT/EQUITY	0.100	0.081	0.065	0.142	0.127	0.116	0.076	0.391	0.137	0.167
12 TOTAL DEBT/EQUITY	0.157	0.264	0.195	0.144	0.138	0.171	0.289	0.423	0.223	0.249
<b>COVERAGE</b>										
13 EBIT/INTEREST	31.311	21.625	12.919	17.744	23.069	25.295	14.292	10.361	19.578	17.621
14 FIXED CHARGE COVERAGE	10.338	9.988	7.153	7.691	8.326	8.904	7.132	6.061	8.202	7.671
16 REPAY LTD+FIX CHARGE COV	*****	9.403	6.882	7.358	7.994	7.276	5.084	4.913	6.987	6.375
<b>OPER PERFORMANCE</b>										
17 GROSS PROFIT/SALES	0.283	0.280	0.288	0.272	0.260	0.274	0.265	0.272	0.274	0.271
18 OPER PROFIT/SALES	0.092	0.089	0.093	0.083	0.084	0.088	0.081	0.090	0.087	0.087
21 PRETAX PROFIT/SALES	0.084	0.083	0.081	0.073	0.076	0.082	0.074	0.079	0.079	0.078
22 NET PROFIT/SALES	0.043	0.043	0.041	0.038	0.040	0.045	0.042	0.045	0.042	0.042
23 NET PROFIT/AVG EQUITY	*****	0.198	0.187	0.163	0.185	0.196	0.198	0.227	0.193	0.198
24 NET PROFIT/AVG CAPITALIZ	*****	0.182	0.175	0.147	0.163	0.175	0.181	0.182	0.172	0.179
26 NET PROFIT/AVG TOT ASSETS	*****	0.107	0.103	0.096	0.113	0.122	0.116	0.121	0.111	0.114
27 E P S GROWTH RATE	*****	0.262	0.134	0.015	0.335	0.261	0.201	0.390	0.228	0.256
28 SALES GROWTH RATE	*****	0.266	0.183	0.107	0.267	0.129	0.277	0.312	0.220	0.233
<b>TURNOVER</b>										
31 SALES/AVG EQUITY	*****	4.603	4.555	4.295	4.635	4.381	4.679	5.039	4.600	4.659
32 SALES/AVG CAPITALIZ	*****	4.226	4.248	3.882	4.089	3.918	4.278	4.032	4.096	4.079
33 SALES/AVG TOT DEBT + ECY	*****	3.786	3.714	3.679	4.064	3.788	3.787	3.696	3.789	3.789
34 SALES/AVG TOTAL ASSETS	*****	2.490	2.501	2.550	2.830	2.734	2.742	2.676	2.646	2.690
35 SALES/AVG OPER ASSETS	*****	2.642	2.677	2.726	3.022	2.937	2.952	2.942	2.842	2.902
36 SALES/AVG GROSS P P E	*****	16.567	18.229	20.013	24.787	25.765	26.805	24.129	22.328	23.956
<b>BALANCE SHEET</b>										
37 CASH/SALES	0.007	0.008	0.003	0.010	0.002	0.004	0.004	0.005	0.005	0.005
38 RECEIVABLES/SALES	0.117	0.109	0.107	0.119	0.117	0.125	0.141	0.127	0.120	0.124
41 INVENTORY/SALES	0.222	0.286	0.227	0.233	0.204	0.218	0.211	0.217	0.227	0.221
42 OTH CURR ASSETS/SALES	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.001	0.000
43 LINE 6/SALES	0.001	0.001	0.001	0.001	0.000	0.001	0.002	0.002	0.001	0.001
44 GROSS P P E/SALES	0.073	0.063	0.056	0.049	0.042	0.040	0.043	0.050	0.052	0.048
45 LINE 13/SALES	0.022	0.029	0.028	0.025	0.025	0.029	0.030	0.045	0.029	0.031
46 MISC ASSETS/SALES	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
47 ACCOUNTS PAYABLE/SALES	0.095	0.137	0.079	0.105	0.074	0.078	0.086	0.085	0.092	0.087
48 ACCRUED TAXES/SALES	0.015	0.017	0.017	0.016	0.015	0.016	0.012	0.015	0.015	0.015
51 ACCRUED LIABILITY/SALES	0.019	0.009	0.007	0.007	0.007	0.008	0.007	0.010	0.009	0.008
52 LINE 21/SALES	0.000	0.010	0.011	0.010	0.010	0.009	0.009	0.010	0.009	0.010
53 DEFERRED TAXES/SALES	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
54 MISC LIABILITIES/SALES	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>MISCELLANEOUS</b>										
57 EQUITY PER COMMON SHARE	2.129	2.554	3.047	3.525	4.181	4.994	5.951	7.290	4.209	5.037
58 RETIRE/PREV GROSS P P E	*****	(0.011)	(0.016)	(0.094)	(0.027)	(0.046)	(0.032)	(0.022)	(0.035)	(0.036)
61 DEPREC/PREV GROSS P P E	*****	0.074	0.075	0.071	0.085	0.089	0.102	0.094	0.084	0.089
62 COM DIVS/ERN-PPD DIVS	0.095	0.101	0.101	0.111	0.091	0.099	0.099	0.089	0.098	0.097
63 TAX RATE	0.487	0.481	0.489	0.481	0.477	0.455	0.427	0.432	0.466	0.456
64 COST OF GOODS/SALES	0.717	0.720	0.712	0.728	0.740	0.726	0.735	0.728	0.726	0.729
65 S G & A/SALES	0.191	0.191	0.195	0.189	0.176	0.186	0.184	0.182	0.187	0.185

Source: Pioneer-Standard Annual Reports  
DATAQUEST, Inc.



## Pitney Bowes Inc.

Walter H. Wheeler, Jr., Drive  
Stamford, Connecticut 06926

Telephone: (203) 356-5000

Fax: (203) 351-6835

Dun's Number: 10-633-2638

*Date Founded: 1920*

---

### CORPORATE STRATEGIC DIRECTION

Pitney Bowes Inc. and its subsidiaries manufacture, market, and service products in three industry segments: business equipment, business supplies and services, and financial services. The business equipment segment provides mailing, copying, and voice processing systems. The business supplies and services segment provides equipment and supplies to encode and track price, content, item identification, and other merchandise information. In addition, the business supplies segment provides retail security systems that are manufactured and marketed by the Company's Monarch Marking Systems Inc. subsidiary. The financial services segment provides lease financing for Pitney Bowes' products as well as financial services for other commercial and industrial markets.

In the fourth quarter of 1989, Pitney Bowes initiated a transition program to enhance global competitiveness and opportunities to achieve strong revenue and profitability growth in the 1990s. The initiative anticipates new generations of business equipment products. According to Pitney Bowes, the planned products will permit the Company to increase the efficiency and productivity of its manufacturing and distribution systems. Transition costs of \$110 million\* were reflected as a one-time, pretax charge to earnings in the fourth quarter of 1989 primarily in the US business equipment segment.

The Company's transition action plans include a worldwide work force reduction of approximately 1,500 positions over a three-year period and change in the employee skill mix. This plan also will establish a dedicated copier division and consolidate distribution centers, as well as streamline administrative systems and equipment service organizations.

\*All dollar amounts are in US dollars.

Pitney Bowes products and services are marketed through an extensive network of offices in the United States, through a number of subsidiaries and independent distributors and dealers worldwide, and through outbound telemarketing. The Company targets a variety of business, governmental, institutional, and other organizations.

Total revenue increased 12 percent to \$2.9 billion in fiscal 1989 from \$2.6 billion in fiscal 1988. Net income increased 4 percent to \$253 million in fiscal 1989 from \$243 million in fiscal 1988. Pitney Bowes employs 31,404 people worldwide.

R&D expenditure totaled \$87 million in fiscal 1989, representing 3 percent of revenue.

More detailed information is available in Tables 1 and 2, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region. Information on revenue by distribution channel is not available. Table 3, a comprehensive financial statement, is at the end of this profile.

---

### BUSINESS SEGMENT STRATEGIC DIRECTION

#### Business Equipment

The Pitney Bowes business equipment segment provides copiers and copier supplies, facsimile systems, voice processing systems, postage meters and mailing systems, and shipping and weighing systems. In fiscal 1989, business equipment revenue accounted for 74 percent of corporate revenue, an 8 percent increase over 1988. Dataquest estimates that Pitney Bowes held 2.4 percent of the plain paper copier market in 1989.

In 1989, Pitney Bowes established a dedicated copier division responsible for the sales, marketing, servicing, and administrative support of the Company's copier business in the United States. The Copier Systems Division introduced seven new copiers in 1989. These copiers range from low- to high-volume copiers. Revenue from the Pitney Bowes worldwide copier business in fiscal 1989 was \$302 million, an 11 percent increase from fiscal 1988, and accounted for 11 percent of total corporate revenue.

Pitney Bowes voice processing systems include small work group and central dictation systems, portable and desktop dictation units, and automatic telephone answering systems.

Pitney Bowes mailing systems include postage meters, parcel registers, mailing machines, manifest systems, letter and parcel scales, mail openers, mailing room furniture, folders, paper handling and shipping equipment, and facsimile machines.

#### **Business Supplies and Services**

The Pitney Bowes business supplies and services segment provides equipment and supplies to encode and track price, content, item identification, and other merchandise information. In addition, the Company provides retail security systems manufactured and marketed by its Monarch Marking Systems subsidiary. In January 1990, the Company reached an agreement to sell its Data Documents Systems Inc.

subsidiary, which had previously been part of the business supplies and services segment. In 1989, the Company also committed to the divestiture of its Wheeler Group Inc. subsidiary.

#### **Financial Services**

The financial services segment includes the Company's worldwide financing operations. Pitney Bowes provides lease financing for its products as well as other financial services for the commercial and industrial markets. Lease financing transactions are executed through the Company's wholly owned subsidiaries: Pitney Bowes Credit Corporation, including Colonial-Pacific Leasing Corporation and Pitney Bowes Real Estate Financing Corporation, in the United States; Pitney Bowes Finance Plc in the United Kingdom; Adrema Leasing Corporation in Germany; and Pitney Bowes Credit Australia Ltd. in Australia. The Company's Pitney Bowes of Canada Ltd. subsidiary also has a financing division through which leasing arrangements are made available to its customers. The finance operations accounted for 14 percent of consolidated revenue in 1989.

#### **Further Information**

For more information about the Company's business segments, please contact the appropriate Dataquest industry service.

**Table 1**  
**Five-Year Corporate Highlights (Millions of US Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$1,815.8	\$1,986.7	\$2,269.8	\$2,575.6	\$2,875.7
Percent Change	-	9.41	14.25	13.47	11.65
Capital Expenditure	0	0	0	0	0
Percent of Revenue	0	0	0	0	0
R&D Expenditure	\$48.4	\$54.2	\$65.1	\$79.5	\$87.3
Percent of Revenue	2.67	2.73	2.87	3.09	3.04
Number of Employees	28,995	29,166	29,460	29,316	31,404
Revenue (\$K)/Employee	\$63	\$68	\$77	\$88	\$92
Net Income	\$150.4	\$167.9	\$199.4	\$243.4	\$252.8
Percent Change	-	11.64	18.76	22.07	3.86
1989 Calendar Year	Q1	Q2	Q3	Q4	
Quarterly Revenue	\$658.20	\$693.60	\$711.90	\$812.00	
Quarterly Profit	\$19.50	\$61.80	\$62.00	\$9.50	

Source: Pitney Bowes Inc.  
Annual Reports and Forms 10-K  
Dataquest (1990)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1985	1986	1987	1988	1989
North America	84.42	85.47	80.07	78.35	76.89
International	15.58	14.53	19.93	21.66	23.11
Europe	8.00	8.00	11.00	12.00	12.00
ROW	7.00	7.00	8.00	9.00	11.00

Source: Pitney Bowes Inc.  
Annual Reports and Forms 10-K  
Dataquest (1990)

---

## 1989 SALES OFFICE LOCATIONS

Information is not available.

---

## MANUFACTURING LOCATIONS

### *North America*

#### Dayton, Ohio

Business supplies

#### Melbourne, Florida

Voice processing systems, postage meters, mailing systems, and shipping and weighing systems

#### Pickering, Ontario, Canada

Voice processing systems, postage meters, mailing systems, shipping and weighing systems, and business supplies

#### Stamford, Connecticut

Voice processing systems, postage meters, mailing systems, and shipping and weighing systems

### *Europe*

#### Harlow, England

Voice processing systems, postage meters, mailing systems, shipping and weighing systems, and business supplies

#### Killwangen, Switzerland

Voice processing systems, postage meters, mailing systems, and shipping and weighing systems

### *Asia/Pacific*

#### Singapore

Business supplies

#### Sydney, Australia

Business supplies

### *ROW*

#### Mexico City, Mexico

Business supplies

---

## SUBSIDIARIES

### *North America*

Baldwine Cooke Co. Ltd. (Canada)

Colonial-Pacific Leasing Corporation (United States)

Dictaphone Canada Ltd. (Canada)

Dictaphone Corp. (United States)

Monarch Marking Systems Inc. (United States)

Monarch Marking Systems Ltd. (Canada)

Pitney Bowes Business Systems LPC Inc. (United States)

Pitney Bowes Credit Corporation (United States)

Pitney Bowes Management Systems (United States)

Pitney Bowes Real Estate Financing Corporation (United States)

Pitney Bowes of Canada Ltd. (Canada)

### *Europe*

Adrema Leasing Corporation (Germany)

Dictaphone Co. Ltd. (United Kingdom)

Dictaphone International A.G. (Switzerland)

PB Leasing Ltd. (United Kingdom)

Pitney Bowes Deutschland GmbH (Germany)

Pitney Bowes France S.A. (France)

Pitney Bowes GesmbH (Austria)

Pitney Bowes Italia S.r.l. (Italy)

Pitney Bowes Ltd. (Ireland)

Pitney Bowes Marking Systems Ltd. (United Kingdom)

Pitney Bowes OY (Finland)

Pitney Bowes Plc (United Kingdom)

Pitney Bowes Svenska Aktiebolag (Sweden)

Pitney Bowes Switzerland A.G. (Switzerland)

### *Asia/Pacific*

Dodwell Pitney Bowes K.K. (Japan)

Monarch Marking (S.E.A.) Pte. Ltd. (Singapore)

Monarch Marking Systems Australia Pty. Ltd. (Australia)

Pitney Bowes Credit Australia Ltd. (Australia)

Remington Pty. Ltd. (Australia)

### *ROW*

Monarch Marking Systems de Mexico S.A. de C.V. (Mexico)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

### *1989*

#### *Sharp*

Pitney Bowes and Sharp entered into an OEM agreement whereby Pitney Bowes will sell copiers manufactured by Sharp.

1982

**Ricoh Company Ltd.**

Pitney Bowes and Ricoh entered into an OEM agreement whereby Pitney Bowes will sell copiers manufactured by Ricoh.

---

**MERGERS AND ACQUISITIONS**

1989

**Pandick Technologies Inc.**

Pitney Bowes acquired Pandick Technologies, a nationwide provider of on-site, contract services for reprographics and mailroom management, for \$95 million in cash.

1988

**Remington**

Pitney Bowes acquired Remington (Sydney, Australia) for \$17 million in cash. Remington, a subsidiary of Natcorp Investments, an industrial investment company, is the biggest independent seller of office products in Australia.

**LPC**

Pitney Bowes acquired LPC, a vendor of software used for mailing and related applications. The privately held LPC was founded in 1972.

---

**KEY OFFICERS**

**George B. Harvey**

Chairman, president and chief executive officer

**James L. Bast**

President, Business Systems

**Hiro R. Hiranandani**

President, International Business Systems

**Carole F. St. Mark**

President, Business Supplies

**John J. Canning**

President, Financial Services

---

**PRINCIPAL INVESTORS**

College Retirement Equities Fund—12.69 percent

---

**FOUNDERS**

Information is not available.

**Table 3**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December**  
**(Millions of US Dollars, except Per Share Data)**

	1985	1986	1987	1988	1989
<b>Balance Sheet</b>					
Total Current Assets	\$714.6	\$791.6	\$963.2	\$1,519.2	\$1,698.5
Cash	17.0	15.7	18.1	45.1	60.9
Receivables	341.7	364.5	465.0	1,061.3	1,156.6
Marketable Securities	45.8	52.6	76.3	0.6	0.8
Inventory	289.9	341.7	381.2	372.5	440.2
Other Current Assets	20.2	17.1	22.6	39.7	40.0
Net Property, Plants	\$384.7	\$401.9	\$434.9	\$465.1	\$509.8
Other Assets	\$663.6	\$834.0	\$1,033.5	\$2,803.9	\$3,402.8
<b>Total Assets</b>	<b>\$1,762.9</b>	<b>\$2,027.5</b>	<b>\$2,431.6</b>	<b>\$4,788.2</b>	<b>\$5,611.1</b>
Total Current Liabilities	\$577.6	\$671.8	\$791.5	\$1,853.0	\$2,270.9
Long-Term Debt	\$107.2	\$127.1	\$240.6	\$1,059.2	\$1,369.3
Other Liabilities	\$275.1	\$315.7	\$361.3	\$606.9	\$542.4
<b>Total Liabilities</b>	<b>\$959.9</b>	<b>\$1,114.6</b>	<b>\$1,393.4</b>	<b>\$3,519.1</b>	<b>\$4,182.6</b>
Total Shareholders' Equity	\$802.9	\$912.9	\$1,038.2	\$1,269.1	\$1,428.5
Converted Preferred Stock	20.9	11.7	9.6	6.9	6.2
Common Stock	76.4	157.0	158.9	160.9	161.6
Other Equity	115.7	37.9	23.1	83.4	71.8
Retained Earnings	589.9	706.3	846.6	1,017.9	1,188.9
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$1,762.8</b>	<b>\$2,027.5</b>	<b>\$2,431.6</b>	<b>\$4,788.2</b>	<b>\$5,611.1</b>
<b>Income Statement</b>					
Revenue	\$1,815.8	\$1,986.7	\$2,269.8	\$2,575.6	\$2,875.7
US Revenue	1,532.9	1,698.1	1,817.5	2,017.9	2,211.2
Non-US Revenue	282.9	288.6	452.3	557.8	664.5
Cost of Sales	\$617.4	\$643.8	\$582.9	\$634.9	\$715.6
R&D Expense	\$48.4	\$54.2	\$65.1	\$79.5	\$87.3
SG&A Expense	\$904.1	\$978.2	\$1,008.1	\$1,120.2	\$1,204.6
Pretax Income	\$199.5	\$268.3	\$310.8	\$352.9	\$261.1
Pretax Margin (%)	10.99	13.50	13.69	13.70	9.08
Effective Tax Rate (%)	43.80	46.30	38.10	34.70	31.00
Net Income	\$150.4	\$167.9	\$199.4	\$243.4	\$252.8
Shares Outstanding, Millions	79.1	79.2	78.9	78.9	79.3
<b>Per Share Data</b>					
Earnings	\$1.90	\$2.12	\$2.53	\$3.08	\$3.19
Dividend	\$0.60	\$0.66	\$0.76	\$0.42	\$1.04
Book Value	\$10.15	\$11.53	\$13.16	\$16.08	\$18.01

**Table 3 (Continued)**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December**  
**(Millions of US Dollars, except Per Share Data)**

<b>Key Financial Ratios</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<i>Liquidity</i>					
Current (Times)	1.24	1.18	1.22	0.82	0.75
Quick (Times)	0.74	0.67	0.74	0.62	0.55
Fixed Assets/Equity (%)	47.91	44.02	41.89	36.65	35.69
Current Liabilities/Equity (%)	71.94	73.59	76.24	146.01	158.97
Total Liabilities/Equity (%)	119.55	122.09	134.21	277.29	292.80
<i>Profitability (%)</i>					
Return on Assets	-	8.86	8.94	6.74	4.86
Return on Equity	-	19.57	20.44	21.10	18.74
Profit Margin	8.28	8.45	8.78	9.45	8.79
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	2.67	2.73	2.87	3.09	3.04
Capital Spending % of Revenue	0	0	0	0	0
Employees	28,995	29,166	29,460	29,316	31,404
Revenue (\$K)/Employee	\$63	\$68	\$77	\$88	\$92
Capital Spending % of Assets	0	0	0	0	0

Source: Pitney Bowes Inc.  
Annual Reports and Forms 10-K  
Dataquest (1990)

# Plasma Technology (UK) Ltd.

## OVERVIEW

Founded in 1981, Plasma Technology is one of Europe's principal manufacturers of plasma etching and deposition equipment. It is a private Company, owned by its co-founders David Carr and John Ball.

The Company was founded because, in the late 1970s, plasma techniques were being demand-pulled by the industry, and no R&D was being carried out for its future development.

To meet this gap, in 1981, Plasma Technology developed the world's first modular range of plasma systems for R&D and pilot line applications, known as Plasmalab. The flexibility of the modular concept allowed systems to be easily adapted or extended for any plasma etching or deposition process, and enabled economical multichamber systems to be configured for R&D customers with several process requirements.

Along with this unique and novel hardware approach, the Company also recognized the R&D customer's need for wide-ranging process support in advanced new technology areas, as well as established silicon device processing. Therefore, it embarked on a program of heavy expenditure in applications laboratory facilities, with customers being encouraged to evaluate processes before making a purchase commitment.

This approach has enabled Plasma Technology to guarantee rapid and effective solutions to customers' processing needs, thus avoiding the difficulties often encountered when hardware alone is purchased.

Following its success in Europe where more than 140 systems were installed by 1984, the Company embarked on an ambitious expansion program aimed at the U.S. and Japanese domestic markets where no competitive indigenous manufacturers existed. In the U.S., Plasma Technology appointed Microscience Inc. as its distributor. This company specializes in providing high-technology products to the R&D side of the microelectronics industry, with a network of representatives from the eastern seaboard to the Pacific Ocean.

Also in 1984, the Company appointed the Marubun Corporation of Japan, which specializes in importing high-technology equipment for the microelectronics industry, as its distributor in Japan.

A measure of the Company's success is illustrated by the fact that sales worldwide have increased some 20 times from US\$200,000 in 1982 to US\$4.1 million in 1985.



# Plasma Technology (UK) Ltd.

## OPERATIONS

As a result of rapid expansion, Plasma Technology moved in 1983 to a new 3.5-acre site at Yatton, near Bristol, England.

This modern site houses the Company's corporate headquarters, a new conference suite, and accommodations for customer process and maintenance training.

Adjacent is a new manufacturing facility that includes two clean laboratory areas which provide a total of 24,000 square feet of production space, assembly, and test areas.

The Company currently employs nearly 70 persons and, as a result of continuing expansion, is expected to have 100 employees by 1988.

During the past four years, Plasma Technology has strengthened its international marketing by appointing agents on a worldwide basis.

## FINANCIAL

Table 1 summarizes the Company's progress for the fiscal year ending October 31, 1982, (the year of incorporation) through 1985.

Table 1 reveals the dramatic growth of Plasma Technology (UK) Ltd. since 1982, when turnover was \$200,000, to 1985, when it was \$4.1 million. Over this same four-year period, profit before tax moved from a loss of \$122,000 to a profit of \$894,000. The Company estimates that in the current fiscal year, turnover will double from the 1985 figure to approximately 7.8 million and that pre-tax profit will approach \$1.95 million against a figure of \$819,481 for 1985, based on 1985 exchange rates.

In 1985, the split of sales by geographic area was approximately 66 percent U.K. and 34 percent exported to Western Continental Europe. First contributions from the U.S. and Japan are expected to produce sales in the order of \$2 million in 1986, based on 1985 exchange rates.

# Plasma Technology (UK) Ltd.

Table 1

Plasma Technology (UK) Ltd.  
PROFIT AND LOSS ACCOUNT  
(Thousands of U.S. Dollars)

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>
Turnover	\$200	\$1,203	\$2,048	\$4,082
Cost of Sales	123	661	1,108	2,227
	-----	-----	-----	-----
GROSS PROFIT	\$ 77	\$ 542	\$ 940	\$1,855
Selling & Admin. Costs	109	273	485	673
R&D Expenses (net)	90	49	114	288
	-----	-----	-----	-----
OPERATING PROFIT	(\$122)	\$ 220	\$ 341	\$ 894
Rate of Exchange				
£ Sterling per US Dollar		0.66	0.75	0.77

Source: Plasma Technology (UK) Ltd.  
Annual Account 1985

## RESEARCH AND DEVELOPMENT

In 1985 the Company's R&D amounted to 13 percent of sales turnover. This reflected a 7 percent increase from the previous year's R&D level.

In its R&D studies, Plasma Technology (UK) Ltd. works closely with government-sponsored research projects, both national and international, and with universities across Europe. By working at the experimental end of the market, the Company has maintained an important lead in the development of plasma technology, a market that is expected to be worth \$1 billion worldwide by 1988.

# Plasma Technology (UK) Ltd.

Some of the R&D studies currently under investigation in support of the Alvey and other government/EEC research projects include:

- Microwave-generated plasmas for reactive ion etching (RIE)
- Etching and deposition of refractory metals and metal silicides
- Doped amorphous silicon
- Evaluation of dry etching processes for electron beam lithography using difference EB and photoresist systems

In conjunction with Olin Electronics and a number of Plasma's customers, Plasma Technology (UK) Ltd. is carrying out a program designed to overcome the problems associated with stripping various types and thicknesses of photoresist. One recent outcome is a process characterized for 4-micron thick negative photoresist, on a batch of 100 5-inch wafers, with stripping times optimized at 45 minutes.

The Company is also at the forefront of etching technology in the shallow etching of gallium arsenide. It has developed a process that uses low ion bombardment energies to minimize surface damage to GaAs substrates. In addition, careful attention to gas chemistry ensures anisotropic etched profiles.

## COMPANY PRODUCTS

Plasma Technology markets a number of Plasmalab systems covering reactive ion etch (RIE), photo resist strip (PRS), and plasma deposition (PD).

### RIE 800

This is a third-generation reactive ion etch system incorporating the following features:

- Optimum electrode area ratio
- Integrated dark space shield
- High flow pumping system with options for closed looped pressure and temperature control
- Microprocessor-based end-point detection system

# Plasma Technology (UK) Ltd.

The RTE 800 system is designed around proven, successful processes and is available as a fully characterized package with appropriate process information and guarantees for a wide range of applications, including:

- Sub-micron, anisotropic etch of Al/Si/Cu metallizations with  $\text{CCl}_4$ ,  $\text{Cl}_2$ , and  $\text{BCl}_3$  processes
- Sub-micron, anisotropic, polymer-free etching of  $\text{SiO}_2$  layers up to 2-micron over Si
- Sub-micron anisotropic etching of features in GaAs with conventional resist masking
- High-rate etching of 200 to 300-micron depth via holes in GaAs with better than 3:1 wall slopes
- Two-stage etching of sub-micron multilevel mask structure in resist or polyimide material with dielectric or metal overlay
- Etching bright or chrome masks down to 0.2-micron features with conventional or EB resists; defect densities as low as  $0.1/\text{cm}^2$  have been achieved
- Sub-micron etching of refractory metal silicide interconnections

## RIE 8000

This is a third-generation, low-pressure, high-frequency, reactive ion etch system. It incorporates the P<sup>4</sup> (programmable planar pick and place) robot, the first such system designed specifically for handling silicon wafers on planar surfaces. The P<sup>4</sup> system employs a polar coordinate design, together with a unique non-contact wafer pickup, using a low-velocity variant of the Bernoulli flow principle. This avoids the shock or stress associated with mechanical pickups, which is important in handling fragile III-V wafers. The non-contact pickup can handle wafers from 2 to 6 inches in diameter.

The RIE 8000 system provides a cost-effective, flexible solution to VLSI production etching. It is supplied as a fully qualified package, with full process information and performance guarantees for state-of-the-art processes.

# Plasma Technology (UK) Ltd.

## PRS 800

This photoresist strip system is designed for maximum throughput with a minimum maintenance downtime. It has the following features:

- Large load capacity of 100 x 5-inch wafers or 150 x 3-inch wafers
- Handling capacity of up to 300 x 5-inch wafers per hour
- Low downtime--less than 2 percent has been achieved on an operating cycle of 24 hours per day, 6 days per week
- Aluminium chamber maintained at 80°C to eliminate warm-up delays
- Vertical gas flow for uniform etching
- Fully automatic control with finish warning
- Standard 10-torr capacitance nanometer for accurate indication of process pressures
- High-power, high-frequency (13.56 MHz) solid state, water-cooled generator to give consistently faster and more uniform stripping than lower frequency systems
- Driven cage electrode for fast stripping without ion or electron damage
- Microprocessor end-point detection system with unique dynamic process optimization feature
- High throughput pumping system with 80M<sup>3</sup> pump to ensure sufficient gas flow to maintain maximum strip rates with full wafer loads
- Standard mass flow control to ensure reproducible process conditions

# Plasma Technology (UK) Ltd.

## DP 800

This is a plasma deposition system for silicon nitride, silicon dioxide, amorphous silicon, and metal silicide films. It is capable of producing uniform plasma deposited films with closely controlled performance parameters on substrates of up to 380mm diagonal.

The DP 800 is used for:

- ◆ Silicon nitride encapsulation
- ◆ Silicon nitride capping for thermal protection of GaAs structures
- ◆ Silicon nitride for capacitor and interlayer dielectric applications
- ◆ Silicon dioxide for interlayer dielectric applications
- ◆ Amorphous silicon for photovoltaic applications
- ◆ Amorphous silicon for thin-film transistor applications

## Alphaline 300

This is a joint development with Edwards High Vacuum (a division of BOC) and is Europe's first modular, multichamber amorphous silicon production system. It is an in-line vacuum coating system for producing amorphous silicon by plasma-enhanced chemical vapor deposition on glass substrate.

The Alphaline 300 system is capable of meeting the demand for the high-speed deposition of amorphous on large substrates--up to 300 x 300mm in size.

## SE 80

This is a high-capacity system for photoresist stripping and general, isotropic fluorine-based etching. This barrel etch/strip system is used in finishing solar cells.

## Nitrogen Trifluoride

A recent addition to Plasma Technology's range of equipment and systems is nitrogen trifluoride--a new gas offered as part of its Expressgas service. Nitrogen trifluoride is finding increasing use as an alternative to carbon tetrachloride for etching silicon-type materials.

# Plasma Technology (UK) Ltd.

It has the advantage of producing only gaseous products when it is decomposed and no polymers are formed. In addition, as  $NF_3$  generates large amounts of atomic fluorine, it allows higher silicon etch rates than are obtainable with fluorocarbon gases.

## FUTURE PROSPECTS

During the past five years, Plasma Technology has built up a steadily increasing user base, with well over 200 systems installed in Europe. From this position, it is well positioned to enter the U.S. and Japanese markets.

Plasma Technology views the area of plasma-etching techniques as one offering above-average growth opportunities. To maintain its leading position, it plans to expand its strong involvement in processes and applications by further collaborative R&D programs with major users and universities. It has identified the following areas:

- Deposition and etching of refractory metals and silicides
- Etching processes for gallium arsenide integrated circuits
- Plasma etching of optically and electron beam-generated chrome mask plates
- Enhanced plasma techniques for next-generation Reactive Ion Etch systems.

The Company is very aware that the microelectronics industry is entering an extremely competitive phase and that attitudes toward purchasing new equipment are becoming more demanding. Customers are looking for sensible, reliable, and cost-effective production equipment in contrast to some of the more exotic, expensive, and temperamental solutions chosen in the past.

Because of its excellent reputation for precision and quality of its process development work for R&D and pilot line applications, we believe that Plasma Technology is well placed to expand its share of the growing worldwide market for plasma systems.

## **STOP PRESS**

As we were going to press we were informed that Oxford Instruments, a U.K. electronic medical equipment company, has acquired Plasma Technology for £9.1 million.

## The Plessey Company plc

Vicarage Lane  
Ilford

Essex, England IG1 4AQ  
Telephone: +44 (1) 478-3040  
Dun's Number: 21-618-7252

*Date Founded: 1919*

---

### CORPORATE STRATEGIC DIRECTION

The Plessey Company plc was founded in 1919 by Brian Clark. His son, Allen Clark (later Sir Allen), led the Company through nearly four decades of major growth, from the 1920s until his death in 1961. The present chairman and chief executive is Sir John Clark.

Prior to its first major investment in semiconductors, the Company's product portfolio included radio communications equipment (primarily for military use), aircraft equipment (primarily pumps), and electrical components (resistors, capacitors, and connectors), among other equipment. In line with the Company's strategy of concentrating in the high-technology product areas, many of these activities have been dispensed with during the last few years.

During 1960 and 1961, Plessey acquired the telephone operations of ATE and Ericsson Telephones (the U.K. arm of Ericsson) in the United Kingdom, signaling its move into British Post Office procurements and into the telecommunications market in general.

Throughout 1986, Plessey was locked in battle to resist takeover by General Electric Company (GEC), the only U.K. company with larger electronics sales than Plessey. The issue was whether such a merger would consolidate the fragmented U.K. electronics industry. The U.K. government finally ruled against GEC's \$1.8 billion\* bid for Plessey on the grounds that the takeover would not serve the national interest.

By the end of 1988, Plessey and GEC agreed on a joint venture. The new company, GEC Plessey

Telecommunications (GPT), supplies telecommunications equipment in the United Kingdom, with access to world markets.

However, in an unfriendly takeover that has been going on since November 1988, both GEC and Siemens of West Germany have won control of Plessey plc, as was announced in October 1989. The \$3 billion bid was confirmed when GEC Siemens plc announced that it had 50.4 percent of Plessey. The deal creates Europe's largest defense and electronics business that includes interests in radar, avionics, telecommunications, semiconductors, and nuclear power plants.

Plessey's current activities center on the development and supply of telecommunications and electronic defense systems. The Company's work in solid-state and electronic components supports these activities and provides a presence in the merchant component market.

The Plessey Company has established three major operational groups of logically integrated activities in which products and markets are interrelated: Telecommunications, Electronic Systems, and Engineering and Components. All three groups rely extensively on silicon technology and are organized for administrative purposes into management and trading companies and divisions.

Plessey's strategic concentration has been on future growth within key core businesses—telecommunications, defense electronics, microelectronics, and aerospace—through acquisitions and consolidations. Several alliances took place within the telecommunications division including the GEC, Telenet, and Racal joint ventures. In defense electronics, Plessey acquired Sippican Inc. of the United States and Leigh Instruments Ltd. of Canada to take advantage of new

\*All dollar amounts are in U.S. dollars.



areas of opportunity that have opened up in North America. In microelectronics, Plessey acquired Ferranti Semiconductors to make Plessey the U.K. leader in ASICs, according to Dataquest.

For fiscal 1989, Plessey reported revenue of \$1.9 billion, a decline of 17.1 percent. Net income decreased in fiscal 1989 to \$73.5 million, from \$143.3 million in 1988.

Research and development expenditures for 1988 amounted to \$86.8 million, or 4.6 percent of revenue. Capital expenditures totaled \$21.9 million, or 1.2 percent of revenue.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region and distribution channel. Table 4, a comprehensive financial statement, is at the end of this profile. Due to the differences in U.S. and European accounting practices, a financial ratio analysis is not available.

---

## BUSINESS SEGMENT STRATEGIC DIRECTION

### Telecommunications

Plessey Telecommunications and Office Systems provides telecommunications authorities, public services, and commercial operators with equipment and systems based on software-controlled digital technology. The aim is to unite telecommunications and data processing in the new technology of integrated information handling.

With the advent of the joint venture, GPT, the new company will be the leading manufacturer and supplier of telecommunications equipment in the United Kingdom. GPT offers a broad spectrum of products supported by research and development. The joint venture formed with Telenet has been integrated into GPT and will sell to the U.K. and Dutch markets. This venture will strengthen Plessey's position as the

leading U.K. supplier of packet-switching data products.

### Semiconductors

Plessey Engineering and Components includes the Solid State Division, which manufactures standard, semicustom, and custom semiconductors and optoelectronic devices for military and industrial high-technology use, as well as components for professional applications.

With the acquisition of Ferranti Semiconductors in 1987, Plessey conducts its U.S. semiconductor operations in its Scotts Valley, California, facility. The size of its semiconductor business has increased significantly as a result of this acquisition.

Dataquest estimates that Plessey maintained its number 32 market share position worldwide in 1987 and 1988. Plessey is a world player in the MOS logic, analog, and optoelectronic markets with 1988 revenue of \$76 million, \$66 million and \$22 million, respectively.

### Electronic Systems

Plessey Electronic Systems supplies a group of related products and services to the avionics and defense industries, as well as the civilian communications sector. Plessey is focusing on international business, where it has had considerable sales success. Orders have come from Australia for communication systems, Canada for radios, and various European countries for radars and air traffic control systems.

Through the acquisitions of Sippican in the United States and Leigh Instruments in Canada, Plessey is trying to strengthen its presence in international regions.

### Further Information

For more information about the Company's business segments, please contact the appropriate industry service.

**Table 1**  
**Five-Year Corporate Highlights (Millions of U.S. Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$1,838.6	\$2,148.7	\$2,343.8	\$2,282.3	\$1,891.9
Percent Change	-	16.87	9.08	(2.62)	(17.10)
Capital Expenditure	\$48.6	\$38.7	\$24.6	\$26.5	\$21.9
Percent of Revenue	2.6	1.8	1.0	1.2	1.2
R&D Expenditure	\$108.8	\$119.4	\$155.2	\$165.3	\$86.8
Percent of Revenue	5.9	5.6	6.6	7.2	4.6
Number of Employees	37,533	34,366	31,955	30,138	26,216
Revenue (\$K)/Employee	\$48.99	\$62.52	\$73.35	\$75.73	\$72.17
Net Income	\$76.2	\$80.6	\$120.5	\$143.3	\$73.5
Percent Change	-	5.71	49.52	18.96	(48.71)
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	
Quarterly Revenue	N/A	N/A	N/A	N/A	
Quarterly Profit	N/A	N/A	N/A	N/A	

N/A = Not Available

Source: Plessey  
Annual Reports  
Dataquest  
January 1990

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1985	1986	1987	1988	1989
Europe	74.00	77.00	77.00	74.00	65.00
International	26.00	23.00	23.00	26.00	35.00
North America	13.00	12.00	12.00	14.00	22.00
All Others	13.00	11.00	11.00	12.00	13.00

Source: Plessey  
Annual Reports

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1989
Direct Sales	N/A
Indirect Sales	N/A

N/A = Not Available

Source: Plessey  
Annual Reports

---

## 1988 SALES OFFICE LOCATIONS

North America—Not available  
Japan—Not available  
Europe—Not available  
Asia/Pacific—Not available  
ROW—Not available

---

## MANUFACTURING FACILITIES

Birkbys Plastics Ltd.  
Furnishing products  
Plessey Aerospace Ltd.  
Fuel and coolant pumps, generation systems,  
decoy systems, pneumatic systems  
Plessey Avionics Ltd.  
Airborne communication systems, aircraft weapon  
control systems, aircraft guidance equipment  
Plessey Connectors Ltd.  
High-performance ICs  
Plessey Controls Ltd.  
Data communications, industrial and traffic  
controls  
Plessey Crypto  
Communications security equipment  
Plessey Defense Ltd.  
Digital defense communications equipment,  
computer-based command and control systems  
Plessey Major Systems Ltd.  
Digital switching, billing and test systems  
Plessey Microwave Ltd.  
Gallium arsenide ICs  
Plessey Military Communications Ltd.  
Army tactical communications equipment,  
shipborne communications equipment, electronic  
wafer and communications systems and  
equipment, civil equipment, printed wiring  
Plessey Navy Systems Ltd.  
Submarine, surface ship, airborne, command, and  
mine warfare systems  
Plessey Network and Office Systems Ltd.  
Private exchanges, private systems and apparatus,  
transmission equipment  
Plessey Optoelectronics Ltd.  
Gallium arsenide ICs

### Plessey Radar Ltd.

Air defense systems, air traffic control systems and  
navigation aids, naval systems, meteorological  
systems

### Plessey Semiconductors Ltd.

High-performance ICs

### Plessey Telecommunications Products Ltd.

Payphones

### Plessey Three-Five Group Ltd.

Gallium arsenide ICs

### Plessey Wound Products Ltd.

High-performance ICs

### Stromberg-Carlson Corp. (United States)

Digital switching systems, transmissions  
equipment, payphones

---

## SUBSIDIARIES

Plessey does not list all of its subsidiaries. Those  
below are only principal subsidiaries and related com-  
panies.

### *North America*

Plessey Inc.  
Sippican Inc.

### *Europe*

Electronica SpA  
GEC Plessey Telecommunications Holdings Ltd.  
Orbitel Mobile Communications Holdings Ltd.  
Plessey GmbH  
Plessey SpA  
Plessey-UK Ltd.

### *Asia/Pacific*

Plessey Pacific Pty. Ltd.

### *ROW*

Plessey South Africa Ltd.  
Telephone Manufacturers of South Africa Pty. Ltd.

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

1988

### GEC

The companies formed a joint venture called GEC Plessey Telecommunications (GPT). The company is jointly owned on a 50/50 basis.

### Telenet

The companies formed a joint venture that became part of GPT.

### Racal

The companies formed a joint venture called Orbitel to supply mobile telecommunications equipment.

---

## MERGERS AND ACQUISITIONS

1988

### Sippican Leigh Instruments

Plessey acquired Sippican in the United States and Leigh Instruments in Canada to join its electronics group.

1987

### Ferranti Semiconductor

Plessey acquired Ferranti Semiconductor for \$49 million.

---

## KEY OFFICERS

### Sir John Clark

Executive, Finance, and Strategic Planning Committees

### Lord Pennock

Executive Committee

### W.J. Sinsheimer

Executive and Finance Committees

### J.C. Bass

General manager

### W. Gosling

Strategic Planning Committee

### A.D. Mayes

Strategic Planning Committee

---

## FOUNDER

Brian Clark

**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending March 30**  
**(Millions of U.S. Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Fixed Assets	\$365.5	\$436.2	\$501.8	\$983.5	\$1,099.6
Tangible Assets	342.1	414.6	478.7	420.0	618.8
Investments	23.4	21.6	23.1	563.5	480.9
Current Assets	\$1,244.5	\$1,451.0	\$1,676.2	\$1,282.5	\$1,202.3
Stocks	385.6	414.1	419.2	267.5	354.9
Debtors	573.5	632.8	754.6	524.9	643.7
Investments	270.5	331.9	460.0	467.4	173.2
Cash	14.9	72.2	42.5	22.6	30.5
Current Liabilities	(\$693.9)	(\$762.2)	(\$771.3)	(\$857.2)	(\$1,178.8)
Long-Term Debt	(\$167.1)	(\$217.8)	(\$272.0)	(\$218.1)	(\$453.7)
Other Liabilities	(\$121.2)	(\$130.0)	(\$147.5)	(\$90.0)	(\$126.7)
Net Current Assets	\$550.6	\$688.8	\$904.9	\$425.3	\$23.5
Net Assets	\$627.8	\$777.2	\$987.2	\$1,100.7	\$542.8
Capital and Reserves	\$617.1	\$769.7	\$978.0	\$1,092.1	\$529.8
Share Capital	239.4	271.3	303.1	325.3	328.1
Share Premium Account	4.7	6.0	10.3	14.7	30.5
Profit and Loss	355.8	477.1	608.4	697.0	56.1
Revaluation Reserve	5.3	5.3	41.3	34.7	113.2
Other Reserves	1.8	3.2	4.1	4.0	1.9
Related Companies' Reserves	10.1	6.8	10.8	16.3	0.0
Minority Interests	\$10.6	\$7.5	\$9.2	\$8.6	\$13.0
Shareholders' Equity	\$627.8	\$777.2	\$987.2	\$1,100.7	\$542.8
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Revenue	\$1,838.6	\$2,148.7	\$2,343.8	\$2,282.3	\$1,891.9
European	1,359.9	1,651.2	1,814.8	1,694.4	1,222.3
International	478.7	497.5	529.0	587.9	669.6
Cost of Sales	\$1,283.4	\$1,510.6	\$1,604.9	\$1,519.5	\$1,384.0
SG&A Expense	\$271.6	\$294.0	\$333.8	\$363.3	\$239.3
R&D Expense	\$108.8	\$119.4	\$155.2	\$165.3	\$86.8
Capital Expense	\$48.6	\$38.7	\$24.6	\$26.5	\$21.9
Operating Profit	\$186.1	\$239.0	\$272.5	\$260.7	\$349.6
Pretax Income	\$212.5	\$250.3	\$302.0	\$301.9	\$343.0
Pretax Margin (%)	11.56	11.65	12.88	13.23	18.13
Effective Tax Rate (%)	45.00	40.00	35.00	35.00	35.00
Net Income	\$76.2	\$80.6	\$120.5	\$143.3	\$73.5
Shares Outstanding, Millions	725.5	727.0	739.7	741.5	748.1
<b>Per Share Data</b>					
Earnings	\$0.02	\$0.02	\$0.03	\$0.03	\$0.03
Dividends	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01
Book Value	\$0.85	\$1.06	\$1.32	\$1.47	\$0.71
Exchange Rate: US\$1/£	£0.77	£0.68	£0.61	£0.57	£0.57*

\*Fiscal 1989 exchange rate is based on Dataquest's Q1 1989 exchange rate.

Source: Plessey  
 Annual Reports  
 Dataquest  
 January 1990

# The Plessey Company plc

Vicarage Lane

Ilford

Essex, England IG1 4AQ

Telephone: +44 (1) 478-3040

Dun's Number: 21-618-7252

*Date Founded: 1919*

---

## CORPORATE STRATEGIC DIRECTION

The Plessey Company plc was founded in 1919 by Brian Clark. His son, Allen Clark (later Sir Allen), led the Company through nearly four decades of major growth, from the 1920s until his death in 1961. The present chairman and chief executive is Sir John Clark.

Prior to its first major investment in semiconductors, the Company's product portfolio included radio communications equipment (primarily for military use), aircraft equipment (primarily pumps), and electrical components (resistors, capacitors, and connectors), among other equipment. In line with the Company's strategy of concentrating in the high-technology product areas, many of these activities have been dispensed with during the last few years.

During 1960 and 1961, Plessey acquired the telephone operations of ATE and Ericsson Telephones (the U.K. arm of Ericsson) in the United Kingdom, signaling its move into British Post Office procurements and into the telecommunications market in general.

Throughout 1986, Plessey was locked in battle to resist takeover by General Electric Company (GEC), the only U.K. company with larger electronics sales than Plessey. The issue was whether such a merger would consolidate the fragmented U.K. electronics industry. The U.K. government finally ruled against GEC's \$1.8 billion\* bid for Plessey on the grounds that the takeover would not serve the national interest.

By the end of 1988, Plessey and GEC agreed on a joint venture. The new company, GEC Plessey

Telecommunications (GPT), supplies telecommunications equipment in the United Kingdom, with access to world markets.

However, in an unfriendly takeover that has been going on since November 1988, both GEC and Siemens of West Germany have won control of Plessey plc, as was announced in October 1989. The \$3 billion bid was confirmed when GEC Siemens plc announced that it had 50.4 percent of Plessey. The deal creates Europe's largest defense and electronics business that includes interests in radar, avionics, telecommunications, semiconductors, and nuclear power plants.

Plessey's current activities center on the development and supply of telecommunications and electronic defense systems. The Company's work in solid-state and electronic components supports these activities and provides a presence in the merchant component market.

The Plessey Company has established three major operational groups of logically integrated activities in which products and markets are interrelated: Telecommunications, Electronic Systems, and Engineering and Components. All three groups rely extensively on silicon technology and are organized for administrative purposes into management and trading companies and divisions.

Plessey's strategic concentration has been on future growth within key core businesses—telecommunications, defense electronics, microelectronics, and aerospace—through acquisitions and consolidations. Several alliances took place within the telecommunications division including the GEC, Telenet, and Racal joint ventures. In defense electronics, Plessey acquired Sippican Inc. of the United States and Leigh Instruments Ltd. of Canada to take advantage of new

---

\*All dollar amounts are in U.S. dollars.

areas of opportunity that have opened up in North America. In microelectronics, Plessey acquired Ferranti Semiconductors to make Plessey the U.K. leader in ASICs, according to Dataquest.

For fiscal 1989, Plessey reported revenue of \$1.9 billion, a decline of 17.1 percent. Net income decreased in fiscal 1989 to \$73.5 million, from \$143.3 million in 1988.

Research and development expenditures for 1988 amounted to \$86.8 million, or 4.6 percent of revenue. Capital expenditures totaled \$21.9 million, or 1.2 percent of revenue.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region and distribution channel. Table 4, a comprehensive financial statement, is at the end of this profile. Due to the differences in U.S. and European accounting practices, a financial ratio analysis is not available.

---

## BUSINESS SEGMENT STRATEGIC DIRECTION

### Telecommunications

Plessey Telecommunications and Office Systems provides telecommunications authorities, public services, and commercial operators with equipment and systems based on software-controlled digital technology. The aim is to unite telecommunications and data processing in the new technology of integrated information handling.

With the advent of the joint venture, GPT, the new company will be the leading manufacturer and supplier of telecommunications equipment in the United Kingdom. GPT offers a broad spectrum of products supported by research and development. The joint venture formed with Telenet has been integrated into GPT and will sell to the U.K. and Dutch markets. This venture will strengthen Plessey's position as the

leading U.K. supplier of packet-switching data products.

### Semiconductors

Plessey Engineering and Components includes the Solid State Division, which manufactures standard, semicustom, and custom semiconductors and optoelectronic devices for military and industrial high-technology use, as well as components for professional applications.

With the acquisition of Ferranti Semiconductors in 1987, Plessey conducts its U.S. semiconductor operations in its Scotts Valley, California, facility. The size of its semiconductor business has increased significantly as a result of this acquisition.

Dataquest estimates that Plessey maintained its number 32 market share position worldwide in 1987 and 1988. Plessey is a world player in the MOS logic, analog, and optoelectronic markets with 1988 revenue of \$76 million, \$66 million and \$22 million, respectively.

### Electronic Systems

Plessey Electronic Systems supplies a group of related products and services to the avionics and defense industries, as well as the civilian communications sector. Plessey is focusing on international business, where it has had considerable sales success. Orders have come from Australia for communication systems, Canada for radios, and various European countries for radars and air traffic control systems.

Through the acquisitions of Sippican in the United States and Leigh Instruments in Canada, Plessey is trying to strengthen its presence in international regions.

### Further Information

For more information about the Company's business segments, please contact the appropriate industry service.

**Table 1**  
**Five-Year Corporate Highlights (Millions of U.S. Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$1,838.6	\$2,148.7	\$2,343.8	\$2,282.3	\$1,891.9
Percent Change	-	16.87	9.08	(2.62)	(17.10)
Capital Expenditure	\$48.6	\$38.7	\$24.6	\$26.5	\$21.9
Percent of Revenue	2.6	1.8	1.0	1.2	1.2
R&D Expenditure	\$108.8	\$119.4	\$155.2	\$165.3	\$86.8
Percent of Revenue	5.9	5.6	6.6	7.2	4.6
Number of Employees	37,533	34,366	31,955	30,138	26,216
Revenue (\$K)/Employee	\$48.99	\$62.52	\$73.35	\$75.73	\$72.17
Net Income	\$76.2	\$80.6	\$120.5	\$143.3	\$73.5
Percent Change	-	5.71	49.52	18.96	(48.71)
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	
Quarterly Revenue	N/A	N/A	N/A	N/A	
Quarterly Profit	N/A	N/A	N/A	N/A	

N/A = Not Available

Source: Plessey  
Annual Reports  
Dataquest  
January 1990

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1985	1986	1987	1988	1989
Europe	74.00	77.00	77.00	74.00	65.00
International	26.00	23.00	23.00	26.00	35.00
North America	13.00	12.00	12.00	14.00	22.00
All Others	13.00	11.00	11.00	12.00	13.00

Source: Plessey  
Annual Reports

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1989
Direct Sales	N/A
Indirect Sales	N/A

N/A = Not Available

Source: Plessey  
Annual Reports



---

## 1988 SALES OFFICE LOCATIONS

North America—Not available  
Japan—Not available  
Europe—Not available  
Asia/Pacific—Not available  
ROW—Not available

---

## MANUFACTURING FACILITIES

Birkbys Plastics Ltd.  
Furnishing products  
Plessey Aerospace Ltd.  
Fuel and coolant pumps, generation systems,  
decoy systems, pneumatic systems  
Plessey Avionics Ltd.  
Airborne communication systems, aircraft weapon  
control systems, aircraft guidance equipment  
Plessey Connectors Ltd.  
High-performance ICs  
Plessey Controls Ltd.  
Data communications, industrial and traffic  
controls  
Plessey Crypto  
Communications security equipment  
Plessey Defense Ltd.  
Digital defense communications equipment,  
computer-based command and control systems  
Plessey Major Systems Ltd.  
Digital switching, billing and test systems  
Plessey Microwave Ltd.  
Gallium arsenide ICs  
Plessey Military Communications Ltd.  
Army tactical communications equipment,  
shipborne communications equipment, electronic  
wafer and communications systems and  
equipment, civil equipment, printed wiring  
Plessey Navy Systems Ltd.  
Submarine, surface ship, airborne, command, and  
mine warfare systems  
Plessey Network and Office Systems Ltd.  
Private exchanges, private systems and apparatus,  
transmission equipment  
Plessey Optoelectronics Ltd.  
Gallium arsenide ICs

Plessey Radar Ltd.  
Air defense systems, air traffic control systems and  
navigation aids, naval systems, meteorological  
systems  
Plessey Semiconductors Ltd.  
High-performance ICs  
Plessey Telecommunications Products Ltd.  
Payphones  
Plessey Three-Five Group Ltd.  
Gallium arsenide ICs  
Plessey Wound Products Ltd.  
High-performance ICs  
Stromberg-Carlson Corp. (United States)  
Digital switching systems, transmissions  
equipment, payphones

---

## SUBSIDIARIES

Plessey does not list all of its subsidiaries. Those  
below are only principal subsidiaries and related com-  
panies.

### *North America*

Plessey Inc.  
Sippican Inc.

### *Europe*

Electronica SpA  
GEC Plessey Telecommunications Holdings Ltd.  
Orbitel Mobile Communications Holdings Ltd.  
Plessey GmbH  
Plessey SpA  
Plessey-UK Ltd.

### *Asia/Pacific*

Plessey Pacific Pty. Ltd.

### *ROW*

Plessey South Africa Ltd.  
Telephone Manufacturers of South Africa Pty. Ltd.

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

1988

### GEC

The companies formed a joint venture called GEC Plessey Telecommunications (GPT). The company is jointly owned on a 50/50 basis.

### Telenet

The companies formed a joint venture that became part of GPT.

### Racal

The companies formed a joint venture called Orbitel to supply mobile telecommunications equipment.

---

## MERGERS AND ACQUISITIONS

1988

### Sippican Leigh Instruments

Plessey acquired Sippican in the United States and Leigh Instruments in Canada to join its electronics group.

1987

### Ferranti Semiconductor

Plessey acquired Ferranti Semiconductor for \$49 million.

---

## KEY OFFICERS

### Sir John Clark

Executive, Finance, and Strategic Planning Committees

### Lord Pennock

Executive Committee

### W.J. Sinsheimer

Executive and Finance Committees

### J.C. Bass

General manager

### W. Gosling

Strategic Planning Committee

### A.D. Mayes

Strategic Planning Committee

---

## FOUNDER

Brian Clark

**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending March 30**  
**(Millions of U.S. Dollars, except Per Share Data)**

Balance Sheet	1985	1986	1987	1988	1989
Fixed Assets	\$365.5	\$436.2	\$501.8	\$983.5	\$1,099.6
Tangible Assets	342.1	414.6	478.7	420.0	618.8
Investments	23.4	21.6	23.1	563.5	480.9
Current Assets	\$1,244.5	\$1,451.0	\$1,676.2	\$1,282.5	\$1,202.3
Stocks	385.6	414.1	419.2	267.5	354.9
Debtors	573.5	632.8	754.6	524.9	643.7
Investments	270.5	331.9	460.0	467.4	173.2
Cash	14.9	72.2	42.5	22.6	30.5
Current Liabilities	(\$693.9)	(\$762.2)	(\$771.3)	(\$857.2)	(\$1,178.8)
Long-Term Debt	(\$167.1)	(\$217.8)	(\$272.0)	(\$218.1)	(\$453.7)
Other Liabilities	(\$121.2)	(\$130.0)	(\$147.5)	(\$90.0)	(\$126.7)
Net Current Assets	\$550.6	\$688.8	\$904.9	\$425.3	\$23.5
Net Assets	\$627.8	\$777.2	\$987.2	\$1,100.7	\$542.8
Capital and Reserves	\$617.1	\$769.7	\$978.0	\$1,092.1	\$529.8
Share Capital	239.4	271.3	303.1	325.3	328.1
Share Premium Account	4.7	6.0	10.3	14.7	30.5
Profit and Loss	355.8	477.1	608.4	697.0	56.1
Revaluation Reserve	5.3	5.3	41.3	34.7	113.2
Other Reserves	1.8	3.2	4.1	4.0	1.9
Related Companies' Reserves	10.1	6.8	10.8	16.3	0.0
Minority Interests	\$10.6	\$7.5	\$9.2	\$8.6	\$13.0
Shareholders' Equity	\$627.8	\$777.2	\$987.2	\$1,100.7	\$542.8
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Revenue	\$1,838.6	\$2,148.7	\$2,343.8	\$2,282.3	\$1,891.9
European	1,359.9	1,651.2	1,814.8	1,694.4	1,222.3
International	478.7	497.5	529.0	587.9	669.6
Cost of Sales	\$1,283.4	\$1,510.6	\$1,604.9	\$1,519.5	\$1,384.0
SG&A Expense	\$271.6	\$294.0	\$333.8	\$363.3	\$239.3
R&D Expense	\$108.8	\$119.4	\$155.2	\$165.3	\$86.8
Capital Expense	\$48.6	\$38.7	\$24.6	\$26.5	\$21.9
Operating Profit	\$186.1	\$239.0	\$272.5	\$260.7	\$349.6
Pretax Income	\$212.5	\$250.3	\$302.0	\$301.9	\$343.0
Pretax Margin (%)	11.56	11.65	12.88	13.23	18.13
Effective Tax Rate (%)	45.00	40.00	35.00	35.00	35.00
Net Income	\$76.2	\$80.6	\$120.5	\$143.3	\$73.5
Shares Outstanding, Millions	725.5	727.0	739.7	741.5	748.1
<b>Per Share Data</b>					
Earnings	\$0.02	\$0.02	\$0.03	\$0.03	\$0.03
Dividends	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01
Book Value	\$0.85	\$1.06	\$1.32	\$1.47	\$0.71
Exchange Rate: US\$1/£	£0.77	£0.68	£0.61	£0.57	£0.57*

\*Fiscal 1989 exchange rate is based on Dataquest's Q1 1989 exchange rate.

Source: Plessey  
 Annual Reports  
 Dataquest  
 January 1990

# Plessey Three-Five Group

Plessey Three-Five Group  
Wood Burcote Way  
Towcester, Northamptonshire, NN12 7JS  
United Kingdom  
(0327) 51871

Established 1985  
No. of Employees: 400

## BACKGROUND

The Plessey Three-Five Group is a group within Plessey Opto Microwave Ltd., a subsidiary of Plessey plc. The first GaAs FET production at Plessey plc occurred in 1965.

Recently, Plessey Opto Microwave Ltd. was restructured into three groups. Plessey Microwave Group focuses on hybrids and modules. Plessey Opto Group is involved in lasers, PIN diodes, receivers, and other opto components. Plessey Three-Five Group has responsibility for chip manufacturing, MMICs, discrete FETs, ICs, and the Caswell R&D Center. A foundry service for GaAs ICs is available, offering D-MESFETs with 0.9 $\mu$  nominal gate lengths integrated with ion-implanted diodes and resistors, metal-insulator-metal (MIM) and interdigitated capacitors, and spiral dielectrically isolated (DI) bridge inductors.

## COMPANY EXECUTIVES

- President/CEO—Alan Price
- Marketing Executive—Jim Arnold
- Director of R&D—Fred Myers

## SERVICES

The Company provides a full-service GaAs MMIC foundry.

## PROCESS TECHNOLOGY

The Company uses submicron GaAs MESFET technology.

# Plessey Three-Five Group

## PRODUCTS

- GaAs ICs
- Fiber-optic devices
- Low-noise FETs

## Applications

The Company's products are used in military and commercial electronics hardware.

## FACILITIES

The 40,000-square-foot facilities employ approximately 400 people in GaAs processes. Plessey invested £50 million between 1985 and 1989 to upgrade its facilities.

# The Plessey Company Plc

The Plessey Company Plc  
Vicarage Lane  
Ilford  
Essex IG1 4AQ  
Telephone: + 44 (1) 478 3040  
Telex: 897971

## THE COMPANY

### Background

The Plessey Company Plc was founded in 1919 by Brian Clark. His son, Allen Clark (later Sir Allen) led the Company through nearly four decades of major growth, from the 1920s until his death in 1961. The present chairman and chief executive is Sir John Clark. His brother, Michael Clark, is the deputy chairman and a deputy chief executive.

The Company's product portfolio includes radio communications equipment (in particular, military), aircraft equipment, electrical components (resistors, capacitors, and connectors), and sheet metal products and hydraulic pumps for civilian applications. In line with the Company's strategy of concentrating on the high-technology product areas, many of these activities have been dispensed with during the last few years.

In 1957, Plessey began to invest in semiconductor operations.

During 1960 and 1961, Plessey acquired the telephone operations of ATE and Ericsson Telephones (the U.K. arm of Ericsson), signaling its move into British Post Office procurements and into the telecommunications market in general.

### Operations

The Plessey Company is principally engaged in the design, development, and manufacture of civil telecommunications, military communications, command and control networks, radar, sonar, direct and satellite radio communication, and traffic control.

Plessey's activities are centered on the following product groups:

- Telecommunications
- Electronic systems and equipment
- Aerospace and engineering
- Microelectronics and components
- Computer peripherals

# The Plessey Company Plc

Table 1 shows a breakdown of turnover business activity.

Table 1

## The Plessey Company Plc Turnover by Business Activity (Millions of Pounds)

<u>Activity</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Telecommunications	£ 577.0	£ 681.1	£ 682.4
Electronic Systems & Equipment	426.0	465.9	518.0
Aerospace & Engineering	109.4	129.5	120.7
Microelectronics & Components	107.7	149.0	161.3
Computer Peripherals	32.2	39.4	34.3
Less Intercompany Sales	<u>N/A</u>	<u>(49.2)</u>	<u>(55.6)</u>
Total	£1,252.3	£1,415.7	£1,461.1

Table 2 shows a breakdown of profit by business activity.

Table 2

## The Plessey Company Plc Profit by Business Activity (Millions of Pounds)

<u>Activity</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Telecommunications	£ 76.5	£ 74.6	£ 70.7
Electronic Systems & Equipment	38.0	24.1	40.3
Aerospace & Engineering	15.2	22.0	25.4
Microelectronics & Components	12.5	13.8	14.8
Computer Peripherals	(2.8)	(0.7)	0.6
Group Services	<u>7.0</u>	<u>9.5</u>	<u>10.7</u>
Operating Profit	£146.4	£143.3	£162.5

Source: The Plessey Company Plc  
Annual Report

# The Plessey Company Plc

## International Operations

In 1985, Plessey's sales to U.K. customers grew strongly, up 26.4 percent to £975.5 million. However, exports and sales by overseas subsidiaries fell back to £440.2 million, reflecting the continued weakness of many Middle East and Third World markets. This trend continued in 1986, with U.K. sales reaching £1,036.9 million, a 6.3 percent increase over 1985 sales; however, Plessey's overseas subsidiaries' sales fell to £424.2 million, accounting for 29.0 percent of total turnover.

The turnover by geographic area is shown in Table 3.

Plessey has subsidiaries in almost all European countries and in Australia, Malaysia, New Zealand, Singapore, South Africa, the United States, and Zimbabwe.

During 1985, the Company acquired a 35 percent shareholding in Electronica SpA, an Italian company specializing in the development and manufacture of advanced electronic warfare systems and equipment.

**Table 3**

**The Plessey Company Plc  
Turnover by Geographic Area  
(Millions of Pounds)**

<u>Regions</u>	<u>1984</u>		<u>1985</u>		<u>1986</u>	
United Kingdom	£ 771.5	61.6%	£ 975.5	68.9%	£1,036.9	71.0%
North America	185.2	14.8	180.5	12.8	174.5	11.9
Africa	126.1	10.1	88.3	6.2	85.9	5.9
Europe	59.0	4.7	71.6	5.0	60.5	4.1
Australasia	54.1	4.3	48.9	3.5	47.5	3.3
Asia	49.4	3.9	42.4	3.0	41.3	2.8
Others	7.0	0.6	8.5	0.6	14.5	1.0
<b>Total</b>	<b>£1,252.3</b>	<b>100.0%</b>	<b>£1,415.7</b>	<b>100.0%</b>	<b>£1,461.1</b>	<b>100.0%</b>

Source: The Plessey Company Plc  
Annual Report



# The Plessey Company Plc

## Research and Development

Plessey maintains extensive laboratories and other facilities, devoting considerable resources to research and development aimed at new products and processes.

The Company holds 873 U.K. and 1,950 non-U.K. patents. Table 4 shows the proportion of research and development funding provided by the Company and the proportion funded by customers of Plessey.

Plessey is engaged in serious studies to identify long-range requirements. These studies are concentrated on fifth-generation computers, voice recognition, further work on VLSI (very large scale integration), new materials in the Three-Five Group, fiber-optic components, and associated laser technology.

The Company's 1986 expenditure on research and development decreased by £2.6 million to £81.2 million. Total research and development funding increased by 5.2 percent to £318.7 million in 1986 compared to £303.0 million in 1985.

Table 4

### The Plessey Company Plc Research and Development Funding (Millions of Pounds)

<u>Year</u>	<u>Company Funded</u>	<u>Customer Funded</u>	<u>Total</u>
1985/1986	£81.2	£237.5	£318.7
1984/1985	£83.8	£219.2	£303.0
1983/1984	£66.4	£149.6	£216.0
1982/1983	£45.1	£121.7	£166.8
1981/1982	£31.7	£103.4	£135.1
1980/1981	£25.5	£102.9	£128.4

Source: The Plessey Company Plc  
Annual Report

## Employees

In 1985, the Company reduced the number of its employees by 3.5 percent from 38,838 to 37,533; in 1986, this was further reduced by 8.4 percent to 34,366 employees.

Table 5 compares, the number of employees in 1985 and 1986 by job area.

# The Plessey Company Plc

Table 5

## The Plessey Company Plc Average Number of Employees

<u>Job Area</u>	<u>1985</u>	<u>1986</u>
Telecommunications	17,543	15,291
Electronic Systems & Equipment	11,280	10,557
Aerospace & Engineering	3,139	3,216
Microelectronics & Components	5,134	4,909
Computer Peripherals	<u>437</u>	<u>393</u>
Total Employees	37,533	34,366

Source: The Plessey Company Plc  
Annual Report

### Telecommunications Activities

Plessey has more than 60 years of experience in telecommunications and has worked in 130 countries. Plessey designs, manufactures, and installs digital switching systems, transmission equipment, optical-fiber line transmission systems, and network management systems.

The turnover of the Company's telecommunication activity showed a small increase from £681.1 million in 1985 to £682.4 million in 1986. This represented 46.7 percent of Plessey's turnover in 1986. The profit of the telecommunications activity decreased by 5.2 percent from £74.6 million in 1985 to £70.7 million in 1986, representing 43.5 percent of Plessey's profits in 1986.

#### System X

Plessey is entrusted with completing the development of System X (British Telecom's digital public exchange network) and with marketing System X abroad.

In March 1987, Plessey won the first major export order for System X when it received a \$24 million contract from Colombia for the digital exchange.

#### Transmission Systems

Plessey manufactures advanced digital transmission systems for worldwide use in public and private trunk, junction, and local distribution networks. Its products include optical-fiber systems, primary multiplexers, video transmission systems, and network management systems.

# The Plessey Company Plc

## **ISDX**

Plessey is a major supplier of digital private switching systems with its ISDX, CDSS, and DKS ranges. The ISDX, a digital private telephone exchange, was introduced in September 1986; it is a switch that allows fully integrated communications services for business. Plessey ISDX supports a wide range of peripherals including basic telephones, feature and facility phones, terminals, workstations, and ISDN access terminals.

## **Electronic Systems and Equipment**

Plessey's electronics systems and equipment activity supplies a related group of products and services to the avionics and defense industries, as well as to the civil communications sector. Major projects include MRS, a tactical and strategic communications system; Ptarmigan, the mobile and damage-resistant tactical communications system for the British army; multiband pulse radar; and military radio communications.

The electronics systems and equipment activity saw significant growth of 11.2 percent in 1986, reaching a level of £40.3 million. This represents 35.5 percent of Plessey's turnover. The profit of the electronic systems and equipment activity increased by 67.2 percent in 1986 representing 24.8 percent of Plessey's total profits for the year.

## **Engineering and Components**

The Plessey Engineering and Components Division includes the Solid State Division, which manufactures standard, semicustom, and custom semiconductors and optoelectronic devices for military and industrial high-technology use, as well as components for professional applications.

### **Plessey Aerospace**

The Plessey Aerospace division won a major order for fuel boost pumps for the Boeing 737-300 aircraft. New orders for chaffrockets and the SHIELD antiship missile decoy system brought orders from the Royal Navy for these products to more than £25 million.

### **Plessey Connectors**

The Plessey Connectors division has moved into volume production of connectors for consumer, commercial, and industrial applications.

### **Plessey Microwave**

The Plessey Microwave division designs, develops, manufactures, and markets microwave components, subsystems, and materials worldwide. The business has doubled in size over the last two years.

# The Plessey Company Plc

## **Plessey Optoelectronics**

The Plessey Optoelectronics division manufactures high-performance fiber-optic emitters and detectors covering data rates from 2 Mbit/s to 565 Mbit/s. The division also supplies a range of data links for point-to-point and local area network applications.

## **Plessey Semiconductors**

The Plessey Semiconductors division has five plant locations—four in the United Kingdom and one in the United States. The division produces MOS, bipolar, and linear integrated circuits; CMOS and ECL gate arrays; microcell and semicustom integrated circuits; hybrids; optoelectronics; and microwave devices.

In February 1987, Plessey unveiled a 1-micron bipolar technology process using three layers of metal and a 5.25-micron line-pitch, to put up to 20,000 gates on a device with maximum toggle frequency of 5.5 GHz and gate delays of 70ps. In 1988, manufacturing strategies increased the number of metal layers from three to four, the pitch coming down to 3.5 microns, the number of gates going up to 30,000, and gate delays going down to 50ps. Samples are due in January 1988 and first production should occur in December 1988. The Company hopes to sample devices of 0.7 micron, with line pitch of 2.5 micron, and 40,000 gates per device, a maximum toggle frequency of 11 GHz, and gate delays of 35ps in mid-1989. Full production of this process is envisaged for the summer of 1990.

In April 1987, Plessey announced it expects to create more than 1,000 jobs in the semiconductor area over the next five years. This is part of an ambitious development plan to expand sales from the current £70 million to £350 million. Part of the plan also includes the new £33 million facility at Roborough, near Plymouth, for the manufacture of semicustom circuits.

## **Computer Peripherals**

The computer peripherals activity saw a slight decrease in sales in 1986, reaching a level of £34.3 million. This represented 2.3 percent of Plessey's turnover for the year. The profit of the computer peripherals activity increased slightly, representing 0.4 percent of Plessey's total profits.

## **OUTLOOK**

In October 1987, The Plessey Company and The General Electric Company announced that they were embarking on discussions that are intended to lead to the combination of all the telecommunications interests of the two companies and the formation of a new 50:50 joint venture Company in 1988. The objective is to create a major international operation, with all the skills and resources necessary to compete effectively for business in telecommunications markets worldwide and to develop new products in both the public and private network sectors.

## The Plessey Company Plc

The new joint venture will have sales in excess of £1.2 billion and assets of about £600 million, covering public switching, transmission, private switching, other telecommunications, and data products and ancillary services.

In November 1987, Plessey acquired Ferranti's semiconductor operations for £30 million in cash. The move will bring together the two largest U.K.-owned chip companies. The combined business will have 3,150 workers and is expected to have sales of £130 million in the first quarter 1988. The aim of the merger is to boost the new company's growth overseas.

In November 1987, Plessey announced disappointing half-year results with operating profits declining 29.3 percent to £54.4 million on turnover that fell by 12.2 percent to £603.4. Plessey's telecommunications business suffered the most with a £60.4 million drop in turnover.

Plessey is reviewing a number of acquisitions in its defense, telecommunications, and microelectronics businesses, and is making a determined effort to boost its position. Although Plessey's full year profits for 1987 will be less than originally anticipated, the outlook for 1988 looks positive.

# The Plessey Company plc

The Plessey Company plc  
2-60 Vicarage Lane  
Ilford, Essex IG1 4AQ, England  
Telephone: 01 478 3040 Telex: 897971  
(Thousands of Pounds Sterling Except Per Share Data)

## Balance Sheet (Fiscal Year Ending March 30)

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>
Working Capital	£144,447	£180,836	£193,250	£ 224,108	£ 253,728
Long-Term Debt	£ 32,672	£ 28,925	£ 25,515	£ 31,414	£ 33,657
Shareholders' Equity	£247,798	£297,826	£359,600	£ 407,800	£ 489,816
After-Tax Return on Average Equity (%)	17.0	20.3	22.2	22.4	25.6

## Operating Performance (Fiscal Year Ending March 30)

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>
Revenue	£751,000	£844,500	£963,074	£1,074,750	£1,218,922
U.K. Revenue	£445,000	£532,000	£588,312	£ 628,285	£ 738,010
Non-U.K. Revenue	£306,000	£312,500	£374,762	£ 446,465	£ 480,912
Cost of Revenue	N/A	N/A	N/A	N/A	N/A
R&D Expense	£108,842	£128,410	£135,111	£ 166,752	£ 215,999
SG&A Expense	N/A	N/A	N/A	N/A	N/A
Pretax Income	£ 60,099	£ 84,537	£111,438	£ 146,362	£ 176,136
Pretax Margin(%)	8.0	10.0	11.6	13.6	14.5
Effective Tax Rate(%)	N/A	N/A	N/A	N/A	N/A
Net Income	£ 41,086	£ 55,513	£ 72,898	£ 85,834	£ 114,724
Average Shares Outstanding (Millions)	N/A	N/A	N/A	N/A	N/A
Per Share					
Earnings* (before extraordinary items)	£ 5.57	£ 7.51	£ 9.77	£ 11.33	£ 15.25
Earnings* (after extraordinary items)	£ 4.90	£ 7.29	£ 10.17	£ 11.14	£ 14.88
Dividends	£ 2.31	£ 2.54	£ 2.87	£ 3.30	£ 3.80
Book Value	N/A	N/A	N/A	N/A	N/A
Price Range	N/A	N/A	N/A	N/A	N/A
Total Employees	52,962	47,339	42,929	40,872	38,838

\*For comparative purposes, earnings and dividends per share for 1983 and earlier have been recalculated on the capital structure introduced in 1983.

N/A = Not Available

Source: The Plessey Company plc  
DATAQUEST, Inc.  
August 1984

---

# The Plessey Company plc

---

## THE COMPANY

### Background

The Plessey Company plc was founded in 1919 by Brian Clark. His son, Allen Clark, later Sir Allen, led the Company through nearly four decades of major growth, from the 1920s until his death in 1961. The present chairman and chief executive is Sir John Clark; his brother, Michael Clark, is the deputy chairman and a deputy chief executive.

Prior to its first major investment in semiconductors, the Company's product portfolio included, among others, radio communications equipment (in particular military), aircraft equipment (primarily pumps), electrical components (resistors, capacitors, and connectors), sheet metal products, and hydraulic pumps (for civilian applications). In line with the Company's strategy of concentrating in the high-technology product areas, many of these activities have been dispensed with during the last few years.

In 1957, Plessey began to invest in semiconductor operations. A joint activity (51 percent Plessey and 49 percent Philco) was formed to manufacture electrochemical transistors.

During 1960 and 1961, Plessey acquired the telephone operations of ATE and Ericsson telephones (the United Kingdom arm of Ericsson), in the United Kingdom, signaling its move into British Post Office procurements and into the telecommunications market in general.

Plessey's commitment to integrated circuits (including merchant sales) was marked by the introduction of IC manufacturing in Swindon of a process developed in Caswell in 1966.

In December 1983, Plessey created a gallium arsenide IC subsidiary called the Plessey Three-Five Group Ltd. Investment in the new company will be US\$75 million spread out over five years.

### Operations

Plessey's current activities center on the development and supply of telecommunications and electronic defense systems. The Company's work in solid-state and electronic components supports these activities, as well as provides a presence in the merchant component market.

# The Plessey Company plc

The Plessey Company plc has established three major operational groups of logically integrated activities whose products and markets are interrelated:

- Telecommunications and Office Systems
- Electronics Systems
- Engineering and Components

All three operational groups rely extensively on silicon technology and are grouped for administrative purposes into management and trading companies and divisions, as Figure 1 illustrates.

The Plessey Company plc's headquarters is located in Ilford, Essex, United Kingdom, and the main board's London offices are located in Millbank Tower, London, United Kingdom. Plessey maintains worldwide regional sales and marketing offices in approximately 30 countries.

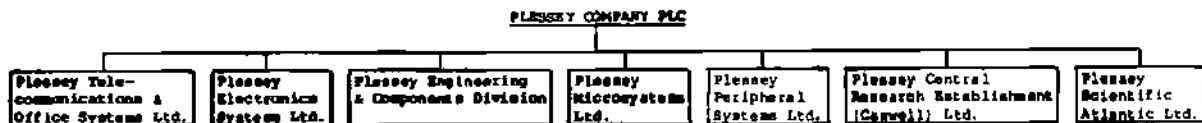
Plessey Semiconductors, Ltd., has its headquarters in Swindon, Wiltshire, United Kingdom. It also maintains sales offices in France, West Germany, Italy, and Belgium.

Plessey's major semiconductor facilities are listed in Table 1.

The Plessey Company plc had a total turnover of £1,218 million in the 1983/1984 fiscal year, up 13.3 percent from the previous fiscal year. Profit before tax was £176.1 million, up 20.3 percent in the same period.

Figure 1

## The Plessey Company plc MAJOR OPERATIONS



Plessey's semiconductor activities include:

Plessey Semiconductors Limited  
Plessey Microwave Limited  
Plessey Optoelectronic Limited  
Plessey Three-Five Group Limited  
Plessey Research (Caswell) Limited

U.S. facilities are located in Irvine, California.

Source: The Plessey Company plc  
DATAQUEST  
August 1984



# The Plessey Company plc

Table 1

## The Plessey Company plc MAJOR SEMICONDUCTOR FACILITIES

Plympton, Devon	Established:	1974
	Products:	MOS integrated circuits
	Technologies:	N-channel and P-channel, silicon gate and metal gate, MOS, NMOS, and CMOS
	Capacity:	8,000 wafers/month, 3-inch wafers*
	Size:	32,000 sq. ft.
Swindon, Wiltshire	Established:	1957
	Products:	Bipolar digital and linear integrated circuits
	Capacity:	5,000 wafers/month, 3-inch wafers*
	Size:	110,000 sq. ft.
Towcester, Northamptonshire	Products:	Optoelectronics and microwave devices
	Technologies:	GaAs, GaP, GaAsP
	Size:	40,000 sq. ft.
Irvine, California	Products:	Semicustom design center, CMOS and ECL gate arrays, Microcell semicustom ICs, and hybrid manufacturing facility
	Technologies:	CMOS, ECL, low-power NMOS
	Capacity:	No wafer fabrication

### Plessey Research (Caswell) Limited

Towcester, Northamptonshire	Established:	1940
	Products:	Process research for all Plessey semiconductor products

\*Conversion from 3-inch to 4-inch wafers is under way

Source: DATAQUEST  
August 1984

# The Plessey Company plc

Telecommunications accounted for approximately 47 percent of fiscal 1983/1984 turnover, while microelectronics and components accounted for 9.0 percent (see Table 2). As indicated in Table 3, approximately 39 percent of turnover resulted from export revenues.

Table 2

The Plessey Company plc  
ESTIMATED REVENUE BY BUSINESS ACTIVITY  
(Thousands of Pounds Sterling)

(Fiscal year ending March 30)

<u>Activity</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>
Telecommunications	£353,100	£418,890	£ 507,461	£ 577,016
Electronic Systems and Equipment	235,900	278,580	325,972	397,595
Microelectronics and Components	105,900	113,801	96,399	107,703
Aerospace and Engineering	124,200	123,881	120,429	109,400
Computer Peripherals	<u>25,400</u>	<u>27,922</u>	<u>24,489</u>	<u>32,208</u>
Total	£844,500	£963,074	£1,074,750	£1,218,922

Source: The Plessey Company plc  
DATAQUEST  
August 1984

# The Plessey Company plc

In fiscal 1984, the average number of Plessey employees worldwide was 38,838. This was a 5.0 percent decrease over the previous fiscal year. Of these, 2,105 were involved in research and development (up 1.0 percent); 2,583 in administration (down 8.2 percent); 2,929 in selling, marketing, and distribution (down 3.8 percent); 10,760 in direct production (down 7.6 percent), and 20,461 in direct labor (down 3.9 percent).

Table 3

**The Plessey Company plc**  
**REVENUE BY GEOGRAPHICAL AREA FISCAL 1980-1984**  
**(Thousands of Pounds Sterling)**

(Fiscal Year Ending March 30)

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>
United Kingdom	£445	£532	£588	£ 628	£ 738
North America	97	92	109	138	185
Europe	82	73	74	73	59
Asia	52	49	44	80	49
Africa	37	51	83	101	126
Australasia	24	33	43	49	54
Rest of World	<u>14</u>	<u>14</u>	<u>22</u>	<u>6</u>	<u>7</u>
Total	£751	£844	£963	£1,075	£1,218

Source: The Plessey Company plc  
 DATAQUEST  
 August 1984

## Research and Development

Table 4 shows Plessey's research and development expenditures.

# The Plessey Company plc

Table 4

The Plessey Company plc  
RESEARCH AND DEVELOPMENT EXPENDITURE FISCAL 1980-1984  
(Thousands of Pounds Sterling)

(Fiscal Year Ending March 30)

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>
Company Funded	£ 19,595	£ 25,518	£ 31,672	£ 45,065	£ 66,424
Customer Funded	<u>89,247</u>	<u>102,892</u>	<u>103,439</u>	<u>121,687</u>	<u>149,575</u>
Total	£108,842	£128,400	£135,111	£166,752	£215,999

Source: The Plessey Company plc  
DATAQUEST  
August 1984

## Prior Year Highlights

During 1982, Plessey was involved in several new activities. Among these activities was the acquisition of the Stromberg-Carlson Corporation in the United States, which gave Plessey a firm base in America in the field of public telephone exchanges.

Plessey also established a new relationship with Scientific-Atlanta, Inc., to exploit international markets in satellite and cable communications equipment. As a result of this action, Plessey and Scientific-Atlanta have formed a joint venture company in the United Kingdom, called Plessey Scientific-Atlanta Ltd., to develop business opportunities in Europe.

In the United Kingdom, as a result of changes in the consortium for the development of the System X digital switch, Plessey was appointed prime development contractor for this generation of public switching.

In 1983, the Three-Five Group was set up. This operation is developing gallium arsenide IC and discrete semiconductor products for the military, optical communications, and satellite communications markets.

# The Plessey Company plc

Also in 1983, Plessey concluded a multimillion pound sterling agreement with Telenokia, the major Finnish telecommunications manufacturers, for the supply and technology transfer of the latest PABX central digital switching system (CDSS) over a 10-year period.

The licensing agreement for CMOS technology, made with Mitel in November 1980, has proven very successful for Plessey.

Plessey hopes that these moves will strengthen its established position in the public sector markets of telecommunications.

## SEMICONDUCTOR ACTIVITIES

DATAQUEST estimates of Plessey's European and worldwide semiconductor revenues are given in Tables 5 and 6, respectively.

Table 5

The Plessey Company plc  
ESTIMATED EUROPEAN SEMICONDUCTOR REVENUES BY PRODUCT LINE  
(Millions of Dollars)

	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
Total Semiconductor	\$13	\$19	\$32	\$36	\$34	\$35	\$38
Total Integrated Circuit	\$12	\$18	\$31	\$35	\$33	\$34	\$37
Bipolar Digital	4	7	11	13	10	8	8
MOS	2	3	7	9	10	13	17
Linear	6	8	13	13	13	13	12
Total Discrete	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
Transistor	0	0	0	0	0	0	0
Diode	0	0	0	0	0	0	0
Thyristor	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Total Optoelectronics	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1
Exchange Rate (US\$ per Pound Sterling)	1.75	1.92	2.12	2.33	2.03	1.75	1.52

Source: DATAQUEST  
August 1984

# The Plessey Company plc

Table 6

**The Plessey Company plc**  
**ESTIMATED WORLDWIDE SEMICONDUCTOR REVENUES BY PRODUCT LINE**  
**(Millions of Dollars)**

	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
Total Semiconductor	\$18	\$26	\$39	\$48	\$49	\$53	\$61
Total Integrated Circuit	\$15	\$22	\$35	\$44	\$46	\$50	\$58
Bipolar Digital	5	8	13	17	18	19	21
MOS	2	4	7	10	11	14	19
Linear	8	10	15	17	17	17	18
Total Discrete	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
Transistor	0	0	0	0	0	0	0
Diode	0	0	0	0	0	0	0
Thyristor	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Total Optoelectronics	\$ 3	\$ 4	\$ 4	\$ 4	\$ 3	\$ 3	\$ 3
Exchange Rate (US\$ per Pound Sterling)	1.75	1.92	2.12	2.33	2.03	1.75	1.52

Source: DATAQUEST  
August 1984

As shown in Table 6, Plessey shipped US\$61 million of semiconductor devices worldwide in 1983; 92 percent of these were ICs. MOS products represent approximately 31 percent of Plessey's total IC sales. DATAQUEST estimates that approximately 75 percent of these devices involved contract processing using mask sets provided by the customer.

Tables 7 and 8 illustrate Plessey's estimated European semiconductor revenues by region and by end use, respectively.

# The Plessey Company plc

Table 7

**The Plessey Company plc**  
**ESTIMATED EUROPEAN SEMICONDUCTOR REVENUES BY REGION**  
 (Millions of Dollars)

	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
Benelux	\$ 0	\$ 0	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1
France	1	1	3	3	2	2	2
Italy	1	1	2	2	2	2	2
Scandinavia	0	0	0	0	0	0	0
United Kingdom	9	14	22	26	25	26	29
West Germany	1	2	3	3	3	3	3
Rest of Europe	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>
<b>Total</b>	<b>\$13</b>	<b>\$19</b>	<b>\$32</b>	<b>\$36</b>	<b>\$34</b>	<b>\$35</b>	<b>\$38</b>
Exchange Rate (US\$ per Pound Sterling)	1.75	1.92	2.12	2.33	2.03	1.75	1.52

Table 8

**The Plessey Company plc**  
**ESTIMATED EUROPEAN SEMICONDUCTOR REVENUES BY END USE**  
 (Millions of Dollars)

	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
Automotive	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
Computer	1	2	2	3	3	5	5
Consumer	2	2	4	5	3	2	2
Government and Military	6	9	16	18	17	14	11
Industrial	2	3	5	5	4	4	5
Telecommunications	<u>2</u>	<u>3</u>	<u>5</u>	<u>5</u>	<u>7</u>	<u>10</u>	<u>15</u>
<b>Total</b>	<b>\$13</b>	<b>\$19</b>	<b>\$32</b>	<b>\$36</b>	<b>\$34</b>	<b>\$35</b>	<b>\$38</b>
Exchange Rate (US\$ per Pound Sterling)	1.75	1.92	2.12	2.33	2.03	1.75	1.52

Source: DATAQUEST  
August 1984

---

# The Plessey Company plc

---

## OTHER ACTIVITIES

Plessey Telecommunications and Office Systems provides telecommunications authorities, public services, and commercial operators with equipment and systems based on software-controlled digital technology. The aim is to unite telecommunications and data processing into the new technology of integrated information handling.

Plessey Electronics Systems supplies a related group of products and services to the avionics and defense industries, as well as to the civil communications sector.

Plessey Engineering and Components includes the Solid State Division, which manufactures standard, semicustom, and custom semiconductors and optoelectronic devices for military and industrial high-technology use, as well as components for professional applications.

Plessey Microsystems produces custom-designed and standard digital systems and subsystems based on microsystems and memories.

Plessey Peripheral Systems is active in hardware (minicomputer systems, microcomputer systems, add-on memories, visual displays, terminals, printers), software (for the range of mini/microcomputers), and service (hardware and software support and maintenance).

Plessey Research covers research and applications of electronic materials, devices, and subsystems. The R&D center has pilot production lines and serves as a link between R&D and subsequent full-scale production.

## OUTLOOK FOR FISCAL 1984/1985

In June 1984, Plessey announced plans to spend £50 million to build a semiconductor plant at Plymouth, United Kingdom. The investment is part of a 5-year, £80-million capital expenditure program for microchip production. The Plymouth plant will be dedicated to silicon IC production, in particular ICs for use in telecommunications, direct broadcast by satellite (DBS), and cellular radio. Plessey is seeking government support for the new plant in the form of regional grants and under the Microelectronics Industry Support Program (MISP).

In July 1984, Plessey Semiconductors initiated plans to join Neohm Elettronica (an Italian firm known for its involvement in thick-film hybrid circuit technology) to develop a design center for gate array and cell-based semicustom ICs. The new design center will be based at Leini,



## The Plessey Company plc

Turin. A design team trained at Plessey's Swindon facility has been established to provide technical and applications support for customers wishing to implement semicustom designs. The collaboration will give customers access to advanced and integrated design techniques based on MOS, CMOS, and thick-film hybrid technology.

During August 1984, Plessey announced its intention to purchase Microtechnology, United States, the custom IC facility of Storage Technology Corporation. A total of £12 million is to be invested, which includes both the initial purchase and some expansion of its present capability. Microtechnology currently produces approximately 5,000 4-inch wafer starts per month, 25 percent in bipolar and 75 percent in CMOS technology. The facility is expected to produce £20 million per year by 1985.

# The Plessey Company plc

## THE COMPANY

### Background

The Plessey Company plc was founded in 1919 mainly to manufacture punches used by the British Post Office. Consumer radios were a major product line until the 1960s. In 1957, Plessey entered the semiconductor industry by establishing a joint venture with Philco to manufacture transistors. During 1960 and 1961, Plessey acquired the telephone operations of AGD and L.M. Ericsson in the United Kingdom in a major move into the telecommunications market in general, and the British Post Office market in particular.

### Operations

Plessey's main activities are in the areas of telecommunications and electronic defense systems. The Solid State Division of the Company supplies semiconductor devices to other divisions of the Company as well as selling them on the open market.

Plessey is divided into three main operating groups:

- Telecommunications and Office Systems
- Electronics Systems
- Engineering and Components (includes the Solid State Division)

### Marketing

Plessey has established a worldwide marketing and sales organization, and uses both direct sales and distributors to market its products. The marketing and sales headquarters for Plessey Solid State Division are:

Plessey Semiconductors Limited  
Crowdy's Hill Estate  
Kembrey Street  
Swindon, Wiltshire SN2 6BA  
England

Telephone: (0793) 694994  
Telex: 449637

Plessey Optoelectronics and  
Microwave Limited  
Wood Burcote Way,  
Towcester  
Northamptonshire NN12 7JN  
England

Telephone: (0327) 51871  
Telex: 311443

# The Plessey Company plc

Plessey's U.S. sales headquarters are:

Plessey Trading Corporation  
1641 Kaiser Avenue  
Irvine, California 92714

Telephone: (714) 540-9979  
TWX: 910 595-1930

## Research and Development

In 1940, Plessey established the Allen Clark Research Centre at Caswell, to conduct research and development in the field of electronics. In 1978, the Integrated Design Project was established to develop new design techniques for integrated circuits. Advanced process development is currently undertaken at Caswell but production circuit design takes place in Swindon.

Plessey's expenditure on research and development increased from 78 million pounds in fiscal year 1978 to 152 million pounds in fiscal year 1981. This expenditure covers the whole company.

Plessey is placing increasing emphasis on CMOS technology, especially in the area of gate arrays.

## SEMICONDUCTOR ACTIVITIES

Plessey manufactures a wide range of semiconductor devices including bipolar and MOS integrated circuits, linear circuits, gallium arsenide devices, optoelectronic devices, and microwave integrated circuits. DATAQUEST estimates that 75 percent of Plessey's integrated circuit sales come from custom and semi-custom products.

In November 1980, Plessey entered into a cross-licensing agreement with Mitel to produce several CMOS devices including the 6802 microprocessor, 4K static RAMs, 16K ROMs, and a number of telecommunications circuits.

## OTHER ACTIVITIES

Plessey Telecommunications and Office Systems provides telecommunications authorities, public services, and commercial operators with equipment and systems based on software-controlled digital technology. The aim is to unite telecommunications and data processing into the technology of integrated information handling.

## The Plessey Company plc

Plessey Electronics Systems supplies a related group of products and services to the avionics and defense industries, as well as to the civil communications sector.

Plessey Electronic Components supplies passive components for both professional and entertainment applications, including standard and custom-made product lines.

Plessey Microsystems produces custom-designed and standard digital systems and sub-systems based on microsystems and memories.

Plessey Peripheral Systems is active in hardware (minicomputer systems, microcomputer systems, add-on memories, visual displays, terminals, printers), software (for the range of mini/microcomputers), and service (hardware and software support and maintenance).

Plessey Research covers research and applications of electronic materials, devices, and subsystems. The center has pilot production lines and serves as a link between R&D and subsequent full-scale production.

# The Plessey Company plc

The Plessey Company plc  
2-60 Vicarage Lane  
Ilford, Essex IG1 4AQ, England  
Telephone: 01 478 3040

(Thousands of Pounds Sterling Except Per Share Data)

## Balance Sheet (April 3, 1981)

	<u>1979</u>	<u>1980</u>	<u>1981</u>
Working Capital	£140,880	£144,447	£180,836
Long-Term Debt	£ 39,539	£ 32,672	£ 28,925
Shareholders' Equity	£235,036	£247,798	£297,826
After-Tax Return on Average Equity (%)	13.9	17.0	20.3

## Operating Performance (Fiscal Year Ending April 3, 1981)

	<u>1979</u>	<u>1980</u>	<u>1981</u>
Revenue	£ 648,300	£ 751,000	£ 844,000
U.K. Revenue	£ 333,000	£ 445,000	£ 532,000
Non-U.K. Revenue	£ 315,300	£ 306,000	£ 312,000
Cost of Revenue	N/A	N/A	N/A
R&D Expense	£ 93,823	£ 135,787	£ 152,277
SG&A Expense	N/A	N/A	N/A
Pretax Income	£ 46,248	£ 60,099	£ 84,537
Pretax Margin (%)	7.1	8.0	10.0
Effective Tax Rate (%)	30.7	31.6	34.3
Net Income	£ 32,040	£ 41,086	£ 55,513
Average Shares Outstanding (Millions)	236.6	237.3	239.4
Per Share			
Earnings (before extraordinary items)	13.1p	16.7p	22.5p
Earnings (after extraordinary items)	11.8p	14.7p	21.8p
Dividends	6.3p	6.9p	7.6p
Book Value	N/A	N/A	N/A
Price Range	N/A	N/A	N/A
Total Employees	53,528	52,962	47,339
Exchange Rate (US\$ per £)	\$ 2.12	\$ 2.33	\$ 2.03

N/A = Not Available

Source: The Plessey Company plc Annual Reports  
DATAQUEST, Inc., estimates  
June 1982

# The Plessey Company plc

The Plessey Company plc  
ESTIMATED SEMICONDUCTOR REVENUES BY PRODUCT LINE  
(Millions of Dollars)

	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
Total Semiconductor	\$30	\$42	\$52	\$49
Total Integrated Circuit	\$24	\$34	\$44	\$42
Bipolar Digital	\$10	\$13	\$19	\$17
MOS	\$ 4	\$ 8	\$ 9	\$12
Linear	\$10	\$13	\$16	\$13
Exchange Rate (US\$ per £)	\$1.92	\$2.12	\$2.33	\$2.03

Source: DATAQUEST, Inc.  
June 1982

**The Plessey Company plc**

(Page intentionally left blank)

# Prime Computer, Incorporated

Prime Park

Natick, Massachusetts 01760

Telephone: (508) 655-8000

Fax: (508) 655-8000 ex. 5090

Dun's Number: 05-782-0458

*Date Founded: 1972*

---

## CORPORATE STRATEGIC DIRECTION

Prime Computer, Incorporated, a Fortune 500 company founded in 1972, is a supplier of integrated system solutions to selected end-user markets. Prime's business can be divided into three broad categories: computer-aided design/computer-aided manufacturing/computer-aided engineering (CAD/CAM/CAE), distributed data processing systems, and customer service. Prime is primarily a value-added integrator of computer systems and workstations that can then be combined with application software to solve customers' needs. The Company is also expanding its consulting, training, and services.

In February 1988, Prime became the second-largest supplier of integrated CAD/CAM/CAE systems (behind IBM) when it merged with Computervision Corp. The Company estimates that one-third of its 1989 total revenue was derived from CAD/CAM products. It intends to continue to be a premier supplier to the CAD/CAM market and to expand its products and services into the computer-integrated manufacturing (CIM) market. Prime also plans to increase its presence in the commercial and public sector with investments in strategic applications such as geographic information systems (GIS).

In the distributed data processing market, Prime will continue to support and expand its proprietary 50 Series line of minicomputers and focus on client/server computing with its UNIX-based EXL line of supermicrocomputers.

Since the Computervision acquisition, Prime has struggled in its attempts to consolidate the two companies. In November 1988, MAI Basic Four, Inc., through its wholly owned subsidiary, Choice Corporation, commenced an unsolicited tender offer for all of Prime's stock at \$20\* per share. After months of

resisting the hostile takeover, Prime was acquired by J.H. Whitney & Co. in June 1989. The takeover attempts have affected Prime's financial results adversely due to customer uncertainty and costs associated with the takeover.

The principal markets for the Company's products are manufacturing, government, architectural, engineering, construction, education, financial services, telecommunications, and utilities.

Prime's total revenue increased 66 percent to \$1.6 billion in fiscal 1988 from \$961 million in fiscal 1987. Net income decreased 71 percent to \$19 million in fiscal 1988 from \$65 million in fiscal 1987. Prime employs approximately 12,000 people worldwide.

The U.S. sales contribution to the total revenue grew to \$712.4 million in fiscal 1988. U.S. sales accounted for 45 percent of the total, down from 54 percent in fiscal 1987.

Research and development expenditures totaled \$174 million in fiscal 1988, representing 11 percent of revenue. Capital spending expenditures totaled \$140 million during that period, representing 9 percent of revenue.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region and distribution channel. Table 4, a comprehensive financial statement, is at the end of this profile.

---

\*All dollar amounts are in U.S. dollars.



## BUSINESS SEGMENT STRATEGIC DIRECTION

### CAD/CAM

As mentioned previously, Prime is the second-largest worldwide supplier of CAD/CAM solutions, with leadership positions in the automotive and industrial equipment industries for mechanical CAD/CAM systems, and holds the number two position in aerospace. Dataquest estimates that in 1988, Prime held 14.6 percent of the worldwide market share in the CAD/CAM market. In the worldwide mechanical CAD/CAM market segment, Prime captured 10 percent of the market share. Prime also ranks second in the worldwide architecture, engineering, and construction (AEC) CAD/CAM vendors with 8 percent of the market. In the worldwide mapping CAD/CAM market segment, Prime is ranked seventh, per a Dataquest estimate.

Prime's products include a range of general-purpose and CAD/CAM hardware platforms, from high-performance 32-bit superminicomputers and multiuser supermicrocomputers to engineering and graphics workstations and PCs. New product developments will focus increasingly on standard UNIX products for client/server networks.

### Distributed Processing Systems

Prime systems are used primarily for business data processing and computational processing in application areas including time-sharing, banking insurance, scientific and engineering calculations, statistical analysis, CAD/CAM, financial measurement and control, information retrieval, application program development, office automation, transaction processing, and data communications. Dataquest estimates that Prime ranked fourth with 6 percent of the market in the business unit computers market segment and eighth with 3 percent of the market in the large department computer market segment.

Prime's 50 Series is a general-purpose multiuser set of compatible systems running PRIMOS, a proprietary operating system. The 50 Series is targeted at departmental solutions and distributed applications. The products range in size from office machines to mainframe-class computer room systems. In the

distributed data processing market, the Company plans continued support and expansion of the 50 Series minicomputer line and continued focus on client/server computing through the EXL supermicrocomputer line, as mentioned previously.

The Prime EXL Series comprises multitasking, multiuser UNIX supermicrocomputers that enable users to merge desktop resources into the corporate computing community. The Prime EXL Series, based on the INTEL 80386 microprocessor, can run UNIX, MS-DOS, or PICK applications simultaneously and can communicate with 50 Series systems, IBM PCs and other compatibles.

The PXCL 5500 workstation is a high-resolution, 3-D, interactive graphics workstation for application development in 3-D modeling. This single-user system is based on RISC technology and the UNIX operating system and is targeted at engineers and scientists. Prime announced in May 1989 that it was de-emphasizing the PXCL and that it would not renew its three-year OEM contract with Silicon Graphics.

The WS3600 workstation (also known as Sun 3/XXX) is a UNIX-based engineering workstation for design drafting applications. One of a family of Sun Microsystems products sold with Prime MEDUSA, CIS MEDUSA, or GNC CAD/CAM software, it can also be installed on a network with other Sun systems purchased from Prime.

CADDStation systems are a complete line of Computervision's family of Motorola 68020-based engineering workstations. The CADDStation is a modified Sun 3/XXX workstation running proprietary high-performance graphics under Sun's version of the UNIX operating system software. The systems are available in bundled configurations for multidiscipline CAD/CAM users.

The CV386 personal series of desktop graphics workstations are based on a family of high-performance, 32-bit personal computers that incorporate the Intel 386 family of microprocessors.

In July 1988, Prime announced that it would withdraw its MXCL 5 minisupercomputer products from the market; it discontinued its marketing agreement with the manufacturer, Cydrome, Inc., of Milpitas,

California.

### Software

Prime offers a variety of software solutions for distributed processing environments including CAD/CAM, GIS applications, data communications, and data management. Prime also licenses various proprietary and third-party packages for its systems and workstations. The Company's information management solutions include Prime INFORMATION and Prime ORACLE. Prime also offers a broad range of 2-D and 3-D graphics software packages for the CAD/CAM/CAE marketplaces including CADD5 4X

software, MEDUSA software, and VersaCAD software. Prime is a member of UNIX International and also of X-Open, an international organization of companies committed to open software standards.

### Further Information

For further information about the Company's business segments, please contact the appropriate industry service.

**Table 1**  
**Five-Year Corporate Highlights**  
 (Millions of U.S. Dollars)

	1984	1985	1986	1987	1988
Five-Year Revenue	\$643	\$770	\$860	\$961	\$1,595
Percent Change	-	19.74	11.76	11.71	66.01
Capital Expenditure	\$59	\$73	\$86	\$83	\$140
Percent of Revenue	9.13	9.50	10.02	8.60	8.80
R&D Expenditure	\$64	\$81	\$92	\$110	\$174
Percent of Revenue	9.97	10.54	10.68	11.42	10.93
Number of Employees	7,348	8,115	8,621	8,818	12,386
Revenue (\$K)/Employee	\$0.09	\$0.09	\$0.10	\$0.11	\$0.13
Net Income	\$60	\$58	\$47	\$65	\$19
Percent Change	-	(3.18)	(18.86)	38.17	(70.68)
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	
Quarterly Revenue	387	381.96	N/A	N/A	
Quarterly Profit	N/A	N/A	N/A	N/A	

N/A = Not Available

Source: Prime Computer, Inc.  
 Annual Reports and Forms 10-K  
 Dataquest  
 January 1990

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1984	1985	1986	1987	1988
North America	60.81	55.26	54.81	53.48	44.66
International	39.19	44.74	45.19	46.52	55.34
Europe	26.95	30.90	32.60	33.53	43.00
Asia/Pacific	12.24	13.84	12.54	12.99	12.34

Source: Prime Computer, Inc.  
 Annual Reports and Forms 10-K  
 Dataquest  
 January 1990

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1988
Direct Sales	80.83
Indirect Sales	18.27
VARs	14.73
Distributors	3.54

Source: Dataquest  
 January 1990

---

## 1988 SALES OFFICE LOCATIONS

North America—100  
 Europe—46  
 Japan—4  
 Asia/Pacific—26  
 ROW—29

---

## MANUFACTURING LOCATIONS

### *North America*

Framingham, Massachusetts  
 Systems  
 Manchester, New Hampshire  
 Systems (closed recently)  
 Ponce, Puerto Rico  
 Systems

### *Europe*

Coolock, Ireland  
 Systems

---

## SUBSIDIARIES

### *North America*

CIS Inc. (United States)  
 Computervision Corporation (United States)  
 Computervision Securities Corporation (United States)  
 CV Holdings, Inc. (United States)  
 Prime Computer, Inc. De Puerto Rico (Puerto Rico)  
 Prime Computer International (United States)  
 Prime Computer International Services Limited (United States)  
 Prime Computer Investment, Ltd. (United States)  
 Prime Computer Leasing Limited (United States)  
 Prime Computer of Canada Limited (Canada)  
 Prime Computer Pensions Limited (United States)  
 Prime Computer R&D Limited (United States)  
 Prime Computer Service Limited (United States)  
 Prime Insurance, Ltd. (United States)

Prime Wild GIS, Inc. (United States)  
 Versacad Corporation (United States)

### *Japan*

Computervision Japan Ltd. (Japan)  
 Prime Computer Japan, Inc. (Japan)

### *Europe*

CIS Medusa B.V. (Netherlands)  
 Computervision A.B. (Sweden)  
 Computervision A/S (Norway)  
 Computervision B.V. (Netherlands)  
 Computervision Coordination Centre S.A. (Spain)  
 Computervision Danmark A/S (Denmark)  
 Computervision Handelsgesellschaft mbH (West Germany)  
 Computervision Inc. (Europe)  
 Oy Prime Computer AB (Finland)  
 Prime Computer (Denmark)  
 Prime Computer, AG (Switzerland)  
 Prime Computer A/S (Norway)  
 Prime Computer, B.V. (Benelux)  
 Prime Computer CAD/CAM, B.V. (Netherlands)  
 Prime Computer De Espana, S.A. (Spain)  
 Prime Computer Finance, B.V. (Netherlands)  
 Prime Computer, GmbH (Germany)  
 Prime Computer Italia, S.p.A. (Italy)  
 Prime Computer Limited (United Kingdom)  
 Prime Computer Ltd. (Ireland)  
 Prime Computer S.A./N.A. (Belgium)  
 Prime Computer Scandinavia, AB (Scandinavia)  
 Prime France, S.A. (France)  
 Prime Wild GIS, A.G. (Switzerland)

### *Asia/Pacific*

Computervision China Inc. (China)  
 Computervision Designer Systems Ltd. (Hong Kong)  
 Computervision Pte Ltd. (Singapore)  
 Prime Computer Limited (Hong Kong)  
 Prime Computer of Australia Limited (Australia)  
 Prime Computer PTE Limited (Singapore)  
 Prime Retirement Benefits Funds Pty. Limited (Australia)  
 Prime Wholesale Pty. Limited (Australia)

### *ROW*

Computervision Do Brasil (Brazil)  
 Computervision Far East Ltd. (Pakistan)  
 Industrial E Comercio Limited (Brazil)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

1989

### Novell

Joint development LAN solutions that incorporate the Prime EXL family of UNIX-based multiuser computers and Novell's Netware Software

### General Electric

Joint development of CAD/CAM software

### Sun Microsystems

Developing, manufacturing, and marketing workstation platforms together with Sun to serve Prime's application markets

1988

### Wild Leitz Group

Formed a joint venture company called Prime Wild GIS Inc., which will market and develop System 9, an advanced geographic information system

### Intel

Conducting shared research into a multiprocessing implementation of the UNIX operating system

### Dialcom Inc.

Formed an alliance for integrated messaging

---

## MERGERS AND ACQUISITIONS

1988

### Computervision

Prime merged with Computervision, a leading supplier of computer-based interactive graphics systems and services to the CAD/CAM/CAE market

### Calma Company

Prime acquired the Mechanical/AEC CAD/CAM assets of the Calma Company, a subsidiary of

General Electric. The acquisition provided Prime with access to more than 800 Calma CAD/CAM customers, including General Electric.

1987

### VersaCad Corporation

Prime acquired VersaCad, a vendor of PC-based CAD and CAE software.

---

## KEY OFFICERS

### Anthony L. Craig

President and chief executive officer

### Richard L. Ballantyne

Vice president and general counsel

### Kathleen A. Cote

Vice president, Manufacturing

### Robert A. Fischer

Vice president, Marketing and Business Development

### Michael H. Forster

President, Americas

### Vladimir P. Geisberg

Vice president, CAD/CAM Product Development

### Cornelius P. McMullan

Vice president and general manager, Asia/Pacific Operations

---

## PRINCIPAL INVESTORS

State Treasurer, State of Michigan—6.2 percent  
Trinity Investment Management Corp.—5.3 percent

**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December**  
**(Millions of U.S. Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
Total Current Assets	\$322.1	\$390.7	\$429.6	\$924.0	\$808.3
Cash	41.3	67.9	87.6	490.2	107.8
Receivables	175.0	220.7	225.1	316.9	500.4
Marketable Securities	0	0	0	0	0
Inventory	96.1	82.9	95.8	87.3	147.6
Other Current Assets	9.7	19.2	21.1	29.6	52.5
Net Property, Plants	\$158.2	\$186.8	\$225.6	\$255.9	\$372.6
Other Assets	\$21.7	\$24.0	\$35.2	\$154.7	\$470.0
<b>Total Assets</b>	<b>\$502.0</b>	<b>\$601.5</b>	<b>\$690.4</b>	<b>\$1,334.6</b>	<b>\$1,650.9</b>
Total Current Liabilities	\$88.7	\$121.8	\$146.2	\$235.7	\$445.7
Long-Term Debt	\$10.0	\$10.0	\$10.0	\$493.5	\$561.2
Other Liabilities	\$78.3	\$86.4	\$93.4	\$101.6	\$102.3
<b>Total Liabilities</b>	<b>\$177.0</b>	<b>\$218.2</b>	<b>\$249.6</b>	<b>\$830.8</b>	<b>\$1,109.2</b>
Total Shareholders' Equity	\$325.0	\$383.3	\$437.8	\$503.8	\$541.7
Converted Preferred Stock	0	0	0	0	0
Common Stock	102.1	104.3	105.5	120.4	130.9
Other Equity	(12.2)	(13.9)	(7.5)	(21.2)	(12.8)
Retained Earnings	235.1	292.9	339.8	404.6	423.6
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$502.0</b>	<b>\$601.5</b>	<b>\$687.4</b>	<b>\$1,334.6</b>	<b>\$1,650.9</b>
<b>Income Statement</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
Revenue	\$642.8	\$769.7	\$860.2	\$960.9	\$1,595.2
U.S. Revenue	390.9	425.3	471.5	513.9	712.4
Non-U.S. Revenue	251.9	344.4	388.7	447.0	882.8
Cost of Sales	\$301.7	\$358.4	\$407.2	\$448.2	\$810.2
R&D Expense	\$64.1	\$81.1	\$91.9	\$109.7	\$174.3
SG&A Expense	\$203.7	\$251.6	\$297.7	\$320.9	\$494.9
Capital Expense	\$58.7	\$73.1	\$86.2	\$82.6	\$140.3
Pretax Income	\$70.3	\$77.0	\$62.6	\$86.4	\$17.8
Pretax Margin (%)	10.94	10.00	7.28	8.99	1.12
Effective Tax Rate (%)	27.90	25.00	24.90	25.00	27.00
Net Income	\$59.7	\$57.8	\$46.9	\$64.8	\$19.0
Shares Outstanding, Millions	47.9	48.2	48.4	49	48.5
<b>Per Share Data</b>					
Earnings	\$1.25	\$1.20	\$0.97	\$1.32	\$0.39
Dividends	0	0	0	0	0
Book Value	\$6.80	\$8.10	\$9.10	\$10.50	\$10.90

**Table 4 (Continued)**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December**  
**(Millions of U.S. Dollars, except Per Share Data)**

<b>Key Financial Ratios</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
<i>Liquidity</i>					
Current (Times)	3.63	3.21	2.94	3.92	1.81
Quick (Times)	3.52	2.53	2.28	3.55	1.48
Fixed Assets/Equity (%)	48.68	48.73	51.53	50.79	68.78
Current Liabilities/Equity (%)	27.29	31.78	33.39	46.78	82.28
Total Liabilities/Equity (%)	54.46	56.93	57.01	164.91	204.76
<i>Profitability (%)</i>					
Return on Assets	-	10.48	7.26	6.40	1.27
Return on Equity	-	16.32	11.42	13.76	3.63
Profit Margin	9.29	7.51	5.45	6.74	1.19
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	9.97	10.54	10.68	11.42	10.93
Capital Spending % of Revenue	9.13	9.50	10.02	8.60	8.80
Employees	7,348	8,115	8,621	8,818	12,386
Revenue (\$K)/Employee	\$87.48	\$94.85	\$99.78	\$108.97	\$128.79
Capital Spending % of Assets	11.69	12.15	12.49	6.19	8.50

Source: Prime Computer, Inc.  
Annual Reports and Forms 10-K  
Dataquest  
January 1990

# Powerex, Inc.

Table 1

**Estimated Worldwide Semiconductor Revenue by Calendar Year  
(Millions of Dollars)**

	<u>1986</u>	<u>1987</u>	<u>1988</u>
<b>Total Semiconductor</b>	94	106	115
<b>Total Integrated Circuit</b>			
<b>Bipolar Digital (Function)</b>			
Bipolar Digital Memory			
Bipolar Digital Logic			
<b>MOS (Function)</b>			
MOS Memory			
MOS Microdevices			
MOS Logic			
<b>Analog</b>			
<b>Total Discrete</b>	94	106	115
<b>Total Optoelectronic</b>			

Table 2

**Powerex, Inc.  
1988 Worldwide Ranking by Semiconductor Markets  
(Revenue in Millions of Dollars)**

	<u>1988</u>	<u>1987</u>	<u>1988</u>	<u>Sales</u>	<u>Industry</u>
	Rank	Rank	Revenue	% Change	% Change
				1987-1988	1987-1988
<b>Total Semiconductor</b>	51	47	\$115	8.5%	33.0%
<b>Total Discrete</b>	19	19	\$115	8.5%	14.4%

Source: Dataquest  
December 1989



# Powerex, Inc.

Table 3

Powerex, Inc.  
Estimated 1988 Semiconductor Revenue by Geographic Region  
(Millions of Dollars)

	<u>U.S.</u>	<u>Japan</u>	<u>Europe</u>	<u>ROW</u>
Total Semiconductor	\$86		\$28	\$1
Total Integrated Circuit				
Bipolar Digital (Function)				
Bipolar Digital Memory				
Bipolar Digital Logic				
MOS (Function)				
MOS Memory				
MOS Microdevices				
MOS Logic				
Analog				
Total Discrete	\$86		\$28	\$1
Total Optoelectronic				

Source: Dataquest  
December 1989

## Prime Computer, Incorporated

Prime Park

Natick, Massachusetts 01760

Telephone: (508) 655-8000

Fax: (508) 655-8000 ex. 5090

Dun's Number: 05-782-0458

*Date Founded: 1972*

---

### CORPORATE STRATEGIC DIRECTION

Prime Computer, Incorporated, was founded in 1972 by seven engineers from Honeywell with the goal of creating a faster minicomputer. Today, Prime is a supplier of integrated system solutions to selected end-user markets. Prime's business can be divided into three broad categories: computer-aided design/computer-aided manufacturing/computer-aided engineering (CAD/CAM/CAE), distributed data processing systems, and customer service. Prime is primarily a value-added integrator of computer systems and workstations that can then be combined with application software to solve customers' needs. The Company is also expanding its consulting, training, and services.

In late 1989, Prime announced a new business plan that involved a significant restructuring of the Company. The new plan organizes the Company into profit centers focusing on the needs of Prime's diverse customer base. The profit centers are the Computervision Business Unit, the Computer Systems Business Unit, the Service Business Unit, the Systems Integration Business Unit, and the International Business Unit. The restructuring also calls for a 20 percent reduction in Prime's worldwide work force, with the most of the cuts being made in the United States. The reorganization is expected to streamline R&D programs and to reduce Prime's selling, general, and administrative expenses.

The Systems Integration Business Unit will concentrate on opportunities in the engineering market and database management activities. Services offered by this new unit will be software and hardware integration, systems consulting, project management, and

custom systems. These services will be offered worldwide and marketed through Prime's global sales force.

The Computervision Business Unit is the result of Prime's 1988 merger with Computervision Corporation. This merger, along with the acquisition of the Calma Company, has made Prime Computer second only to IBM as a supplier of integrated CAD/CAM/CAE systems. Since the creation of this new business unit, all of Prime's CAD/CAM programs have been united under the name Computervision, regardless of their origin.

Prime intends to continue to be a premier supplier to the CAD/CAM market and to expand its products and services into the computer-integrated manufacturing (CIM) market. Prime also intends to increase its presence in the commercial and public sector with investments in strategic applications such as geographic information systems (GISs).

In the distributed data processing market, Prime will continue to support and expand its proprietary 50 Series line of minicomputers and focus on client-server computing with its UNIX-based EXL line of supermicrocomputers.

The principal markets for the Company's products are manufacturing, government, architectural, engineering, construction, education, financial services, telecommunications, and utilities.

Prime Computer has replaced its distributors with a two-tier MasterVAR-VAR structure. Prime has contracted with its first two MasterVARs—Unicomp (Dallas) and Minicomputer Associates Inc. (Jacksonville, Florida). Prime is attempting to reduce the

number of VARs it uses while increasing support for those that remain. Ultimately, Prime expects the VAR channel to generate at least 50 percent of its UNIX volume.

After a long period of uncertainty, Prime Computer was acquired by DR Acquisition Corporation, an affiliate of J. H. Whimney & Co., a private New York-based investment firm. The acquisition took place in August 1989. Previous takeover attempts by Prime's rival MAI Basic Four, Inc., affected Prime's financial results adversely due to customers' concern and the costs associated with Prime's defense.

Prime's total 1989 revenue was \$1.52 billion,\* a 4.7 percent decrease from the previous year. This decline was minimized by a strong fourth quarter, which showed a 12.5 percent increase in product revenue over the third quarter. This was made possible by the resolution of MAI Basic Four's takeover threat and the completion of Prime's restructuring.

Research, development, and engineering expenditure, which represented 13 percent of total revenue through the first seven months of 1989, totaled \$173.2 million for 1989, down from \$174.3 million the previous year. Under Prime's new business plan, R&D will no longer be organized as a corporate function, but rather will operate within each business unit.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region and distribution channel. Table 4, a comprehensive financial statement, is at the end of this background. Because Prime became a privately held company when it was acquired by J. H. Whimney & Co. in August 1989, comprehensive financial information is not available after the fiscal year ended December 31, 1988.

---

## BUSINESS SEGMENT STRATEGIC DIRECTION

### Computervision Business Unit

As mentioned previously, Prime's Computervision is the second largest worldwide supplier of CAD/CAM solutions, with emphasis on the automotive, industrial

equipment, and aerospace markets for mechanical CAD/CAM systems. Manufacturers use Computervision CAD/CAM systems and engineering data management systems to reduce product development time, lower development and manufacturing costs, and improve product quality. Utility companies and government agencies use Computervision GISs to improve service efficiency and asset utilization. In 1989, this business unit accounted for 32 percent of Prime's total revenue.

Computervision has over 50,000 workstation- and minicomputer-based seats installed throughout the world, as well as 100,000 personal computer-based seats installed. In 1989, more than 60 percent of Computervision's revenue was derived from markets outside the United States. Computervision has sales and support offices in 21 countries and distributors in 33 countries.

CADDs software is an integrated CAD/CAM software product line used to design, analyze, and manufacture complex components and assemblies. It provides a solution for manufacturers involved in the entire product development process, from conceptual design to product delivery. It is employed in a variety of industries, including automotive, aerospace, electronics, consumer goods, and defense. CADDs software runs on the Sun SPARCstation in a bundled CADDStation configuration. Over 350 modules provide specific architectural, engineering, and construction (AEC) and mechanical, manufacturing, and electronics design applications.

CADDStation Systems are a complete line of Computervision's family of Motorola 68020-based engineering workstations. The CADDStation is a modified Sun 3/XXX workstation running proprietary high-performance graphics under Dun's version of the UNIX operating system software. The systems are available in bundled configurations for multidiscipline CAD/CAM users.

Prime plans to incorporate its two versions of Medusa (one of which was developed by Prime, the other by Computervision) into a single product under the Computervision brand name. Medusa is a set of CAD/CAM application products used by companies in discrete manufacturing, AEC activities, and facilities management. Its "electronic drawing board"

---

\*All dollar amounts are in US dollars.

approach is well-suited to customers that prefer to implement CAD incrementally, providing systems to individual engineers or departments over a period of time. Medusa is sold worldwide through a direct sales force.

The Personal Computer Business Unit (PCBU) is a division of Computervision comprising two software product families: Personal Systems and VersaCAD. Personal Systems products are based on CAD/CAM software applications that run on IBM-compatible PCs operating MS-DOS and extended DOS, SUN386i's running UNIX operating systems, and SPARCstations. The packages include Personal Designer for 3-D mechanical design input, geometric modeling, and surface design, and the Personal Machinist for extracting and combining design data from the Personal Designer for numerical control programming and distributed numerical control.

Versacad software runs on IBM-compatible PCs, the Apple Macintosh, and UNIX workstations from Sun and HP/Apollo. It is used for a variety of applications, including AEC, mechanical design, facilities design and management, and mapping.

Other Computervision products include the Product Design Graphic System (PDGS) and the Calma product family. PDGS is used to design complex sculptured surfaces such as automobile bodies. The Calma product family is used in mechanical and AEC industries. It includes Prism/DDM software, an integrated analytic solids, surface, and wireframe modeler; and Dimension III, a software package used by companies in the AEC industry. Dimension III provides 3-D design applications for piping, structural steel, concrete, civil site layout, and electrical layout. It is used to design oil refineries, electrical power generation plants, offshore oil platforms, and other complex facilities.

Prime markets the Computervision GIS product line including mapping products, civil engineering solutions, and the GIS System 9 geoprocessing applications. These products are sold primarily to municipal and federal government agencies and public transportation and utility companies.

Prime experienced moderate growth in its 1989 CAD/CAM business. Revenue increased to \$890 million, 5 percent over 1988's revenue of \$850 million.

Dataquest estimates that in 1989 Prime's Computervision Unit held 7.0 percent of the worldwide CAD/CAM/CAE market. In the worldwide mechanical CAD/CAM market segment, Prime captured 12.4 percent and ranked second. Prime ranks fourth among the worldwide AEC CAD/CAM vendors with 6.4 percent of the market. Dataquest further estimates that, in the worldwide PCB layout CAD/CAM market, Prime ranks sixth with 4.5 percent share.

DR Acquisition Corporation is considering selling Prime's Computervision Unit by the middle of the 1990s.

### Computer Systems Business Unit

The Computer Systems Business Unit accounted for approximately 28 percent of Prime's total 1989 revenue. This unit comprises the 50 Series and PRIME EXL hardware product lines, database management software products, and communications and networking products.

Prime's 50 Series is a line of compatible, 32-bit superminicomputers that run on the Company's proprietary PRIMOS operating system. The nine systems in this product line range in size from office-installable machines to computer-room systems. Prevalent applications include accounting systems, administration, manufacturing management, order processing, and distribution. The two newest models in the 50 Series, the 6450 and the dual 6650, increase the line's performance range up to 29 percent in multiuser applications. The new models, introduced in 1990, are built in VLSI ECL technology.

Dataquest estimates that Prime ranked 13th in the worldwide midrange computer market with approximately 1.7 percent market share based on revenue of \$489.3 million.

The PRIME EXL Series is a family of supermicrocomputers based on the industry-standard Intel 386 family of microprocessors and running a version of the UNIX operating system. These multiuser, multitasking systems offer users ease of development or delivery, transparent PC and file access to DOS applications, and departmental solutions. The EXL Series also runs MS-DOS and PICK applications, and can communicate with 50 Series systems, IBM PCs, and other compatibles. Within the PRIME EXL Series,

the entry-level PRIME EXL MBX and midrange 300 Series are single-processor systems. The midrange to high-end 1200 Series products are multiprocessor configurations with 8 to 32 processors.

Database-related products include Prime INFORMATION and ORACLE. Prime INFORMATION is a flexible relational-based data management system that has a prominent position in the PICK database market. Prime's version of ORACLE is compatible with all ORACLE-based applications. It offers users a complete set of administrative utilities and software tools for application development and provides transparent connectivity in a multivendor, open-systems environment.

### Service Business Unit

Prime provides hardware and software maintenance for approximately 27,000 systems and 10,000 customers worldwide through its Service Business Unit, which is responsible for all field service and support for all the Company's product lines. In 1989, this unit accounted for 40 percent of total Company revenue. It employs approximately 3,300 people at over 180 locations.

This unit also offers a wide variety of courses and customized instruction for customers. Currently, more than 150 self-paced and traditional educational courses are offered worldwide.

### Systems Integration Business Unit

The Systems Integration Business Unit provides customers with total system integration and project management capabilities that address strategic information needs. It concentrates on opportunities in the engineering market and database management activities. The business unit proposes, designs, and implements projects including Prime standard products, custom-designed products, and externally purchased products and subsystems. The Systems Integration Unit offerings include systems integration project management, business, and technology consulting services; custom hardware and software products; externally purchased hardware, software, and services; and special education, training, and seminars.

### International Business Unit

The International Business Unit is responsible for marketing the full line of Prime's products and services outside the United States. As mentioned previously, 60 percent of the Company's revenue is generated in international markets. In order to serve customers in over 60 countries, Prime has established international headquarters in Munich, Germany; marketing subsidiaries in large markets; and an international distributor network to serve developing markets.

Prime is a founding member of UNIX International and a member of X/Open, a consortium of international computer systems vendors that are developing a Common Applications Environment based on de facto and international standards.

### Further Information

For further information about the Company's business segments, please contact the appropriate Dataquest industry service.

**Table 1**  
Corporate Highlights\* (Millions of US Dollars)

	1985	1986	1987	1988
Four-Year Revenue	\$769.7	\$860.2	\$960.9	\$1,595.2
Percent Change	-	11.76	11.71	66.01
Capital Expenditure	\$73.1	\$86.2	\$82.6	\$140.3
Percent of Revenue	9.50	10.02	8.60	8.80
R&D Expenditure	\$81.1	\$91.9	\$109.7	\$174.3
Percent of Revenue	10.54	10.68	11.42	10.93
Number of Employees	8,115	8,621	8,818	12,386
Revenue (\$K)/Employee	\$94.85	\$99.78	\$108.97	\$128.79
Net Income	\$57.8	\$46.9	\$64.8	\$19.0
Percent Change	-	(18.86)	38.17	(70.68)
1989 Calendar Year	Q1	Q2	Q3	Q4
Quarterly Revenue	\$387.00	\$381.96	NA	NA
Quarterly Profit	NA	NA	NA	NA

\*Because the Company became privately held in 1989, comprehensive financial information is no longer available. NA = Not available. Source: Prime Computer, Incorporated Annual Reports and Forms 10-K Dataquest (1990)

**Table 2**  
Revenue by Geographic Region (Percent)

Region	1985	1986	1987	1988	1989
North America	55.26	54.81	53.48	44.66	45.0
International	44.74	45.19	46.52	55.34	55.0
Europe	30.90	32.60	33.53	43.00	41.2
Asia/Pacific	13.84	12.54	12.99	12.34	13.8

Source: Prime Computer, Incorporated Annual Reports and Forms 10-K Dataquest (1990)

**Table 3**  
Revenue by Distribution Channel (Percent)

Channel	1988	1989
Direct Sales	80.83	NA
Indirect Sales	18.27	NA
VARs	14.73	NA
Distributors	3.54	NA

NA = Not available

Source: Dataquest (1990)

---

## 1989 SALES OFFICE LOCATIONS

North America—100  
Europe—46  
Asia/Pacific—30  
Japan—4  
ROW—29

---

## MANUFACTURING LOCATIONS

### *North America*

Framingham, Massachusetts  
Systems  
Manchester, New Hampshire  
Systems (closed recently)  
Ponce, Puerto Rico  
Systems

### *Europe*

Coolock, Ireland  
Systems

---

## SUBSIDIARIES

### *North America*

CIS Inc. (United States)  
Computervision Corporation (United States)  
Computervision Securities Corporation (United States)  
CV Holdings, Inc. (United States)  
Prime Computer, Inc. de Puerto Rico (Puerto Rico)  
Prime Computer International (United States)  
Prime Computer International Services Limited (United States)  
Prime Computer Investment, Ltd. (United States)  
Prime Computer Leasing Limited (United States)  
Prime Computer of Canada Limited (Canada)  
Prime Computer Pensions Limited (United States)  
Prime Computer R&D Limited (United States)  
Prime Computer Service Limited (United States)  
Prime Insurance, Ltd. (United States)  
Prime Wild GIS, Inc. (United States)  
VersaCAD Corporation (United States)

### *Europe*

CIS Medusa B.V. (Netherlands)  
Computervision A.B. (Sweden)

Computervision A/S (Norway)  
Computervision B.V. (Netherlands)  
Computervision Coordination Centre S.A. (Spain)  
Computervision Danmark A/S (Denmark)  
Computervision Handelsgesellschaft mbH (Germany)  
Computervision Inc. (Europe)  
Oy Prime Computer AB (Finland)  
Prime Computer (Denmark)  
Prime Computer, AG (Switzerland)  
Prime Computer A/S (Norway)  
Prime Computer, B.V. (Benelux)  
Prime Computer CAD/CAM, B.V. (Netherlands)  
Prime Computer De Espana, S.A. (Spain)  
Prime Computer Finance, B.V. (Netherlands)  
Prime Computer, GmbH (Germany)  
Prime Computer Italia, S.P.A. (Italy)  
Prime Computer Limited (United Kingdom)  
Prime Computer Ltd. (Ireland)  
Prime Computer S.A./N.A. (Belgium)  
Prime Computer Scandinavia, AB (Scandinavia)  
Prime France, S.A. (France)  
Prime Wild GIS, A.G. (Switzerland)

### *Asia/Pacific*

Computervision China Inc. (China)  
Computervision Designer Systems Ltd. (Hong Kong)  
Computervision Far East Ltd. (Pakistan)  
Computervision Japan Ltd. (Japan)  
Computervision Pte Ltd. (Singapore)  
Prime Computer Japan, Inc. (Japan)  
Prime Computer Limited (Hong Kong)  
Prime Computer of Australia Limited (Australia)  
Prime Computer Pte Limited (Singapore)  
Prime Retirement Benefits Funds Pty. Limited (Australia)  
Prime Wholesale Pty. Limited (Australia)

### *ROW*

Computervision Do Brasil (Brazil)  
Industrial E Comercio Limited (Brazil)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

### *1990*

#### **Minardi Team**

Computervision signed an agreement with the Minardi Team, a European designer of Formula

One race cars. Computervision will act as a technology sponsor and will supply its Personal CAD/CAM technology to Minardi.

#### **Sun Microsystems, Inc.**

Prime has signed a two-year, \$200 million agreement to resell SPARC workstations and servers from Sun.

#### **BellSouth Corporation and AT&T**

Prime Computer achieved successful integration of high-speed, primary-rate Integrated Services Digital Network (ISDN) between its computer installations in Atlanta, working closely with Bellsouth and AT&T. Prime is the first major computer supplier to successfully integrate its wide area networking services with ISDN at primary-rate interface speeds of up to 1.544 Mbps.

1989

#### **Korea Computer**

Prime and Korea Computer will jointly operate an educational institute in South Korea to expand use of CAD/CAM technology. Students will be referred to the institute by their industries and will receive full scholarships from the two parent companies.

#### **Phoenix Technologies**

Prime will license MS-DOS emulation from Phoenix Technologies. Prime will provide Phoenix Open PC MS-DOS software as a standard feature on its SPARC-based WS42C workstation. The software allows users of the SPARC computer to switch between DOS applications and programs operating under the workstation's native UNIX operating system.

#### **Object Management Group (OMG)**

OMG is an international organization devoted to making computer systems and software from different manufacturers communicate and work together more efficiently using object-oriented technology. Members of the group include Prime, Canon, Philips International, Sun Microsystems, 3COM, and Unisys, among others. In joining, each company commits to researching or developing products based on the common applications environment.

#### **G&R Technologies**

This Midwestern distributor of microcomputer-based presentation graphics and computer imaging

entered a Master-VAR agreement with Prime to market Prime's EXL line of UNIX-based super-microcomputers.

#### **Number Nine Computer**

POWER9, Number Nine's display list processing software for its PEPPER graphics board family, has been released for Prime/Computervision's Personal Designer series CAD software. Number Nine and Prime worked together to achieve CAD workstation performance levels in a desktop platform.

#### **Novell**

The companies are jointly developing LAN solutions that incorporate the Prime EXL family of UNIX-based multiuser computers and Novell's Netware Software.

#### **General Electric**

The companies are jointly developing CAD/CAM software.

#### **Sun Microsystems**

Prime is developing, manufacturing, and marketing workstation platforms together with Sun to serve Prime's application markets.

1988

#### **Wild Leitz Group**

The companies formed a joint venture company called Prime Wild GIS Inc., which will market and develop System 9, an advanced geographic information system.

#### **Intel**

The companies are conducting shared research into a multiprocessing implementation of the UNIX operating system.

#### **Dialcom Inc.**

The companies formed an alliance for integrated messaging.

---

## **MERGERS AND ACQUISITIONS**

1988

#### **Computervision**

Prime merged with Computervision, a leading supplier of computer-based interactive graphics systems and services to the CAD/CAM/CAE market.



**Calma Company**

Prime acquired the mechanical/AEC CAD/CAM assets of the Calma Company, a subsidiary of General Electric. The acquisition provided Prime with access to more than 800 Calma CAD/CAM customers, including General Electric.

1987

**VersaCAD Corporation**

Prime acquired VersaCAD, a vendor of PC-based CAD and CAE software.

---

**KEY OFFICERS**

**James F. McDonald**

Vice chairman and chief executive officer

**John T. Shields**

President and chief operating officer

**Lawrence M. Bornstein**

Vice president, Human Resources

**Anthony N. Fiore, Jr.**

Vice president, general counsel, and secretary

**Joseph F. Pesce, Jr.**

Vice president, corporate controller, and treasurer

**Harvey A. Wagner**

Vice president, Finance, Administration, and Planning, and chief financial officer

**Richard L. Ballantyne**

Vice president and general counsel

**Kathleen A. Cote**

Vice president, Manufacturing

**Robert A. Fischer**

Vice president, Marketing and Business Development

**Michael H. Forster**

President, Americas

**Vladimir P. Geisberg**

Vice president, CAD/CAM Product Development

**Cornelius P. McMullan**

Vice president and general manager, Asia/Pacific Operations

---

**PRINCIPAL INVESTORS**

State Treasurer, State of Michigan—6.2 percent

Trinity Investment Management Corp.—5.3 percent

---

**FOUNDERS**

Information is not available.

**Table 4**  
**Comprehensive Financial Statement\***  
**Fiscal Year Ending December**  
**(Millions of US Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
<b>Total Current Assets</b>	\$390.7	\$429.6	\$924.0	\$808.3
Cash	67.9	87.6	490.2	107.8
Receivables	220.7	225.1	316.9	500.4
Inventory	82.9	95.8	87.3	147.6
Other Current Assets	19.2	21.1	29.6	52.5
<b>Net Property, Plants</b>	\$186.8	\$225.6	\$255.9	\$372.6
<b>Other Assets</b>	\$24.0	\$35.2	\$154.7	\$470.0
<b>Total Assets</b>	<b>\$601.5</b>	<b>\$690.4</b>	<b>\$1,334.6</b>	<b>\$1,650.9</b>
<b>Total Current Liabilities</b>	\$121.8	\$146.2	\$235.7	\$445.7
<b>Long-Term Debt</b>	\$10.0	\$10.0	\$493.5	\$561.2
<b>Other Liabilities</b>	\$86.4	\$93.4	\$101.6	\$102.3
<b>Total Liabilities</b>	<b>\$218.2</b>	<b>\$249.6</b>	<b>\$830.8</b>	<b>\$1,109.2</b>
<b>Total Shareholders' Equity</b>	\$383.3	\$437.8	\$503.8	\$541.7
Common Stock	104.3	105.5	120.4	130.9
Other Equity	(13.9)	(7.5)	(21.2)	(12.8)
Retained Earnings	292.9	339.8	404.6	423.6
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$601.5</b>	<b>\$687.4</b>	<b>\$1,334.6</b>	<b>\$1,650.9</b>
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
<b>Revenue</b>	\$769.7	\$860.2	\$960.9	\$1,595.2
US Revenue	425.3	471.5	513.9	712.4
Non-US Revenue	344.4	388.7	447.0	882.8
<b>Cost of Sales</b>	\$358.4	\$407.2	\$448.2	\$810.2
<b>R&amp;D Expense</b>	\$81.1	\$91.9	\$109.7	\$174.3
<b>SG&amp;A Expense</b>	\$251.6	\$297.7	\$320.9	\$494.9
<b>Capital Expense</b>	\$73.1	\$86.2	\$82.6	\$140.3
<b>Pretax Income</b>	\$77.0	\$62.6	\$86.4	\$17.8
<b>Pretax Margin (%)</b>	10.00	7.28	8.99	1.12
<b>Effective Tax Rate (%)</b>	25.00	24.90	25.00	27.00
<b>Net Income</b>	\$57.8	\$46.9	\$64.8	\$19.0
<b>Shares Outstanding, Millions</b>	48.2	48.4	49	48.5
<b>Per Share Data</b>				
Earnings	\$1.20	\$0.97	\$1.32	\$0.39
Dividend	0	0	0	0
Book Value	\$8.10	\$9.10	\$10.50	\$10.90

Table 4 (Continued)  
 Comprehensive Financial Statement\*  
 Fiscal Year Ending December  
 (Millions of US Dollars, except Per Share Data)

Key Financial Ratios	1985	1986	1987	1988
<i>Liquidity</i>				
Current (Times)	3.21	2.94	3.92	1.81
Quick (Times)	2.53	2.28	3.55	1.48
Fixed Assets/Equity (%)	48.73	51.53	50.79	68.78
Current Liabilities/Equity (%)	31.78	33.39	46.78	82.28
Total Liabilities/Equity (%)	56.93	57.01	164.91	204.76
<i>Profitability (%)</i>				
Return on Assets	-	7.26	6.40	1.27
Return on Equity	-	11.42	13.76	3.63
Profit Margin	7.51	5.45	6.74	1.19
<i>Other Key Ratios</i>				
R&D Spending % of Revenue	10.54	10.68	11.42	10.93
Capital Spending % of Revenue	9.50	10.02	8.60	8.80
Employees	8,115	8,621	8,818	12,386
Revenue (\$K)/Employee	\$94.85	\$99.78	\$108.97	\$128.79
Capital Spending % of Assets	12.15	12.49	6.19	8.50

\*Because the Company became privately held in 1989, comprehensive financial information is no longer available.

Source: Prime Computer, Incorporated  
 Annual Reports and Forms 10-K  
 Dataquest (1990)

## Printronix, Inc.

17500 Cartwright Road  
P.O. Box 19559  
Irvine, California 92713  
Telephone: (714) 863-1900  
Fax: (714) 660-8682  
Dun's Number: 06-617-7007

*Date Founded: 1974*

---

### CORPORATE STRATEGIC DIRECTION

Printronix, Inc., was incorporated in 1974 and reincorporated in December 1986. Printronix designs, manufactures, and markets a wide range of printers for use with microcomputers, minicomputers, and mainframe computer systems. Printronix's printers are aimed at business and industrial applications, allowing a multitude of printed computer output, such as reports, graphics, and bar code labels. In addition, Printronix manufactures printed circuit board assemblies.

Revenue for the first three quarters of fiscal year 1990 was \$91.9 million,\* down from \$103.6 million in year-to-date fiscal year 1989. The downturn arises partly from a slowdown in the midrange computer segment and partly to satisfying pent-up demand for certain new products in the first six months of fiscal year 1989. Net income after tax for the first three quarters of fiscal year 1990 was \$1.7 million, versus a loss of \$1.3 million in fiscal year 1989. The profitability improvement arises primarily from reduced manufacturing costs resulting from the discontinuation of manufacturing in the Netherlands and at certain U.S. facilities. Printronix's general and administration spending also has been decreased.

Total revenue increased 7.7 percent to \$134.8 million in fiscal year 1989, up from \$125.1 million in fiscal year 1988. Due to a decline in the order rate during the last two quarters of fiscal 1989, manufacturing activities went down, resulting in underutilization of facilities. Thus, total net loss was \$4.4 million for fiscal 1989, representing a decrease of 576.1 percent from 1988 fiscal year's net income of \$929,000. Printronix currently employs 1,300 people throughout the world.

---

\*All dollar amounts are in U.S. dollars.

Printronix markets its printers worldwide directly to original equipment manufacturers (OEMs) and to end users through a network of distributors and resellers supported by Printronix's management team. For fiscal 1989, Printronix conducted business with approximately 110 OEMs, making up 38 percent of net sales, and 156 distributors and resellers, making up 62 percent of net sales.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region and distribution channel. Table 4, a comprehensive financial statement, is at the end of this profile.

---

### BUSINESS SEGMENT STRATEGIC DIRECTION

#### Printers

Printronix's product line consists of impact dot matrix line printers, laser printers, and LED array printers. According to Dataquest's 1988 figures, Printronix ranked second in revenue and units shipped in the United States for line printers. The matrix line printer models include the P6000L Series, the P9000 Series, the P3040 Series, and the MVP Series. Model speeds range from 200 lines per minute (lpm) to 1,200 lpm. All of the matrix line printers are supported by the Intelligence Graphics Processor Series, which allows users to generate on-line forms, bar codes, logos, expanded/compressed text, and reversed and rotated print.

The L1012 laser printer is a nonimpact page printer that uses cut-sheet paper at a throughput rate of 12 pages per minute (ppm) with a 300 x 300 dots per inch (dpi) resolution. Designed for use in personal computer applications, the L1012 offers a large font selection by using cartridges and downloadable fonts.

The L2324 Report Expeditor is an LED array printer designed for multiuser work group environments. It prints at 24 ppm and 300 x 300-dpi resolution. Other features include two standard input cassettes, user-selectable resident fonts with built-in disk drive, 72 standard fonts supplied on floppy disks, 300-dpi resolution, 4Mb RAM and 2Mb disk

memory, standard RS-232-C and RS-422 serial, Centronics parallel interfaces, and an optional 1,200-sheet feeder.

#### Printer Interfaces

Printronix carries a line of printer interface products that enable certain Printronix products to be attached to IBM computer systems. The line consists of the PI-5225 and PI-3287 interfaces.

#### Further Information

For more information about the Company's business segments, please contact the appropriate industry services.

**Table 1**  
**Five-Year Corporate Highlights (Thousands of U.S. Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$148,429.0	\$131,892.0	\$123,651.0	\$125,073.0	\$134,755.0
Percent Change	-	(11.14)	(6.25)	1.15	7.74
Capital Expenditure	N/A	N/A	\$5,853.0	\$2,703.0	\$4,676.0
Percent of Revenue	0	0	4.73	2.16	3.47
R&D Expenditure	\$8,352.0	\$13,721.0	\$13,718.0	\$9,797.0	\$10,924.0
Percent of Revenue	5.63	10.40	11.09	7.83	8.11
Number of Employees	1,950	1,624	1,500	1,760	1,530
Revenue (\$K)/Employee	\$76.1	\$81.2	\$82.4	\$71.0	\$88.1
Net Income	\$7,115.0	(\$11,721.0)	(\$4,892.0)	\$929.0	(\$4,423.0)
Percent Change	-	(264.74)	58.26	118.99	(576.10)
<b>1989 Calendar Year</b>		<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>
Quarterly Revenue		N/A	\$29,250.00	\$31,886.00	N/A
Quarterly Profit		N/A	(\$607.00)	\$1,237.00	N/A

N/A = Not Available

Source: Printronic, Inc.  
 Annual Reports and  
 Forms 10-K  
 Dataquest  
 1990

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1985	1986	1987	1988	1989
North America	N/A	86.70	77.35	76.32	72.32
International	N/A	13.30	22.65	23.68	27.68
Europe	N/A	13.28	22.14	21.18	25.63
Asia/Pacific	N/A	0.02	0.51	2.50	2.05

N/A = Not Available

Source: Printronic, Inc.  
 Annual Reports and  
 Forms 10-K  
 Dataquest  
 1990

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1988	1989
Direct Sales	61.00	62.00
Indirect Sales	39.00	38.00
OEMs	39.00	38.00

Source: Printronic, Inc.  
 Annual Reports and  
 Forms 10-K  
 Dataquest  
 1990

---

## 1989 SALES OFFICE LOCATIONS

North America—8  
Europe—4  
Asia/Pacific—1

---

## MANUFACTURING LOCATIONS

*North America*  
Irvine, California  
Printers  
  
*Asia/Pacific*  
Singapore  
Printers

---

## SUBSIDIARIES

*Europe*  
Printronix A.G.  
Printronix France S.A.  
Printronix G.m.b.H.  
Printronix Ltd.  
Printronix Netherlands B.V.

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

1987

Wang Laboratories  
A multiyear OEM contract for Wang's LM Series Shuttle Matrix Printer

Pragma Ltd.  
Exclusive distribution of the Printronix L300 and L600 bar code label printers

---

## KEY OFFICERS

Robert A. Kleist  
President and chief executive officer  
  
J. Edward Belt, Ph.D.  
Senior vice president, Engineering, and chief technical officer  
  
Gordon B. Barrus  
Vice president, Advanced Development  
  
Steven M. Egol  
Vice president, International Sales  
  
Norm E. Farb, Ph.D.  
Vice president, Strategic Technology  
  
Joe L. Marolda  
Vice president, Marketing

---

## PRINCIPAL INVESTORS

Robert A. Kleist—17.0 percent  
Dimensional Fund Advisor Inc.—8.4 percent  
Central Securities Corporation—6.3 percent  
David W. Mayne—4.9 percent  
Capital Group—6.0 percent

**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending March**  
**(Thousands of U.S. Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Total Current Assets	\$80,113.0	\$71,642.0	\$68,121.0	\$76,805.0	\$63,721.0
Cash	663.0	10,309.0	6,141.0	5,755.0	2,448.0
Receivables	28,287.0	25,567.0	23,683.0	25,439.0	19,719.0
Marketable Securities	N/A	N/A	N/A	N/A	N/A
Inventory	49,652.0	34,165.0	37,269.0	44,707.0	40,245.0
Other Current Assets	1,511.0	1,601.0	1,028.0	904.0	1,309.0
Net Property, Plants	\$21,592.0	\$16,378.0	\$15,357.0	\$12,368.0	\$10,438.0
Other Assets	\$8,703.0	\$2,128.0	\$1,347.0	\$916.0	\$465.0
<b>Total Assets</b>	<b>\$110,408.0</b>	<b>\$90,148.0</b>	<b>\$84,825.0</b>	<b>\$90,089.0</b>	<b>\$74,624.0</b>
Total Current Liabilities	\$25,971.0	\$20,765.0	\$20,389.0	\$23,591.0	\$15,097.0
Long-Term Debt	\$2,961.0	N/A	N/A	N/A	N/A
Other Liabilities	\$1,781.0	\$2,020.0	\$4,138.0	\$4,238.0	\$2,963.0
<b>Total Liabilities</b>	<b>\$30,713.0</b>	<b>\$22,785.0</b>	<b>\$24,527.0</b>	<b>\$27,829.0</b>	<b>\$18,060.0</b>
Total Shareholders' Equity	\$79,695.0	\$67,363.0	\$60,298.0	\$62,260.0	\$56,564.0
Converted Preferred Stock	N/A	N/A	N/A	N/A	N/A
Common Stock	43,107.0	41,685.0	45.0	46.0	46.0
Other Equity	37,173.0	806.0	41,379.0	42,411.0	41,138.0
Retained Earnings	(585.0)	24,872.0	18,874.0	19,803.0	15,380.0
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$110,408.0</b>	<b>\$90,148.0</b>	<b>\$84,825.0</b>	<b>\$90,089.0</b>	<b>\$74,624.0</b>
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Revenue	\$148,429.0	\$131,892.0	\$123,651.0	\$125,073.0	\$134,755.0
U.S. Revenue	N/A	114,344.0	95,648.0	95,460.0	97,453.0
Non-U.S. Revenue	N/A	17,548.0	28,003.0	29,613.0	37,302.0
Cost of Sales	\$103,246.0	\$96,232.0	\$97,319.0	\$96,441.0	\$105,413.0
R&D Expense	\$8,352.0	\$13,721.0	\$13,718.0	\$9,797.0	\$10,924.0
SG&A Expense	\$25,964.0	\$26,763.0	\$25,116.0	\$18,360.0	\$22,433.0
Capital Expense	N/A	N/A	\$5,853.0	\$2,703.0	\$4,676.0
Pretax Income	\$8,915.0	(\$15,608.0)	(\$7,784.0)	\$1,009.0	(\$6,404.0)
Pretax Margin (%)	6.01	(11.83)	(6.30)	0.81	(4.75)
Effective Tax Rate (%)	46.00	46.00	46.00	37.00	34.00
Net Income	\$7,115.0	(\$11,721.0)	(\$4,892.0)	\$929.0	(\$4,423.0)
Shares Outstanding, Thousands	4,839.1	4,928.3	4,711.3	4,581.1	4,582.3
<b>Per Share Data</b>					
Earnings	\$1.47	(\$2.38)	(\$1.04)	\$0.20	(\$0.97)
Dividends	N/A	N/A	N/A	N/A	N/A
Book Value	\$16.47	\$4.51	\$12.80	\$13.59	\$12.34

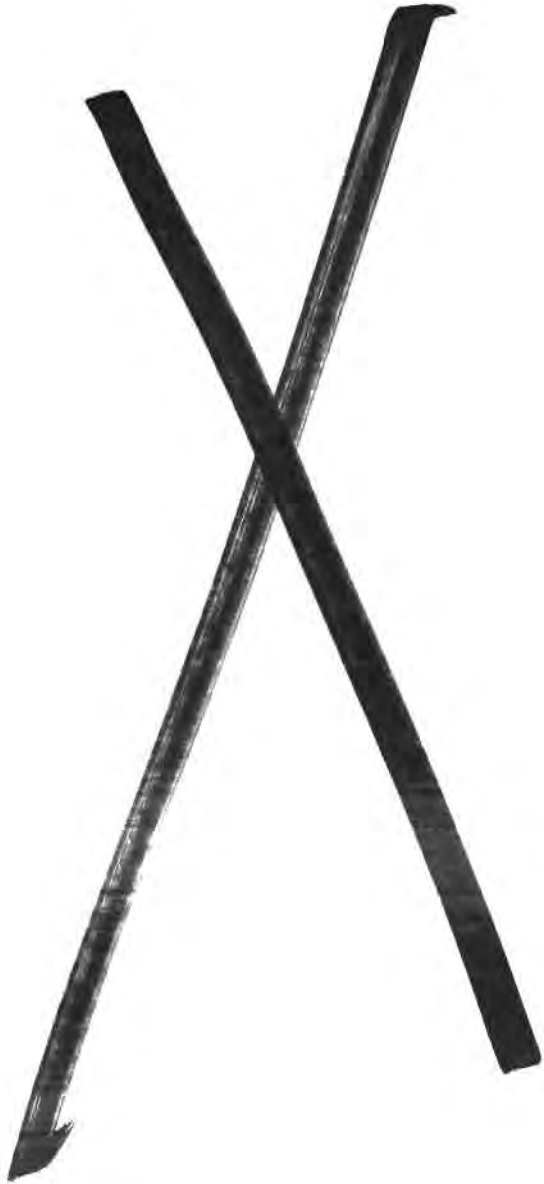


**Table 4 (Continued)**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending March**  
**(Thousands of U.S. Dollars, except Per Share Data)**

<b>Key Financial Ratios</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<i>Liquidity</i>					
Current (Times)	3.08	3.45	3.34	3.26	4.22
Quick (Times)	1.17	1.80	1.51	1.36	1.56
Fixed Assets/Equity (%)	27.09	24.31	25.47	19.87	18.45
Current Liabilities/Equity (%)	32.59	30.83	33.81	37.89	26.69
Total Liabilities/Equity (%)	38.54	33.82	40.68	44.70	31.93
<i>Profitability (%)</i>					
Return on Assets	-	(11.69)	(5.59)	1.06	(5.37)
Return on Equity	-	(15.94)	(7.66)	1.52	(7.44)
Profit Margin	4.79	(8.89)	(3.96)	0.74	(3.28)
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	5.63	10.40	11.09	7.83	8.11
Capital Spending % of Revenue	0	0	4.73	2.16	3.47
Employees	1,950	1,624	1,500	1,760	1,530
Revenue (\$K)/Employee	\$76,117.43	\$81,214.29	\$82,434.00	\$71,064.20	\$88,075.16
Capital Spending % of Assets	0	0	6.90	3.00	6.27

N/A = Not Available

Source: Printronic, Inc.  
 Annual Reports and  
 Forms 10-K  
 Dataquest  
 1990



## Rockwell International Corporation

600 Grant Street  
Pittsburgh, Pennsylvania 15219  
Telephone: (412) 565-2000  
Fax: (412) 565-7388  
Dun's Number: 00-825-5523

*Date Founded: 1928*

### CORPORATE STRATEGIC DIRECTION

Rockwell International Corporation is a multi-industry company engaged in the research, development, manufacturing, and marketing of products for commercial and government markets.

Revenue totaled \$12.5 billion \*in 1989, a 4.8 percent increase over the previous year's revenue of \$11.9 billion. This increase was because of higher sales in the electronics, automotive, and graphics industries, as well as in space systems operations within the aerospace industry. The mix of the Company's sales in 1989 showed growth in the commercial industry, including international, while the sales to the US government decreased 3 percent to 44 percent of total sales. US commercial business sales totaled \$4.0 billion while international commercial sales totaled \$3.0 billion. The US government sales totaled \$5.5 billion, with the Department of Defense and National Aeronautics and Space Administration (NASA) responsible for \$3.5 billion and \$2.0 billion, respectively.

The Company encompasses four product divisions: Aerospace, Electronics, Automotive, and Graphics. An important shift is taking place in the Company's structure. Electronics is now the largest sector, and growth is coming increasingly from commercial and international markets. The Electronics Division is responsible for 39.2 percent (\$4.9 billion) of total revenue for fiscal 1989. In electronics, through its subsidiary Allen-Bradley, Rockwell is a leader in global industrial automation technologies. Avionics supplies instrumentation, communication, and navigation for air transport and business aircraft manufactured outside the Soviet Union. Rockwell Telecommunications provides hardware used by most long

distance telephone operating companies and communications networks in the United States. The Company produces defense-related electronic systems that play mission-critical roles in sea/air/land strategic communication.

The Aerospace Division is responsible for 31.2 percent (\$3.9 billion) of total revenue. Within this division are two segments, the Space Systems and Aircraft, that accounted for \$2.8 billion and \$1.1 billion, respectively. Under the Space Systems segment are the Space Transportation Systems Division, the Rocketdyne Division, and the Rockwell Space Operations Company, all of which contract out to NASA and the US government.

The Automotive Division's revenue totaled \$2.4 billion and represented 19.4 percent of total revenue. This division is segmented into two groups, Heavy Vehicles and Light Vehicles. More than two-thirds of division sales volume worldwide is derived from the Heavy Vehicles business—axles, brakes, and other components for medium- and heavy-duty trucks, buses, trailers, and off-highway users. In fiscal 1989, the largest percentage sales growth was shown by Light Vehicles, which is served by the Automotive Body & Chassis Systems organization. This group serves passenger-car and light-truck original equipment manufacturers (OEMs) in Europe, North America, Brazil, and Australia, providing total-design engineering and manufacturing expertise for products including door-window system modules and sunroof systems.

The Graphics Division's sales exceeded \$1 billion for the first time, totaling \$1.1 billion, or 8.9 percent of total revenue. Technologically advanced new products accounted for approximately 40 percent of the total. These products include the Colorliner and Headliner Offset T70 presses for large-circulation

\*All dollar amounts are in US dollars.

newspapers. In 1989, the Graphics Division acquired the Baker Perkins printing machinery business from APV Plc. This business is now named Rockwell PMC and serves the high-quality and high-volume publication and commercial printing markets.

The remaining 2.3 percent of total revenue comprises other income and gains on sales of businesses.

Net income of \$734.9 million for fiscal 1989 showed a decrease of 9.5 percent, down from \$811.9 million in fiscal 1988. Earnings from the electronics businesses for 1989 were up 29 percent from 1988, primarily reflecting significant volume improvements in avionics and the Allen-Bradley industrial automation businesses. Aerospace earnings decreased 15 percent in fiscal 1989, while automotive earnings showed a slight decrease. Graphics increased 98 percent over fiscal 1988, reflecting the successful introduction of new products.

Capital expenditure in 1989 totaled \$609 million and was used primarily for facilities and equipment dedicated to new products, improving quality, and increasing productivity. The Company expects capital expenditure to be about the same in fiscal 1990. Rockwell International employed 108,715 people in 1989.

R&D expenditure in 1989 totaled \$1.7 billion, posting a 6.3 percent increase over fiscal 1988 while representing 13.6 percent of total revenue. Of the \$1.7 billion, \$476 million was Company-initiated and the remainder was related to contracts with the US government.

More detailed information is available in Tables 1 and 2, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region. Information on revenue by distribution channel is not available. Table 3, a comprehensive financial statement, is at the end of this background.

---

## BUSINESS SEGMENT STRATEGIC DIRECTION

### Electronics

The Electronics Division represents defense electronics, telecom, avionics, and Allen-Bradley industrial

automation. The US defense electronics budget is expecting zero to negative real growth over the next several years, thus affecting Rockwell's Electronics Division.

In telecommunications, Rockwell is one of the nation's principal suppliers of transmission systems, switching systems, and line conditioning and line termination equipment to telephone companies. Dataquest estimates that the Company ranks first in the standalone automatic call distributors (ACDs) market, with 57.4 percent share in 1989. During 1989, Rockwell became active in the Far East market for the first time with sales to Nippon Telegraph and Telephone of Japan. Rockwell International is one of the world's leading suppliers of image modems for facsimile machines. Modems are the central focus of the Company's semiconductor product business, which derives 60 percent of its sales internationally, the majority coming from Japan.

In avionics, the Company plans to sustain fleet growth in the large commercial aircraft and regional airline segment of the general aviation market. Rockwell introduced systems for automatic flight control, in-flight monitoring, and maintenance information displays to broaden the existing product range from a base in communications and navigation equipment. According to Rockwell, the Company has gained market share and holds the leading position with about 40 percent of the addressed market.

Allen-Bradley industrial automation showed strong performances from both its expanding lines of industrial automation products and its traditional lines of electromechanical industrial control devices. In 1989, Allen-Bradley began shipping the Pyramid Integrator, which consists of a family of automation products developed in partnership with Digital Equipment Corporation (DEC) and incorporating its MicroVAX computer. Allen-Bradley acquired Creonics, Inc., to broaden its motion control product line. Also, a new joint venture with Hyundai Electronics Industries is manufacturing, selling, and supporting programmable controllers in South Korea.

### Aerospace

Rockwell's Aerospace Division engages in the research, development, and manufacture of military aircraft, manned and unmanned space systems, rocket engines, advanced space-based surveillance systems, and high-energy laser and other directed-energy programs.

Dataquest estimates that Rockwell obtained a 2.5 percent share with \$2.2 billion in revenue in the military aerospace electronic equipment market. The major focus of this division in 1989 was the construction of a new shuttle orbiter (the Endeavour) and its main engines. Rockwell's subsidiary Rocketdyne is under contract with NASA to build the Space Station Freedom's power system. Engines for expendable launch vehicles constitute an increase in the large rocket engine business. The Company is currently producing 28 NAVSTAR Global Positioning System (GPS) satellites. The Company is also competing for design of the National Aero Space Plane (NASP) airframe and for its propulsion system.

### Graphics

The Graphics Division surpassed \$1 billion for the first time in fiscal 1989. This was largely because of the introduction of the Goss Colorliner press and the Headliner Offset T70 press. These two new presses are used in the production of colored newspapers. In an effort to serve the Japanese newspaper press market more effectively, Rockwell purchased from Ikegai

Corporation its 50 percent interest in its former Ikegai-Goss joint venture.

### Automotive

The Automotive Division continued to increase its presence on international markets, from which 44 percent of its sales come. In 1989, Rockwell expanded its heavy vehicle drive-train product line to include a new family of manual transmissions for North American 1990 models. Also introduced in 1989 were clutches for heavy-duty trucks. To add to the Company's strong plastics market presence, Rockwell acquired Butler Polymet, a major supplier of structural thermoplastic composites. This expanded capability supplements the existing sheet molding compound business, which supplies exterior body panels used on nearly 40 percent of the heavy-duty trucks manufactured in North America.

### Further Information

For further information on the Company's business segments, please contact the appropriate Dataquest industry service.

**Table 1**  
**Five-Year Corporate Highlights (Millions of US Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$11,337.6	\$12,295.7	\$12,123.4	\$11,946.3	\$12,518.1
Percent Change	-	8.45	(1.40)	(1.46)	4.79
Capital Expenditure	\$614.4	\$543.6	\$474.1	\$554.8	\$609.0
Percent of Revenue	5.42	4.42	3.91	4.64	4.86
R&D Expenditure	\$1,500.0	\$1,400.0	\$1,400.0	\$1,600.0	\$1,700.0
Percent of Revenue	13.23	11.39	11.55	13.39	13.58
Number of Employees	123,266	121,194	116,148	112,160	108,715
Revenue (\$K)/Employee	\$91.98	\$101.45	\$104.38	\$106.51	\$115.15
Net Income	\$595.3	\$611.2	\$635.1	\$811.9	\$734.9
Percent Change	-	2.67	3.91	27.84	(9.48)
1989 Calendar Year	Q1	Q2	Q3	Q4	
Quarterly Revenue	\$2,869.3	\$3,161.7	\$3,212.1	\$3,275.0	
Quarterly Profit	\$160.0	\$270.7	\$178.1	\$126.1	

Source: Rockwell International Corporation  
 Annual Reports  
 Dataquest (1990)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1985	1986	1987	1988	1989
North America	92.00	89.00	89.00	84.00	85.60
International	8.00	11.00	11.00	16.00	14.4
Europe	5.00	7.00	7.00	10.00	10.20
All Others	1.00	1.00	1.00	3.00	4.20

Source: Rockwell International Corporation  
 Annual Reports

---

## 1989 SALES OFFICE LOCATIONS (Corporate Offices Only)

North America—13  
Europe—2  
Asia/Pacific—2  
Japan—1

---

## MANUFACTURING LOCATIONS

### *North America*

**Autonetics ICBM System Division, Anaheim, California**  
Guidance and control systems

**Autonetics Marine System Division, Anaheim, California**  
Submarine navigation systems

**Autonetics Sensors and Aircraft Division, Anaheim, California**  
Tactical and strategical sensor systems, ground electrical systems

**Collins Defense Communications Division, Santa Ana, California**  
Airplane console radios, radio transmitters, transportable radio systems, defense communications systems

**Collins Defense Communications Division, Cedar Rapids, Iowa**  
Airplane console radios, radio transmitters, transportable radio systems, defense communications systems

**Collins Defense Communications Division, Richardson, Texas**  
Airplane console radios, radio transmitters, transportable radio systems, defense communications systems

**Collins General and Air Transport Aviation Division, Cedar Rapids, Iowa**  
Test equipment/ATE, ground support equipment, cockpit instrumentation

**Collins Government Avionics Division, Cedar Rapids, Iowa**  
Functional ATE, portable/field service ATE, avionics test equipment for military aircraft, cockpit instrumentation

**Electronic Components Division, El Paso, Texas**  
Passive components

**Maine Electronic Group, Lisbon, Maine**  
Connectors/packaging

**Missile Systems Division, Duluth, Georgia**  
Nuclear missiles, missile components

**North American Aircraft Operations, Los Angeles, California**  
Conventional missiles, military aircraft, airframe structures, spacecraft

**Rocketdyne Division, Canoga Park, California**  
Nuclear missiles, nuclear energy components, space stations, engine systems, rocket engines, space shuttle main engines, space power systems

**Rockwell DEL, Inc., Huntington Beach, California**  
EW communications systems, parallel tube transmitters, airborne jamming systems, combat simulation systems, optical collimators, RF environmental generators

**Satellite and Space Electronics Division, Seal Beach, California**  
Spaceborne processors, surveillance satellites, laser radar, space-based laser R&D, signal/data processing equipment for space, satellite transponders, spaceborne receivers, navigation satellites, laser radar, infrared sensors

**Semiconductor Products Division, Newport Beach, California**  
Microcomputers, intelligent display controllers, computer ICs, microprocessors, modem chip sets, data modem modules, image modem modules, secure communications ICs, cell-based ICs

**Space Transportation Systems Division, Downey, California**  
Advanced launch systems, national aerospace planes, space shuttle orbiter, shuttle C, space-based interceptors

**Strategic Defense Center, El Segundo, California**  
EW equipment, defense/government services, design engineering services

---

## SUBSIDIARIES

### *North America*

**Allen-Bradley Company, Inc. (United States)**  
**DataMyte Corporation (United States)**  
**Decision Software Co., Inc. (United States)**  
**Electronics Corp. (United States)**  
**Rocketdyne (United States)**  
**Rockwell Financial Service Corporation (United States)**

Rockwell Graphic Systems, Inc. (United States)  
Rockwell International & Suspension Systems Co.,  
Inc. (United States)  
Rockwell International Finance Corporation (United  
States)  
Rockwell International of Canada Ltd. (Canada)  
Science Center (United States)  
Springs & Stampings (United States)

*Europe*

Rockwell Compagnie Industrielle de Mecanismes,  
S.A. (France)  
Rockwell CVC S.R.L. (Italy)

*ROW*

Rockwell do Brazil Industria e Comercio Ltda.  
(Brazil)

Creonics, Inc.  
Allen-Bradley Group purchased Creonics to  
broaden its motion control product line.

Butler Polymet  
Rockwell International acquired Butler Polymet to  
add to the Company's plastic presence.

*1987*

Valeo of France  
Rockwell acquired Soma Europe Transmissions  
from Valeo of France.

Communications Machinery  
Rockwell acquired Communications Machinery for  
\$40 million.

---

**ALLIANCES, JOINT VENTURES, AND  
LICENSING AGREEMENTS**

*1989*

Hyundai Electronics Industries  
Rockwell and Hyundai agreed to have Hyundai  
manufacture, sell, and support programmable con-  
trollers.

*1988*

Digital Equipment Corporation (DEC)  
DEC licensed Rockwell's Allen-Bradley Division  
to build its VAX computers for use in industrial  
automation systems.

Microelectronics & Computer Corporation  
(MCC)—Research Consortium  
Since 1982, Rockwell has been a member of the  
MCC, a corporate research venture conducting  
R&D in microelectronics and computer technology  
owned by 19 US companies.

---

**MERGERS AND ACQUISITIONS**

*1989*

Baker Perkins Inc.  
Rockwell International acquired the Baker Perkins  
printing machinery business from APV Plc and  
renamed it Rockwell PMC.

---

**KEY OFFICERS**

Donald Beall  
Chairman of the board, chief executive officer

Kent Black  
Executive vice president

Robert A. de Palma  
Senior vice president, chief financial officer

Sam Iacobellis  
Executive vice president

J. Tracy O'Rourke  
Executive vice president

---

**PRINCIPAL INVESTORS**

Information is not available.

---

**FOUNDERS**

Information is not available.



**Table 3**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending September**  
**(Millions of US Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Total Current Assets</b>	\$3,492.7	\$3,837.5	\$4,622.0	\$4,924.8	\$4,366.8
Cash	451.5	756.9	1,103.4	899.7	332.4
Receivables	1,724.9	1,703.2	1,990.1	2,209.0	2,137.2
Inventory	1,240.5	1,300.3	1,451.6	1,526.7	1,574.1
Other Current Assets	75.8	77.1	76.9	289.4	323.1
Investments	\$146.1	\$156.4	0	0	0
Net Property, Plants	\$2,523.8	\$2,620.4	\$2,669.1	\$2,640.4	\$2,594.2
Other Assets	\$1,170.2	\$1,089.1	\$1,448.1	\$1,643.3	\$1,977.8
<b>Total Assets</b>	<b>\$7,332.8</b>	<b>\$7,703.4</b>	<b>\$8,739.2</b>	<b>\$9,208.5</b>	<b>\$8,938.8</b>
<b>Total Current Liabilities</b>	\$3,317.5	\$3,411.4	\$3,992.4	\$3,795.9	\$3,482.2
Long-Term Debt	\$647.5	\$627.4	\$762.6	\$745.3	\$552.1
Other Liabilities	\$419.5	\$502.5	\$670.0	\$974.3	\$926.9
<b>Total Liabilities</b>	<b>\$4,384.5</b>	<b>\$4,541.3</b>	<b>\$5,425.0</b>	<b>\$5,515.5</b>	<b>\$4,961.2</b>
<b>Total Shareholders' Equity</b>	\$2,948.3	\$3,162.1	\$3,314.2	\$3,693.0	\$3,977.6
Converted Preferred Stock	1.6	1.4	2.5	2.3	2.1
Common Stock	155.3	155.3	190.8	200.2	209.5
Class A Common Stock	0	0	88.7	79.4	69.9
Other Equity	(51.8)	(265.0)	(67.4)	(305.1)	(541.0)
Retained Earnings	2,843.2	3,270.4	3,099.6	3,716.2	4,237.1
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$7,332.8</b>	<b>\$7,703.4</b>	<b>\$8,739.2</b>	<b>\$9,208.5</b>	<b>\$8,938.8</b>
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Revenue</b>	\$11,337.6	\$12,295.7	\$12,123.4	\$11,946.3	\$12,518.1
US Revenue	10,381.0	11,115.0	10,798.0	9,986.0	10,310.0
Non-US Revenue	956.6	1,180.7	1,325.4	1,960.3	2,208.1
Cost of Sales	\$9,090.7	\$9,913.0	\$9,560.3	\$9,508.8	\$9,986.2
R&D Expense	\$1,500.0	\$1,400.0	\$1,400.0	\$1,600.0	\$1,700.0
SG&A Expense	\$1,218.3	\$1,318.1	\$1,363.1	\$1,435.4	\$1,472.8
Capital Expense	\$614.4	\$543.6	\$474.1	\$554.8	\$609.0
Pretax Income	\$1,062.5	\$1,058.6	\$1,186.7	\$1,053.0	\$1,205.7
Pretax Margin (%)	9.37	8.61	9.79	8.81	9.63
Effective Tax Rate (%)	44.00	42.30	46.50	22.90	39.00
Net Income	\$595.3	\$611.2	\$635.1	\$811.9	\$734.9
Shares Outstanding, Millions	148.7	148.3	280.0	266.6	255.6
<b>Per Share Data</b>					
Earnings	\$4.00	\$4.12	\$2.27	\$3.04	\$2.87
Dividend	\$1.06	\$1.16	\$0.65	\$0.71	\$0.75
Book Value	\$19.83	\$21.32	\$11.84	\$13.85	\$15.56

**Table 3 (Continued)**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending September**  
**(Millions of US Dollars, except Per Share Data)**

<b>Key Financial Ratios</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<i>Liquidity</i>					
Current (Times)	1.05	1.12	1.16	1.30	1.25
Quick (Times)	0.68	0.74	0.79	0.90	0.80
Fixed Assets/Equity (%)	85.60	82.87	80.54	71.50	65.22
Current Liabilities/Equity (%)	112.52	107.88	120.46	102.79	87.55
Total Liabilities/Equity (%)	148.71	143.62	163.69	149.35	124.73
<i>Profitability (%)</i>					
Return on Assets	-	8.13	7.73	9.05	8.10
Return on Equity	-	20.01	19.61	23.17	19.16
Profit Margin	5.25	4.97	5.24	6.80	5.87
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	13.23	11.39	11.55	13.39	13.58
Capital Spending % of Revenue	5.42	4.42	3.91	4.64	4.86
Employees	123,266	121,194	116,148	112,160	108,715
Revenue (\$K)/Employee	\$91.98	\$101.45	\$104.38	\$106.51	\$115.15
Capital Spending % of Assets	8.38	7.06	5.42	6.02	6.81

Source: Rockwell International Corporation  
Annual Reports  
Dataquest (1990)

# Rockwell MRDC

Rockwell Microelectronics Research and  
Development Center (MRDC)  
3370 Miraloma Avenue  
Anaheim, CA 92803  
(714) 762-4074  
(805) 375-1295 (Newbury Park facility)

Established 1975  
Number of Employees: N/A

## **BACKGROUND**

Rockwell International is a multi-industry corporation engaged in R&D and the manufacture and sale of products for government and commercial markets. It was the prime contractor for the B1 bomber. Its principal space activity is the space shuttle program for NASA.

Rockwell developed the first DOD-sponsored GaAs foundry capability via Defense Advance Research Project Agency and other funding. The cost of the facility was \$16 million. Its production schedule was 100 3-inch wafers per shift per week in 1987 with a total planned capacity of 250 wafers per shift per week. The plant includes LEC crystal production, wafer preparation, device R&D, CAD systems, and complete fab capabilities.

## **COMPANY EXECUTIVES**

- Vice President/Center Director—Dr. Eugene E. Pentecost
- GaAs Facility Director—Jai Haku
- GaAs Programs Manager—Art Cappon

## **STRATEGIC ALLIANCES**

- IBM and Rockwell have a GaAs technology exchange agreement.

## **SERVICES**

The Company operates a full-service GaAs foundry.

# Rockwell MRDC

## **PROCESS TECHNOLOGY**

The Company uses GaAs MESFET and HBT technology.

## **PRODUCTS**

- MMICs
- DigICs, including 15K SRAMs
- 6,000-gate arrays for operational use by DARPA

## **Applications**

- Military electronics
- Aerospace electronics

## **FACILITIES**

Rockwell MRDC's Thousand Oaks, California, facility has 40,700 square feet, including 12,200 square feet of controlled environment.

## Recognition Equipment

P.O. Box 660204  
Dallas, Texas 75266-0204  
Telephone: (214) 579-6000  
Fax: (214) 579-6830  
Dun's Number: 00-734-7628

*Date Founded: 1962*

---

### CORPORATE STRATEGIC DIRECTION

Recognition Equipment designs, manufactures, markets, and services data capture, document scanning, and image-processing systems. These systems include terminal-based keyboard products and fully integrated systems that utilize networks, high-speed paper handling, optical character recognition, and image-processing and management hardware and software.

Since 1985, Recognition Equipment has acquired several organizations engaged in, and the assets relating to, the marketing of terminal-based products. In March 1985 the Company purchased the operating assets of Inforex Inc. and in October 1985 it acquired six European subsidiaries of Mohawk Data Sciences Corp. In December 1987 the Company acquired Mohawk Data Sciences-Canada Ltd., a Canadian company that markets terminal-based products. In January 1988 the Company acquired certain assets of CompuScan Inc. relating to CompuScan's field service operations and a data entry scanning product. These various acquisitions provided additional sales and service personnel and facilities in the United States, Canada, and Europe.

In August 1989 Recognition Equipment purchased certain assets of Plexus Computers Inc., thus providing the Company with image-processing software products and personnel with technical expertise in image-processing technologies. Plexus also sells its software autonomously to OEMs. According to Dataquest, Plexus held 6.2 percent of the worldwide installed base of high-volume document-imaging systems in 1989, even though Plexus stopped shipping systems in 1989.

Total revenue decreased by 1.88 percent to approximately \$255.8 million\* in fiscal 1989 from about

---

\*All dollar amounts are in U.S. dollars.

\$260.7 million in fiscal 1988. Net income of approximately \$9.0 million in fiscal 1988 decreased 513 percent to a net loss of about \$37.2 million in fiscal 1989. Recognition Equipment employs 2,540 people worldwide.

Research and development expenditures totaled \$6.5 million in fiscal 1989, representing about 2.5 percent of revenue.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region and distribution channel. Table 4, a comprehensive financial statement, is at the end of this profile.

---

### BUSINESS SEGMENT STRATEGIC DIRECTION

#### Data Capture Products

Recognition Equipment traditionally has marketed and continues to market various products designed to input data from documents for processing. The technologies utilized by these products include high-speed paper handling, OCR, and local area networking.

Also, Recognition Equipment is engaged in various systems integration activities in both the commercial marketplace and the federal, state, and local government marketplaces. Systems integration involves the combination of various hardware and software products from multiple vendors.

### Document Image-Processing Products

Although Recognition Equipment continues to market data capture products that do not include image-processing capabilities, Recognition's current relationship with Plexus indicates that the Company is expanding its primary focus to the document imaging market. Document image processing is a technological evolution of the Company's traditional data capture products. Document-imaging systems include image scanners, OCR technology, image application development software tools, and image-based work-flow management software. Image scanners are used to digitize information from paper documents. OCR technology automatically converts the digitized images to computer processable data. In addition, the digitized images are used for storage and retrieval of document images. Image application development software tools provide users with the means to implement and maintain their image-processing applications.

### Postal Products

Recognition Equipment's POSTALogic Division designs, manufactures, and markets mail processing systems for commercial businesses and government postal agencies to the commercial mail processing automation market. POSTALogic products include a multifont ZIP code reader subsystem, a multiline OCR subsystem for international postal government agencies, and a Wide Area Postnet bar code reader. A low-cost/high-speed multifont, multiline OCR reader and a multifont post office box reader for incoming mail and lockbox applications have been announced and will be available in 1990.

### Currency Products

Recognition Equipment's Currency Systems Division designs, manufactures, and markets currency processing products. Its Currency Verification, Counting, and Sorting (CVCS) system is a high-speed currency processor that automatically counts currency and determines its denomination, authenticity, and fitness for recirculation. The CVCS system is used by the U.S. Federal Reserve Banks, central banks in other countries, and selected commercial organizations that handle large amounts of currency. The Company is in the process of developing a second generation Advanced Currency Processing System (ACPS). In 1988 the U.S. Federal Reserve awarded the Company a contract to deliver up to 100 ACPS systems and issued an initial delivery order for 26 systems.

### Point-of-Transaction Products

Recognition Equipment's WAND Products Division designs, manufactures, and markets a variety of point-of-transaction products utilizing OCR and bar code technologies. These products include hand-held and stationary devices used in conjunction with point-of-sale cash registers and other electronic financial terminals for inventory control and for reading retail price tags, checks, and deposit slips.

### Further Information

For more information about the Company's business segments, please contact the appropriate industry service. Dataquest tracks Recognition Equipment through its Document Image Management Systems (DIMS) industry service.

**Table 1**  
**Five-Year Corporate Highlights (Thousands of U.S. Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$163,147.0	\$241,795.0	\$264,658.0	\$260,764.0	\$255,874.0
Percent Change	-	48.21	9.46	(1.47)	(1.88)
Capital Expenditure	-	-	-	-	-
Percent of Revenue	-	-	-	-	-
R&D Expenditure	\$9,843.0	\$11,612.0	\$11,642.0	\$8,503.0	\$6,504.0
Percent of Revenue	6.03	4.80	4.40	3.26	2.54
Number of Employees	3,017	2,907	2,918	2,708	2,540
Revenue (\$K)/Employee	\$54.00	\$83.00	\$91.00	\$96.00	\$101.00
Net Income	\$6,516.0	\$14,973.0	\$18,690.0	\$9,015.0	(\$37,265.0)
Percent Change	-	129.79	24.82	(51.77)	(513.37)
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	
Quarterly Revenue	\$64,154.00	\$64,378.00	\$59,462.00	\$67,880.00	
Quarterly Profit	\$186.00	(\$676.00)	(\$3,864.00)	(\$34,449.00)	

Source: Recognition Equipment  
Annual Reports and Forms 10-K  
Dataquest  
1990

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1985	1986	1987	1988	1989
North America	-	-	59.06	51.09	52.32
International	-	-	40.94	48.91	47.68
Japan	-	-	-	-	-
Europe	-	-	40.00	44.00	44.00
Asia/Pacific	-	-	-	-	-
ROW	-	-	0.94	4.91	3.68

Source: Recognition Equipment  
Annual Reports and Forms 10-K  
Dataquest  
1990

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1988	1989
Direct Sales	95.00	96.00
Indirect Sales	5.00	4.00
VARs	-	-
Distributors	5.00	4.00
Dealers	-	-
Mass Merchandisers	-	-
Manufacturers' Representatives	-	-

Source: Dataquest  
1990

---

## 1990 SALES OFFICE LOCATIONS

North America—70  
Europe—70  
Asia/Pacific—5

---

## MANUFACTURING LOCATIONS

### *North America*

Irving, Texas  
Primary manufacturing site for Recognition Equipment's entire product offerings

### *Europe*

St. Augustine, Germany  
Primary manufacturing site for Recognition Equipment's entire product offerings

---

## SUBSIDIARIES

### *North America*

Mohawk Data Sciences Canada Limited (Canada)  
Plexus Software Inc. (United States)  
Recognition Equipment Inc. (United States)

### *Japan*

Recognition Equipment Inc.

### *Europe*

MDS Belgium N.V. (Belgium)  
MDS Deutschland GmbH (Germany)  
MDS Svenska AB (Sweden)  
Plexus Computers Ltd. (England)  
Recognition A.S. (Denmark)  
Recognition Equipment AB (Sweden)  
Recognition Equipment GmbH (Germany)  
Recognition Equipment Ibercia S.A. (Spain)  
Recognition Equipment Italia S.p.A. (Italy)  
Recognition Equipment Ltd. (England)

Recognition Equipment Netherland B.V.  
(Netherlands)

Recognition Equipment Norge A/S (Norway)  
Recognition Equipment OY AB (Finland)  
Recognition Holding Ltd. (England)  
REI-MDS Deutschland GmbH (Germany)

### *Asia/Pacific*

Recognition Equipment Pte. Ltd. (Singapore)  
Recognition Equipment Pty. Ltd. (Australia)  
Recognition Pacific Ltd. (Hong Kong)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

1987

### **TRAQ Technology**

Recognition Equipment and TRAQ Technology entered into a marketing agreement under which TRAQ Technology agreed to market Recognition Equipment's optical character recognition and bar code products.

### **Dataserv**

Recognition Equipment and Dataserv entered into a marketing agreement under which Dataserv agreed to market Recognition Equipment's BEAM Reader bar code scanner.

---

## MERGERS AND ACQUISITIONS

1989

### **Plexus Computer**

Recognition Equipment acquired Plexus Computers, an image-processing software company. Plexus Computers was renamed Plexus Software and will operate as a subsidiary.

1988

### **Mohawk Data Sciences**

Recognition Equipment acquired Mohawk Data Sciences, a data capture equipment company, for \$10.3 million and 200,000 shares of Recognition's common stock.



**CompuScan**  
Recognition Equipment acquired CompuScan's  
forms reader operation for \$4.1 million.

---

**Thomas A. Loose**  
Senior vice president

**Dwayne L. McAfee**  
Senior vice president

---

**KEY OFFICERS**

**Thomas Hurley**  
Co-chief executive officer

**Robert Vanourek**  
Co-chief executive officer

**Israel Sheinberg**  
Executive vice president

**PRINCIPAL INVESTORS**

Prospect Group Inc.—14.08 percent  
Bankers Trust Co.—8.97 percent  
Dimensional Fund Advisors Inc.—6.31 percent

**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending October**  
**(Thousands of U.S. Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Total Current Assets</b>	\$125,508.0	\$162,075.0	\$176,943.0	\$149,191.0	\$152,430.0
Cash	6,213.0	13,084.0	10,331.0	41,845.0	33,736.0
Receivables	53,661.0	61,564.0	70,518.0	70,591.0	51,530.0
Marketable Securities	6,435.0	21,227.0	17,767.0	-	-
Inventory	55,097.0	63,909.0	73,424.0	31,875.0	42,254.0
Other Current Assets	4,102.0	2,291.0	4,903.0	4,880.0	24,910.0
<b>Net Property, Plants</b>	\$42,192.0	\$42,464.0	\$46,698.0	\$25,202.0	\$23,483.0
<b>Other Assets</b>	\$27,995.0	\$27,085.0	\$33,962.0	\$86,354.0	\$63,657.0
<b>Total Assets</b>	<b>\$195,695.0</b>	<b>\$231,624.0</b>	<b>\$257,603.0</b>	<b>\$260,747.0</b>	<b>\$239,570.0</b>
<b>Total Current Liabilities</b>	\$50,336.0	\$56,832.0	\$59,895.0	\$88,642.0	\$93,737.0
<b>Long-Term Debt</b>	\$42,322.0	\$55,179.0	\$59,118.0	\$57,607.0	\$61,833.0
<b>Other Liabilities</b>	\$4,230.0	\$3,731.0	\$4,692.0	\$3,263.0	\$11,442.0
<b>Total Liabilities</b>	<b>\$96,888.0</b>	<b>\$115,742.0</b>	<b>\$123,705.0</b>	<b>\$149,512.0</b>	<b>\$167,012.0</b>
<b>Total Shareholders' Equity</b>	\$98,807.0	\$115,882.0	\$133,898.0	\$111,235.0	\$72,558.0
Converted Preferred Stock	-	-	-	-	-
Common Stock	2,442.0	2,478.0	2,556.0	2,557.0	2,562.0
Other Equity	90,909.0	97,409.0	101,533.0	94,565.0	94,686.0
Retained Earnings	5,456.0	15,995.0	29,809.0	14,113.0	(24,690.0)
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$195,695.0</b>	<b>\$231,624.0</b>	<b>\$257,603.0</b>	<b>\$260,747.0</b>	<b>\$239,570.0</b>
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Revenue</b>	\$163,147.0	\$241,795.0	\$264,658.0	\$260,764.0	\$255,874.0
U.S. Revenue	-	-	156,314.0	133,230.0	133,875.0
Non-U.S. Revenue	-	-	108,344.0	127,534.0	121,999.0
<b>Cost of Sales</b>	\$101,316.0	\$146,143.0	\$152,815.0	\$167,975.0	\$183,095.0
<b>R&amp;D Expense</b>	\$9,843.0	\$11,612.0	\$11,642.0	\$8,503.0	\$6,504.0
<b>SG&amp;A Expense</b>	\$40,973.0	\$65,804.0	\$76,650.0	\$82,333.0	\$81,225.0
<b>Capital Expense</b>	-	-	-	-	-
<b>Pretax Income</b>	\$6,516.0	\$14,973.0	\$18,690.0	\$9,015.0	(\$37,265.0)
<b>Pretax Margin (%)</b>	3.99	6.19	7.06	3.46	(14.56)
<b>Effective Tax Rate (%)</b>	-	-	-	-	-
<b>Net Income</b>	\$6,516.0	\$14,973.0	\$18,690.0	\$9,015.0	(\$37,265.0)
<b>Shares Outstanding, Millions</b>	9.7	9.9	10.4	10.1	10.3
<b>Per Share Data</b>					
Earnings	\$0.44	\$1.06	\$1.33	(\$1.55)	(\$3.78)
Dividends	-	-	-	-	-
Book Value	\$10.19	\$11.71	\$12.87	\$11.01	\$7.04

Table 4 (Continued)  
 Comprehensive Financial Statement  
 Fiscal Year Ending October  
 (Thousands of U.S. Dollars, except Per Share Data)

Key Financial Ratios	1985	1986	1987	1988	1989
<i>Liquidity</i>					
Current (Times)	2.49	2.85	2.95	1.68	1.63
Quick (Times)	1.40	1.73	1.73	1.32	1.18
Fixed Assets/Equity (%)	42.70	36.64	34.88	22.66	32.36
Current Liabilities/Equity (%)	50.94	49.04	44.73	79.69	129.19
Total Liabilities/Equity (%)	98.06	99.88	92.39	134.41	230.18
<i>Profitability (%)</i>					
Return on Assets	-	7.01	7.64	3.48	(14.90)
Return on Equity	-	13.95	14.97	7.36	(40.55)
Profit Margin	3.99	6.19	7.06	3.46	(14.56)
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	6.03	4.80	4.40	3.26	2.54
Capital Spending % of Revenue	-	-	-	-	-
Employees	3,017	2,907	2,918	2,708	2,540
Revenue (\$K)/Employee	\$54.00	\$83.00	\$91.00	\$96.00	\$101.00
Capital Spending % of Assets	-	-	-	-	-

Source: Recognition Equipment  
 Annual Reports and Forms 10-K  
 Dataquest 1990

## Ricoh Company, Ltd.

15-5, Minami-Aoyama 1-chome  
Minato-ku, Tokyo 107, Japan

Telephone: (03) 479-3111

Fax: (03) 403-1578

Dun's Number: 10-277-1235

*Date Founded: February 1936*

---

### CORPORATE STRATEGIC DIRECTION

Ricoh Company, Ltd., founded in 1936 by Kiyoshi Ichimura, has an estimated revenue of ¥729.4 billion (US\$5.7 billion) for the fiscal year ending March 1989. The Company has four major lines of business: copiers and related supplies, facsimile equipment, data processing systems, and other products (cameras, lenses, integrated circuits and other electronic devices, educational machines, measuring devices, and thermal paper). Copiers and related supplies represented 55.0 percent of net sales for the fiscal year ending March 1989; facsimile equipment, 15.2 percent; data processing systems, 15.4 percent; and other products, 14.4 percent.

Ricoh entered the business machine market by introducing a diazo copier in 1955. The Company introduced a plain paper copier in 1972, facsimile machines in 1974, text and graphic-image editing systems and ink jet printers in 1980, and laser printers in 1983.

The Japan-based Company is not a member of any larger industrial group. Ricoh is organized along product and regional lines, with centralized manufacturing and marketing organizations in North America and Europe as well as in Japan. The Company is convinced that the creation of independent overseas operations to plan, procure, manufacture, and market its products locally is the key to long-term international success. Ricoh also intends to increase product development and continue diversifying its product lines with the development of new R&D facilities.

Ricoh's estimated revenue for the fiscal year ending March 1990 was ¥810 billion (US\$5.7 billion). Ricoh reported total revenue of ¥729.4 billion (US\$5.7 billion) in the fiscal year ending March 1989, an increase of 8.2 percent over the fiscal year ending March 1988 figure of ¥674.2 billion (US\$4.9 billion).

(Percentage changes refer only to ¥ amounts; US\$ percentage changes will differ because of fluctuations in Dataquest exchange rates.) This increase can be attributed largely to the 21.0 percent increase in sales of other products for fiscal 1989, reflecting strong demand for the Company's electronic devices. Sales in Japan rose 10.0 percent to ¥461 billion (US\$3.6 billion) while sales in North America and Europe rose 2.7 percent and 8.3 percent, respectively. Ricoh's estimated net income for the fiscal year ending March 1990 was ¥20 billion (US\$140.4 million). The Company's net income rose 4.1 percent to ¥17.8 billion (US\$138.8 million) in 1989 from ¥17.1 billion (US\$123.9 million) in fiscal 1988.

The Company's estimated capital expenditure for the fiscal year ending March 1990 was ¥46.8 billion (US\$328.5 million), representing 5.8 percent of total revenue. Capital expenditure totaled ¥59.3 billion (US\$462 million) for fiscal 1989, representing 8.13 percent of revenue. This is an increase of nearly 72.0 percent over the fiscal 1988 figure of ¥34.5 billion (US\$177.5 million). This increase was due primarily to Ricoh's expanding manufacturing into Europe and North America. Ricoh also built or modified three manufacturing plants in Japan to increase production capacity of printed circuit boards, copiers, laser printers, and electronic devices.

Ricoh's estimated research and development expenditure for the fiscal year ending March 1990 was ¥52.3 billion (US\$367.1 million), representing 6.5 percent of revenue. Research and development expenditure totaled ¥46.5 billion (US\$362.5 million) for fiscal 1989, representing 6.4 percent of total revenue. This is an increase of 8.4 percent over the fiscal 1988 figure of ¥42.9 billion (US\$310.8 million).

Most of Ricoh's products are marketed under the Ricoh brand name, but the Company also produces

components and finished goods for OEMs including Savin and Pitney Bowes. Ricoh has major subsidiaries in Europe and the United States. These subsidiaries manufacture copiers and facsimiles and sell them and other Ricoh products into their local markets. Ricoh's Taiwanese subsidiary manufactures cameras for worldwide sale, and its Korean subsidiary manufactures copiers and facsimile machines.

Ricoh employed approximately 12,700 people in fiscal 1989.

More detailed information is available in Tables 1 and 2, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region. Information on revenue by distribution channel is not available. Tables 3 and 4, comprehensive financial statements, are at the end of this profile.

---

## BUSINESS SEGMENT STRATEGIC DIRECTION

### Copiers

According to Ricoh, the sale of copiers and copier-related products generated approximately ¥401.1 billion (US\$3.13 billion) or 47.0 percent of total revenue in fiscal 1989. Dataquest estimates that Ricoh held 5.7 percent of the US copier market, ranking fifth in the market. Ricoh has 300 dealers with two branch offices in the United States and uses such alternate channels as manufacturers' representatives, distributors, wholesalers, and retailers to distribute its products. Dataquest believes that Ricoh can increase its market share by expanding its product offerings and services. As products are becoming more similar, vendors can differentiate themselves from their competitors through after-sales support. In addition, because of improved product design, more low-end copier users are doing their own maintenance, and alternate channels are increasing in popularity. Dataquest estimates that 16 percent of placements will go through alternate channels by 1994. Dataquest ranks Ricoh third in the worldwide plain paper copier market, with 14 percent of market share.

Ricoh released the FT9100 in Japan during the first quarter of 1989. The FT9100 is able to throughput 101 A4 copies per minute. Also released were the FW7120D, Ricoh's first digital copier for technical drawings. Internationally, Ricoh's best-performing products were the FT4480 desktop model, the

FT6620 high-speed model, and the FT2260 compact copier with zoom functions. Also introduced in 1989 were the FT2220, FT4400, FT4460, FT4490, FT5540, FT5570, FT 7770, and the LR-2.

Ricoh released the NC-100 in April 1990. The NC-100 is a xerographic full-color copier that also provides full-featured black-and-white capabilities. The Company also demonstrated a full-color copier prototype called the AGX-1, developed in a joint venture with Polaroid Corporation. The AGX-1 uses photographic technology similar to that used in Polaroid cameras.

### Facsimiles

Facsimile equipment sales rose by 7.0 percent in fiscal 1989 to ¥111 billion (US\$865.5 million), with overseas sales increasing by 20.9 percent to ¥65 billion (US\$506.8 million). Revenue generated by the sale of facsimile machines represents 15.2 percent of total revenue. Ricoh introduced the Rifax 2000 series, a family of compact plain paper laser facsimile machines, as well as the L series of speaking facsimile machines in 1989. Ricoh also introduced the Rifax 7200S plain paper facsimile machine that has provisions for incorporating a bar-code scanner. The Rifax D7000 and the Rifax T80 were introduced in the fall of 1989. To help reduce its reliance on exports and therefore ensure steady, long-term growth, Ricoh has stepped up production of facsimiles overseas through such subsidiaries as Ricoh Electronics, Inc., in the United States and Ricoh Industrie France S.A.

According to Dataquest, Ricoh ranked fifth, with 7.9 percent share of the facsimile market in the United States and sales of 118.6 million machines in calendar 1989. In the plain paper facsimile market, Ricoh ranked third in United States in 1989. Dataquest ranks Ricoh sixth in the United Kingdom, with 11.6 million units shipped and 5.6 percent of the market in fiscal 1989. Ricoh ranked first in the Japanese market in calendar 1989, with 20.3 percent share, according to Nikkei, Sangyo Shimbun, a source of information in Japan.

### Computer Storage

Ricoh competes in two of the six Dataquest segments of the worldwide computer storage market. Ricoh ranks first through Maxoptix Corporation, a joint venture with Maxtor, in the 5.25-inch write-once read-many (WORM) market, with a 36 percent market share. Dataquest estimates that Maxoptix shipped

7,500 units, contributing ¥1.24 billion (US\$9.7 million) to total revenue.

Ricoh/Olympus ranks second behind Sony in the rewritable disk drives worldwide market, with an 18 percent share in fiscal 1989. Dataquest estimates that Ricoh shipped 6,000 units, which contributed ¥1.5 billion (US\$11.7 million) to revenue in fiscal 1989. The computer storage segment of Ricoh's business contributes a total of ¥2.74 billion (US\$21 million), or less than 1 percent of the Company's total revenue.

### Semiconductors

Dataquest estimates that Ricoh generated ¥12.6 billion (US\$91 million) in semiconductor revenue for fiscal 1989, a 7 percent increase over fiscal 1988. This revenue represents nearly 2 percent of Ricoh's total revenue generated in fiscal 1989. Ricoh's largest single market is Japan, which contributes ¥12.1 billion (US\$88 million) in semiconductor revenue, representing 96 percent of the Company's semiconductor revenue. In Japan, Ricoh ranks 23rd and controls less than 1 percent of the market.

Ricoh produces a variety of NMOS, PMOS, CMOS, and BiCMOS memory, microdevices, and logic chips. Dataquest estimates that Ricoh generated ¥4.9 billion (US\$38 million) in MOS logic chips, ¥3.9 billion (US\$31 million) in MOS memory, and ¥2.8 billion (US\$22 million) in MOS microdevices in fiscal 1989. A majority of the Company's semiconductors use CMOS technology.

### Information Systems

Ricoh continued its aggressive expansion into domestic information systems, selling Hitachi Ltd. PCs and IBM System/55s and System/36s on an OEM basis. Ricoh also acts as a sales agent for NEC Corp. selling its office computers. These OEM policies resulted in

office and personal computer sales of ¥17.4 billion (US\$126 million) and ¥22.3 billion (US\$161.5 million), respectively. Profit remained at a low of 4 percent, largely because Ricoh does not sell its own hardware. Ricoh's use of OEM equipment has made it difficult for the Company to continue its efforts to expand its information systems business overseas because of difficulty in maintaining after-sales maintenance and software compatibility problems.

### Personal Computers

Ricoh produces and markets personal computers. The best selling Ricoh computer is the MR. MyTool II/III, with an estimated 40,000 units sold worldwide in 1989. The Company entered the desktop publishing market with the Riport Star 9000 in 1989.

### Printers

Ricoh produces a line of printers and laser printers, including the PC Laser 6000/PS (1060-SP3 in Japan). Other Ricoh printers include the LP-4400 and LP 5400 introduced in 1985. Dataquest estimates that Ricoh had approximately 2 to 4 percent of the US market page printer in 1989.

Revenue from computer storage devices, semiconductors, personal computers, and printers is included in the data processing systems figure of approximately ¥110.8 billion (US\$863.9 million), which represented 15.4 percent of total revenue for fiscal 1989.

### Further Information

For further information about the Company's business segments, please contact the appropriate Dataquest industry service.

**Table 1**  
**Five-Year Corporate Highlights (Billions of US Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$2.2	\$2.7	\$3.7	\$4.9	\$5.7
Percent Change	-	19.82	38.32	31.56	16.44
Capital Expenditure	\$0.2	\$0.2	\$0.2	\$0.2	\$0.5
Percent of Revenue	9.24	8.13	4.20	5.12	8.13
R&D Expenditure	\$0.1	\$0.2	\$0.2	\$0.3	\$0.4
Percent of Revenue	5.35	6.10	6.16	6.36	6.38
Number of Employees	25,000	26,500	28,000	33,000	12,700
Revenue (\$K)/Employee	\$0.09	\$0.10	\$0.13	\$0.15	\$0.45
Net Income	\$0.1	\$0.1	\$0.1	\$0.1	\$0.1
Percent Change	-	1.54	(2.48)	81.35	12.03
Exchange Rate: US\$1=¥	¥243.51	¥221.26	¥159.56	¥138.03	¥128.25
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	
Quarterly Revenue	NA	NA	NA	NA	
Quarterly Profit	NA	NA	NA	NA	

NA = Not available

Source: Ricoh Company, Ltd.  
Annual Reports  
Dataquest (1990)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1985	1986	1987	1988	1989
Japan	61.00	60.00	66.00	62.00	63.00
International	39.00	40.00	34.00	38.00	37.00
North America	27.00	25.00	20.00	22.00	21.00
Europe	8.00	10.00	10.00	11.00	11.00
All Others	4.00	5.00	4.00	5.00	5.00

Source: Ricoh Company, Ltd.  
Annual Reports  
Dataquest (1990)

---

## 1989 SALES OFFICE LOCATIONS

North America—3  
 Europe—4  
 Asia/Pacific—14

---

## MANUFACTURING LOCATIONS

### *North America*

Ricoh Corp.  
 Facsimiles and R&D of OA equipment  
 Ricoh Electronics  
 Copiers, facsimiles, toners

A new manufacturing site will be completed in 1990 in Lawrenceville, Georgia, which will produce copier supplies.

### *Europe*

Ricoh Industries (France)  
 Copiers, facsimiles, supplies  
 Ricoh UK Products (United Kingdom)  
 Copiers, facsimiles, toners

### *Asia/Pacific*

AT&T Ricoh (Japan)  
 Key telephone sets, office automation (OA) equipment and peripherals  
 Hasama Ricoh (Japan)  
 Copier parts, photographic equipment  
 Ricoh Denshi (Japan)  
 Data processing equipment  
 Ricoh Elemex (Japan)  
 Watches, OA equipment, copier parts, FDDs, measuring instruments, semiconductor  
 Ricoh Keiki (Japan)  
 Copier parts, data processing equipment  
 Ricoh Microelectronics (Japan)  
 Printed circuit boards  
 Ricoh Optical Industries (Japan)  
 Photographic equipment  
 Ricoh Research Institute of General Electronics (Japan)  
 R&D of materials, applied electronics technologies  
 Ricoh Tokki (Japan)  
 Facsimiles, copiers, microfilm equipment  
 Sindo Ricoh, South Korea (Korea)  
 Copiers, facsimiles

Taiwan-Ricoh (Taiwan)  
 Cameras, photographic equipment  
 Tohoku Ricoh (Japan)  
 Offset printing equipment, stencil duplicators, educational equipment, printers, copier parts

---

## SUBSIDIARIES

### *North America*

Ricoh Corporation (Canada), Ltd. (Canada)  
 Ricoh Corporation (United States)  
 Ricoh Development of California, Inc. (United States)  
 Ricoh Electronics, Inc. (United States)  
 Ricoh Finance Corporation (United States)  
 Ricoh Thermal Systems, Inc. (United States)

### *Europe*

Ricoh Deutschland GmbH (West Germany)  
 Ricoh Europe B.V. (Netherlands)  
 Ricoh France S.A. (France)  
 Ricoh Industries France S.A. (France)  
 Ricoh UK Ltd. (United Kingdom)  
 Ricoh UK Products Ltd. (United Kingdom)  
 Saitama Ricoh Co., Ltd.

### *Asia/Pacific*

Aichi Ricoh Co., Ltd. (Japan)  
 Daiichi Ricoh Co., Ltd. (Japan)  
 Fukuoka Ricoh Co., Ltd. (Japan)  
 Hasama Ricoh Co., Ltd. (Japan)  
 Hokkaido Ricoh Co., Ltd. (Japan)  
 Hyogo Ricoh Co., Ltd. (Japan)  
 Kanagawa Ricoh Co., Ltd. (Japan)  
 Kinki Ricoh Co., Ltd. (Japan)  
 Miyagi Ricoh Co., Ltd. (Japan)  
 Nihon Business Supply Co., Ltd. (Japan)  
 Ricoh Denshi Co., Ltd. (Japan)  
 Ricoh Educational Equipment Co., Ltd. (Japan)  
 Ricoh Information System Co., Ltd. (Japan)  
 Ricoh Keiki Co., Ltd. (Japan)  
 Ricoh Microelectronics Co., Ltd. (Japan)  
 Ricoh Office System Co., Ltd. (Japan)  
 Ricoh Optical Industries Co., Ltd. (Japan)  
 Ricoh Research Institute of General Electronics Co., Ltd. (Japan)  
 Ricoh Tecnonet Co., Ltd. (Japan)  
 Ricoh Tokki Co., Ltd. (Japan)  
 Taiwan-Ricoh (Korea)  
 Taiwan-Ricoh Co. (Taiwan)  
 Tohoku Ricoh Co., Ltd. (Japan)  
 Tokyo Ricoh Co., Ltd. (Japan)



---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

1990

### Tokyo Computer Service Co., Ltd., and Computron

Ricoh, Tokyo Computer, and Computron will jointly establish a computer software development firm that will produce software for office computers and mainframes made by IBM Corporation.

### IBM Japan, Ltd.

Ricoh and IBM Japan will establish Rios Systems Co., Ltd., a joint venture company. The new company will develop office systems, which will include computers and other office equipment. IBM Japan also will supply the AS/400 Model C to Ricoh, which will begin to ship the computer products as the Ricoh I-Series Model 740 computer.

1989

### International Chip Corporation

Ricoh and International Chip have developed the Knowledge-Based Silicon Compiler (KBSC), a CAD tool that automates the chip-development process from the logic synthesis level.

### IBM Corp.

Ricoh began marketing the Ricoh PS-Series Model 5530-T, a 32-bit PC made by IBM.

### Caere Corporation

Ricoh is to OEM Caere's Omnipage page-recognition software for sale with its 286 and 386 PCs.

September 1988

### Olympus Optical

The companies agreed to jointly develop, produce, and market erasable optical disk drives.

April 1988

### Canon

The companies agreed to exchange each other's plain-paper copiers on an OEM basis.

March 1988

### IBM Japan

The companies agreed to market the System/55 and System/36 small business computers in Japan. Ricoh acquired a production plant in Tustin, California, which began operations in mid-1988.

February 1987

### Advanced Silicon

Ricoh signed a five-year contract under which Ricoh will fabricate Advanced Silicon's custom ICs.

1982

### Pitney Bowes

Ricoh and Pitney Bowes entered into an OEM agreement whereby Pitney Bowes will sell copiers manufactured by Ricoh.

1973

### Savin Corporation

Ricoh and Savin entered into an OEM agreement whereby Savin will sell copiers manufactured by Ricoh.

---

## KEY OFFICERS

Hiroshi Hamada  
President

Kenji Hiruma  
Executive vice president

Hisashi Kubo  
Executive vice president

Morio Onoe  
Executive vice president

---

## PRINCIPAL INVESTORS

Nippon Life—6.0 percent  
Sumitomo Trust—4.5 percent  
Asahi Mutual Life Insurance—3.3 percent  
Fuji Bank—2.8 percent  
Tokai Bank—2.8 percent  
Toho Mutual Life Insurance—2.9 percent  
Mitsubishi Bank—3.7 percent  
Koa Fire & Marine Insurance—3.1 percent  
Non-Japanese ownership—4.0 percent

**Table 3**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending March 31**  
**(Billions of US Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Total Current Assets</b>	\$1.5	\$1.5	\$2.4	\$3.2	\$3.8
Cash	0.3	0.3	0.7	1.0	1.1
Receivables	0.5	0.6	0.8	1.1	1.3
Marketable Securities	0.2	0.2	0.3	0.3	0.4
Inventory	0.3	0.4	0.5	0.7	0.8
Other Current Assets	0.1	0.1	0.1	0.1	0.2
Net Property, Plants	\$0.5	\$0.6	\$0.8	\$0.9	\$1.3
Investments, Other Assets	\$0.2	\$0.2	\$0.4	\$0.5	\$0.6
<b>Total Assets</b>	<b>\$2.1</b>	<b>\$2.4</b>	<b>\$3.5</b>	<b>\$4.6</b>	<b>\$5.7</b>
<b>Total Current Liabilities</b>	\$0.9	\$1.0	\$1.5	\$2.1	\$2.5
Long-Term Debt	\$0.3	\$0.4	\$0.6	\$0.3	\$0.6
Other Liabilities	\$0.1	\$0.1	\$0.1	\$0.1	\$0.1
<b>Total Liabilities</b>	<b>\$1.3</b>	<b>\$1.4</b>	<b>\$2.2</b>	<b>\$2.5</b>	<b>\$3.2</b>
<b>Total Shareholders' Equity</b>	\$0.8	\$0.9	\$1.3	\$2.1	\$2.5
Common Stock	0.1	0.1	0.2	0.5	0.6
Other Equity	0.3	0.3	0.4	0.7	0.9
Retained Earnings	0.4	0.5	0.7	0.9	1.1
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$2.1</b>	<b>\$2.4</b>	<b>\$3.5</b>	<b>\$4.6</b>	<b>\$5.7</b>
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Revenue</b>	\$2.2	\$2.7	\$3.7	\$4.9	\$5.7
US Revenue	1.4	1.6	2.4	3.0	3.6
Non-US Revenue	0.9	1.1	1.3	1.9	2.1
Cost of Sales	\$1.4	\$1.7	\$2.4	\$3.1	\$3.6
R&D Expense	\$0.1	\$0.2	\$0.2	\$0.3	\$0.4
SG&A Expense	\$0.7	\$0.8	\$1.1	\$1.5	\$1.8
Capital Expense	\$0.2	\$0.2	\$0.2	\$0.2	\$0.5
Pretax Income	\$0.1	\$0.1	\$0.2	\$0.3	\$0.3
Pretax Margin (%)	6.64	5.24	4.25	5.21	5.05
Effective Tax Rate (%)	57.80	60.90	66.20	61.00	63.00
Net Income	\$0.1	\$0.1	\$0.1	\$0.1	\$0.1
Shares Outstanding, Millions	406.6	413.1	452.3	581.5	599.7
<b>Per Share Data</b>					
Earnings	\$0.15	\$0.15	\$0.15	\$0.21	\$0.22
Dividend	\$0.04	\$0.05	\$0.06	\$0.07	\$0.08
Book Value	0	0	0	0	0
Exchange Rate: US\$1 = ¥	¥243.51	¥221.26	¥159.56	¥138.03	¥128.25

Source: Ricoh Company, Ltd.  
Annual Reports  
Dataquest (1990)

Table 4  
Comprehensive Financial Statement  
Fiscal Year Ending March 31  
(Billions of Yen, except Per Share Data)

Balance Sheet	1985*	1986	1987	1988	1989
Total Current Assets	¥354.0	¥341.7	¥382.1	¥446.1	¥488.0
Cash	83.5	68.9	110.0	138.0	145.6
Receivables	124.8	128.3	133.1	149.5	170.3
Marketable Securities	48.0	45.2	46.3	48.2	46.4
Inventory	82.7	83.2	76.3	90.7	106.3
Other Current Assets	15.0	16.1	16.4	19.7	19.4
Net Property, Plants	¥119.8	¥131.9	¥124.6	¥129.6	¥165.8
Investments, Other Assets	¥38.7	¥47.0	¥56.0	¥64.8	¥76.4
Total Assets	¥512.5	¥520.6	¥562.7	¥640.5	¥730.2
Total Current Liabilities	¥230.7	¥216.2	¥237.4	¥286.8	¥319.9
Long-Term Debt	¥73.8	¥83.1	¥97.1	¥46.5	¥73.1
Other Liabilities	¥15.8	¥15.0	¥15.1	¥15.7	¥16.6
Total Liabilities	¥320.3	¥314.3	¥349.6	¥349.0	¥409.6
Total Shareholders' Equity	¥192.2	¥206.3	¥213.1	¥291.5	¥320.6
Common Stock	26.8	28.5	29.2	63.1	70.6
Other Equity	68.3	69.8	69.5	102.1	112.4
Retained Earnings	97.1	108.0	114.4	126.3	137.6
Total Liabilities and Shareholders' Equity	¥512.5	¥520.6	¥562.7	¥640.5	¥730.2
<b>Income Statement</b>	<b>1985*</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Revenue	¥545.5	¥593.9	¥592.4	¥674.2	¥729.4
US Revenue	332.2	358.5	389.5	418.8	460.8
Non-US Revenue	213.3	235.4	202.9	255.4	268.6
Cost of Sales	¥348.5	¥378.2	¥381.0	¥426.5	¥463.9
R&D Expense	¥29.2	¥36.2	¥36.5	¥42.9	¥46.5
SG&A Expense	¥163.3	¥184.0	¥183.0	¥207.3	¥231.0
Capital Expense	¥50.4	¥48.3	¥24.9	¥34.5	¥59.3
Pretax Income	¥36.2	¥31.1	¥25.2	¥35.1	¥36.8
Pretax Margin (%)	6.64	5.24	4.25	5.21	5.05
Effective Tax Rate (%)	57.80	60.90	66.20	61.00	63.00
Net Income	¥16.8	¥15.5	¥10.9	¥17.1	¥17.8
Shares Outstanding, Millions	406.6	413.1	452.3	581.5	599.7
<b>Per Share Data</b>					
Earnings	¥37.14	¥33.93	¥24.09	¥29.48	¥28.04
Dividend	¥10.00	¥10.00	¥10.00	¥10.00	¥10.00
Book Value	¥0.47	¥0.50	¥0.47	¥0.11	¥0.12

Table 4 (Continued)  
 Comprehensive Financial Statement  
 Fiscal Year Ending March 31  
 (Billions of Yen, except Per Share Data)

Key Financial Ratios	1985*	1986	1987	1988	1989
<i>Liquidity</i>					
Current (Times)	1.53	1.58	1.61	1.56	1.53
Quick (Times)	1.18	1.20	1.29	1.24	1.19
Fixed Assets/Equity (%)	62.33	63.94	58.47	44.46	51.72
Current Liabilities/Equity (%)	120.03	104.80	111.40	98.39	99.78
Total Liabilities/Equity (%)	166.65	152.35	164.05	119.73	127.76
<i>Profitability (%)</i>					
Return on Assets	-	3.00	2.01	2.84	2.60
Return on Equity	-	7.78	5.20	12.38	9.83
Profit Margin	3.08	2.61	1.84	2.54	2.44
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	5.35	6.10	6.16	6.36	6.38
Capital Spending % of Revenue	9.24	8.13	4.20	5.12	8.13
Employees	25,000	26,500	28,000	33,000	12,700
Revenue (¥K)/Employee	¥21.82	¥22.41	¥21.16	¥20.43	¥57.43
Capital Spending % of Assets	9.83	9.28	4.43	5.39	8.12
Exchange Rate: US\$1=¥	¥243.51	¥221.26	¥159.56	¥138.03	¥128.25

\*Fiscal 1985 has been translated at the rate of ¥259 to US\$1.

Source: Ricoh Company, Ltd.  
 Annual Reports  
 Dataquest (1990)

## Ricoh Company, Ltd.

15-5, Minami-Aoyama 1-chome  
Minato-ku, Tokyo 107, Japan

Telephone: (03) 479-3111

Fax: (03) 403-1578

Dun's Number: 10-277-1235

*Date Founded: February 1936*

---

### CORPORATE STRATEGIC DIRECTION

Ricoh Company, Ltd., founded in 1936 by Kiyoshi Ichimura, is a \$5.4 billion\* manufacturer of cameras, office equipment, related supplies, and electronic devices. Ricoh produced its first cameras in 1938. In 1950, it marketed the Ricoh-Flex twin-lens reflecting camera, which is credited with triggering the postwar camera boom. Ricoh entered the business machine market by introducing a diazo copier in 1955. The Company introduced a plain paper copier in 1972, facsimile machines in 1974, text/graphic-image editing systems and ink jet printers in 1980, and laser beam printers in 1983.

As a Japanese-based company, globalization of operations is top priority for Ricoh in order to fulfill its obligations as an international corporate citizen. By adding new plants abroad, Ricoh intends to increase production capacity while reducing production costs. Ricoh also intends to increase product development and continue diversifying its product lines with the development of new R&D facilities.

Ricoh is not a member of any larger industrial group. The Company is organized along product and regional lines, with centralized North American and European manufacturing and marketing organizations.

The Company has four major lines of business: copiers and related supplies, facsimile equipment, data processing systems, and other products (cameras, lenses, integrated circuits and other electronic devices, educational machines, measuring devices, and thermal paper). Copiers and related supplies represented 55.5 percent of net sales for fiscal 1988;

facsimile equipment, 15.3 percent; data processing systems, 16.3 percent; and other products, 12.9 percent.

Ricoh reported total revenue of \$5.4 billion in fiscal 1988, an increase of 33 percent over fiscal 1987. Net income rose 82 percent to \$136.1 million for the same period.

Capital expenditures totaled \$288.2 million for fiscal period 1988, or 5 percent of revenue. Ricoh spent \$342.1 million on R&D during fiscal 1988, representing 6 percent of revenue.

Most of Ricoh's products are marketed under the Ricoh brand name, but the Company also produces components and finished goods for OEMs. Ricoh has major subsidiaries in Europe and the United States. These subsidiaries manufacture copiers and facsimiles and sell them and other Ricoh products into their local markets. Ricoh's Taiwanese subsidiary manufactures cameras for worldwide sale, and its Korean subsidiary manufactures copiers and facsimile machines. Twenty percent of the products manufactured in the United States are exported to Japan and Europe.

Ricoh's worldwide work force for fiscal 1988 was 33,000.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region and distribution channel. Table 4, a comprehensive financial statement, is at the end of this profile.

\*All dollar amounts are in U.S. dollars.

---

## BUSINESS SEGMENT STRATEGIC DIRECTION

### Copiers

The copier market is in its mature stage, with an expected growth rate of only 5.0 percent per year. Dataquest estimates that Ricoh held 6.4 percent of the copier market in 1988, behind Canon and Sharp with 24.0 and 14.2 percent, respectively. Dataquest believes that Ricoh can increase its market share by expanding its product offerings and by concentrating on the personal copier market, which is expected to grow. Ricoh competes in six of the seven Dataquest copier segments.

Ricoh announced the Artage 5330 full-color copier in Japan on December 20, 1988. This copier is designed to work in either full-color or black-only modes. Its success in the decentralized area will depend upon its convenience copier capabilities.

Ricoh announced its newest console copier, the FT-9100, in the beginning of 1989. The FT-9100 is able to throughput 101 A4 copies per minute and has standard features that will make it a formidable competitor in the high-volume copier market.

### Facsimiles

Ricoh has been very successful in marketing high-end facsimile products. Dataquest estimates that Ricoh held the number four position, based on 1988 shipments of 102,500 units, or 9.9 percent market share. Ricoh capitalizes upon the depth and breadth of its product line with major activity in the top five price segments. Sharp Corporation led the facsimile market with 20.8 percent share.

In the Japanese market, Dataquest estimates that Ricoh held the number one market share position for two years in a row, with 21.0 percent in 1987 and 20.3 percent in 1988.

Late fourth quarter 1989, Ricoh began shipping its RF900 and RF850 combination facsimile and telephone units to retailers. The Ricoh RF900 and RF850 combine the capabilities of a facsimile machine with those of a full-featured telephone and also offer a copier function. The units are expected to find wide use in small businesses and home offices.

### Computer Storage

Ricoh competes in two of the six Dataquest segments in the optical disk drive market through Maxoptix Corp., a joint venture with Maxtor. Maxoptix ranked number one in the worldwide 5.25-inch write-once, read-many (WORM) optical disk drive market for 1988 with 32 percent of the market.

### Semiconductors

Ricoh offers a variety of CMOS, NMOS, and BiCMOS memory, microdevices, and logic. Products include ROMS, gate arrays, cell-based ICs, electrically programmable logic (EPL), and microperipherals. Dataquest estimates that Ricoh's 1988 worldwide semiconductor revenue was \$85 million, with the majority, or \$80 million, coming from Japan. Ricoh ranked sixty-sixth in the worldwide semiconductor market based on revenue for 1988 compared with its sixty-fifth ranking in 1987.

### Further Information

For further information about the Company's business segments, please contact the appropriate industry service.

**Table 1**  
**Five-Year Corporate Highlights (Millions of U.S. Dollars)**

	1984	1985	1986	1987	1988
Five-Year Revenue	\$2,104.3	\$3,030.7	\$3,299.2	\$4,057.4	\$5,393.7
Percent Change	-	44.02	8.86	22.98	32.93
Capital Expenditure	\$136.4	\$194.6	\$271.3	\$164.9	\$288.2
Percent of Revenue	6.48	6.42	8.22	4.06	5.34
R&D Expenditure	\$103.1	\$112.7	\$203.9	\$241.7	\$342.1
Percent of Revenue	4.90	3.72	6.18	5.96	6.34
Number of Employees	21,000	25,000	26,500	28,000	33,000
Revenue (\$K)/Employee	\$100.20	\$121.23	\$124.50	\$144.91	\$163.45
Net Income	\$67.8	\$64.7	\$85.9	\$74.9	\$136.1
Percent Change	-	(4.57)	32.77	(12.81)	81.71
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	
Quarterly Revenue	N/A	N/A	N/A	N/A	
Quarterly Profit	N/A	N/A	N/A	N/A	

N/A = Not Available

Source: Ricoh Company, Ltd.  
 Annual Reports  
 Dataquest  
 January 1990

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1984	1985	1986	1987	1988
North America	22.00	27.00	25.00	20.00	22.00
International	78.00	73.00	75.00	80.00	78.00
Japan	66.00	61.00	60.00	66.00	62.00
Europe	8.00	8.00	10.00	10.00	11.00
All Others	4.00	4.00	5.00	4.00	5.00

Source: Ricoh Company, Ltd.  
 Annual Reports

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1988
Direct Sales	N/A
Indirect Sales	N/A

N/A = Not Available

Source: Ricoh Company, Ltd.  
 Dataquest  
 January 1990

---

## 1988 SALES OFFICE LOCATIONS

North America—3  
Japan—14  
Europe—4

---

## MANUFACTURING LOCATIONS

### *Japan*

AT&T Ricoh  
Key telephone sets, office automation (OA)  
equipment and peripherals  
Hasama Ricoh  
Copier parts, photographic equipment  
Ricoh Denshi  
Data processing equipment  
Ricoh Elemex  
Watches, OA equipment, copier parts, FDDs,  
measuring instruments, semiconductors  
Ricoh Keiki  
Copier parts, data processing equipment  
Ricoh Microelectronics  
Printed circuit boards  
Ricoh Optical Industries  
Photographic equipment  
Ricoh Research Institute of General Electronics  
R&D of materials, applied electronics technologies  
Ricoh Tokki  
Facsimiles, copiers, microfilm equipment  
Tohoku Ricoh  
Offset printing equipment, stencil duplicators,  
educational equipment, printers, copier parts

### *North America*

Ricoh Corp.  
Facsimiles and R&D of OA equipment  
Ricoh Electronics  
Copiers, facsimiles, toners

### *Europe*

Ricoh Industries France  
Copiers, facsimiles, supplies  
Ricoh UK Products  
Copiers, facsimiles, toners

### *Asia/Pacific*

Sindo Ricoh, South Korea  
Copiers, facsimiles  
Taiwan-Ricoh  
Cameras, photographic equipment

A new manufacturing site will be completed in 1990  
in Lawrenceville, Georgia, which will produce copier  
supplies.

---

## SUBSIDIARIES

### *Japan*

Aichi Ricoh Co., Ltd.  
Daiichi Ricoh Co., Ltd.  
Fukuoka Ricoh Co., Ltd.  
Hasama Ricoh Co., Ltd.  
Hokkaido Ricoh Co., Ltd.  
Hyogo Ricoh Co., Ltd.  
Kanagawa Ricoh Co., Ltd.  
Kinki Ricoh Co., Ltd.  
Miyagi Ricoh Co., Ltd.  
Nihon Business Supply Co., Ltd.  
Ricoh Denshi Co., Ltd.  
Ricoh Educational Equipment Co., Ltd.  
Ricoh Information System Co., Ltd.  
Ricoh Keiki Co., Ltd.  
Ricoh Microelectronics Co., Ltd.  
Ricoh Office System Co., Ltd.  
Ricoh Optical Industries Co., Ltd.  
Ricoh Research Institute of General Electronics Co.,  
Ltd.  
Ricoh Tecnonet Co., Ltd.  
Ricoh Tokki Co., Ltd.  
Tohoku Ricoh Co., Ltd.  
Tokyo Ricoh Co., Ltd.

### *North America*

Ricoh Corporation (Canada), Ltd. (Canada)  
Ricoh Corporation (United States)  
Ricoh Development of California, Inc. (United States)  
Ricoh Electronics, Inc. (United States)  
Ricoh Finance Corporation (United States)  
Ricoh Thermal Systems, Inc. (United States)

### *Europe*

Ricoh Deutschland GmbH (West Germany)  
Ricoh Europe B.V. (Netherlands)  
Ricoh France S.A. (France)  
Ricoh Industries France S.A. (France)



Ricoh UK Ltd. (United Kingdom)  
 Ricoh UK Products Ltd. (United Kingdom)  
 Saitama Ricoh Co., Ltd.

*Asia/Pacific*

Taiwan-Ricoh (Korea)  
 Taiwan-Ricoh Co. (Taiwan)

---

## ALLIANCES, JOINT VENTURES

*September 1988*

**Olympus Optical**

The companies agreed to jointly develop, produce, and market erasable optical disk drives.

*April 1988*

**Canon**

The companies agreed to exchange each other's plain paper copiers on an OEM basis.

*March 1988*

**IBM Japan**

The companies agreed to market the System/55 and System/36 small business computers in Japan.

*February 1987*

**Advanced Silicon**

Ricoh signed a five-year contract under which Ricoh will fabricate Advanced Silicon's custom ICs.

---

## TECHNOLOGY LICENSING AGREEMENTS—IMPORT

*Licensor, Patents/Know-How Licensing, and Contract Term*

**Ricoh Corp., United States**  
 Facsimiles (12/79 to 12/90)

---

## TECHNOLOGY LICENSING AGREEMENTS—EXPORT

*Licensees, Patents/Know-How Licensing, and Contract Term*

**AT&T Information Systems, United States**  
 Business communication equipment (12/84 to 1/89)

**Hoechst A.G., West Germany**  
 Copiers G3/G4 fax (4/87 to 1/95)

**Nashua Corp., United States**  
 Copiers in Europe (4/79 to 12/95)

**Savin Corp., United States**  
 Copiers (1/87 to 12/95)

---

## TECHNOLOGY LICENSING AGREEMENTS—CROSS LICENSING

*Licensing Partners, Patents/Know-How Licensing, and Contract Term*

**IBM, United States**  
 Data processing systems (12/80 until patent expires)

**Xerox Corp., United States**  
 Electrophotography method (10/80 until patent expires)

---

## MERGERS AND ACQUISITIONS

*1988*

Ricoh acquired a production plant in Tustin, California, which began operations in mid-1988.

*1987*

Ricoh Corp. (United States) absorbed Ricoh Systems (R&D) and purchased all the interest in Ricoh Electronics to manage Ricoh's operation in the United States.

---

## KEY OFFICERS

**Hiroshi Hamada**  
President

**Kenji Hiruma**  
Executive vice president

**Hisashi Kubo**  
Executive vice president

**Morio Onoe**  
Executive vice president

---

## PRINCIPAL INVESTORS

Nippon Life—6.3 percent  
Sumitomo Trust—4.2 percent  
Asahi Mutual Life Insurance—4.0 percent  
Fuji Bank—3.4 percent  
Tokai Bank—3.4 percent  
Toho Mutual Life Insurance—3.3 percent  
Mitsubishi Bank—3.3 percent  
Koa Fire & Marine Insurance—3.2 percent  
Non-Japanese ownership—7.7 percent

**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending March 31**  
**(Millions of U.S. Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1984</b>	<b>1985*</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
<b>Total Current Assets</b>	\$1,331.3	\$1,367.1	\$1,903.0	\$2,616.4	\$3,568.2
Cash	57.2	70.4	140.3	332.3	152.0
Receivables	473.4	481.8	716.8	911.2	1,196.2
Marketable Securities	445.9	437.7	493.9	738.2	1,337.3
Inventory	298.6	319.3	462.2	522.2	725.4
Other Current Assets	56.2	57.9	89.8	112.5	157.3
<b>Net Property, Plants</b>	\$414.7	\$462.4	\$732.7	\$853.3	\$1,036.3
<b>Investments, Other Assets</b>	\$139.7	\$149.5	\$256.4	\$384.3	\$519.5
<b>Total Assets</b>	<b>\$1,885.7</b>	<b>\$1,979.0</b>	<b>\$2,892.1</b>	<b>\$3,854.0</b>	<b>\$5,124.0</b>
<b>Total Current Liabilities</b>	\$826.5	\$890.9	\$1,201.2	\$1,625.8	\$2,294.7
<b>Long-Term Debt</b>	\$330.8	\$338.7	\$533.7	\$754.4	\$479.2
<b>Other Liabilities</b>	\$7.2	\$7.4	\$11.1	\$14.5	\$18.2
<b>Total Liabilities</b>	<b>\$1,164.5</b>	<b>\$1,237.0</b>	<b>\$1,746.0</b>	<b>\$2,394.7</b>	<b>\$2,792.1</b>
<b>Total Shareholders' Equity</b>	\$721.2	\$742.0	\$1,146.1	\$1,459.3	\$2,331.9
Common Stock	86.7	103.6	158.5	200.1	505.4
Other Equity	377.2	263.5	387.4	475.8	816.3
Retained Earnings	257.3	374.9	600.2	783.4	1,010.2
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$1,885.7</b>	<b>\$1,979.0</b>	<b>\$2,892.1</b>	<b>\$3,854.0</b>	<b>\$5,124.0</b>
<b>Income Statement</b>	<b>1984</b>	<b>1985*</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
<b>Revenue</b>	\$2,104.3	\$3,030.7	\$3,299.2	\$4,057.4	\$5,393.7
U.S. Revenue	462.1	822.9	830.2	819.9	1,187.5
Non-U.S. Revenue	1,642.2	2,207.8	2,469.0	3,237.5	4,206.2
<b>Cost of Sales</b>	\$1,336.5	\$1,345.8	\$2,100.9	\$2,609.7	\$3,412.2
<b>R&amp;D Expense</b>	\$103.1	\$112.7	\$203.9	\$241.7	\$342.1
<b>SG&amp;A Expense</b>	\$618.3	\$630.5	\$1,021.9	\$1,447.7	\$1,657.9
<b>Capital Expense</b>	\$136.4	\$194.6	\$271.3	\$164.9	\$288.2
<b>Pretax Income</b>	\$152.4	\$139.8	\$173.0	\$172.9	\$280.8
<b>Pretax Margin (%)</b>	7.24	4.61	5.24	4.26	5.21
<b>Effective Tax Rate (%)</b>	60.30	57.80	60.90	66.20	61.00
<b>Net Income</b>	\$67.8	\$64.7	\$85.9	\$74.9	\$136.1
<b>Shares Outstanding, Millions</b>	388.3	406.6	413.1	452.3	581.5
<b>Per Share Data</b>					
Earnings	\$0.17	\$0.15	\$0.19	\$0.17	\$0.24
Dividends	\$0.04	\$0.06	\$0.06	\$0.07	\$0.08
Book Value	\$1.86	\$1.82	\$2.77	\$3.23	\$0.87

Table 4 (Continued)  
 Comprehensive Financial Statement  
 Fiscal Year Ending March 31  
 (Millions of U.S. Dollars, except Per Share Data)

Key Financial Ratios	1984	1985*	1986	1987	1988
<i>Liquidity</i>					
Current (Times)	1.61	1.53	1.58	1.61	1.55
Quick (Times)	1.25	1.18	1.20	1.29	1.24
Fixed Assets/Equity (%)	57.50	62.32	63.93	58.47	205.05
Current Liabilities/Equity (%)	114.60	120.07	104.81	111.41	454.04
Total Liabilities/Equity (%)	161.47	166.71	152.34	164.10	552.45
<i>Profitability (%)</i>					
Return on Assets	-	3.35	3.53	2.22	3.03
Return on Equity	-	8.84	9.10	5.75	13.85
Profit Margin	3.22	2.13	2.60	1.85	2.52
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	4.90	3.72	6.18	5.96	6.34
Capital Spending % of Revenue	6.48	6.42	8.22	4.06	5.34
Employees	21,000	25,000	26,500	28,000	33,000
Revenue (\$K)/Employee	\$100.20	\$121.23	\$124.50	\$144.91	\$163.45
Capital Spending % of Assets	7.23	9.83	9.38	4.28	5.62

\*Fiscal 1985 has been translated at the rate of ¥259 to \$1.

Source: Ricoh Company, Ltd.  
 Annual Reports  
 Dataquest  
 January 1990

# Ricoh Company, Ltd.

Ricoh Company, Ltd.  
15-5, Minami-Aoyama 1-chome  
Minato-ku, Tokyo 107, Japan  
Telephone: (03) 479-3111  
Fax: (03) 403-1578  
(Billions of Yen except Per Share Data)

## Balance Sheet (March 31)

	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
Working Capital	¥ 70.0	¥113.1	¥123.3	¥126.3	¥144.6
Long-Term Debt	¥ 24.2	¥ 62.2	¥ 73.8	¥ 83.1	¥ 97.1
Shareholders' Equity	¥148.9	¥161.5	¥192.2	¥206.3	¥213.1
After-Tax Return on Average Equity (%)	7.0	9.8	9.5	7.8	5.2

## Operating Performance (Fiscal Year Ending March 31)

	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
Sales	¥389.7	¥471.4	¥545.5	¥593.9	¥592.4
Japanese Sales	¥264.4	¥310.8	¥332.2	¥358.5	¥389.5
Non-Japanese Sales	¥125.3	¥160.6	¥213.3	¥235.4	¥202.9
Cost of Sales	¥248.8	¥299.4	¥348.6	¥378.2	¥381.0
R&D Expense	¥ 19.2	¥ 23.2	¥ 29.2	¥ 36.3	¥ 36.5
SG&A Expense	¥117.2	¥138.5	¥163.3	¥184.0	¥183.0
Pretax Income	¥ 25.4	¥ 34.1	¥ 36.2	¥ 31.1	¥ 25.2
Pretax Margin (%)	6.5	7.2	6.6	5.2	4.3
Effective Tax Rate (%)	58.7	60.3	57.8	60.9	66.2
Net Income	¥ 10.1	¥ 15.2	¥ 16.8	¥ 15.5	¥ 10.9
Average Shares Outstanding (Millions)	353	372	397	410	433
Per Share					
Earnings*	¥23.83	¥35.19	¥35.31	¥31.42	¥24.09
Dividend*	¥ 8.57	¥ 8.57	¥ 9.26	¥ 9.26	¥10.00
Book Value	¥ 422	¥ 434	¥ 484	¥ 503	¥ 492
Price Range	N/A	N/A	N/A	N/A	N/A
Total Employees	N/A	N/A	N/A	N/A	N/A
Capital Expenditures	¥ 30.5	¥ 30.7	¥ 50.4	¥ 48.3	¥ 24.9
Exchange Rate (Yen per US\$)	249.1	235.7	245.3	220.8	159.5

\*Retroactive adjustments have been made for free share distributions in 1984 and 1987.

N/A = Not Available

Source: Ricoh Company, Ltd.  
Dataquest  
March 1988

# Ricoh Company, Ltd.

Ricoh Company, Ltd.  
15-5, Minami-Aoyama 1-chome  
Minato-ku, Tokyo 107, Japan  
Telephone: (03) 479-3111  
Fax: (03) 403-1578

(Millions of Dollars except Per Share Data)

## Balance Sheet (March 31)

	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
Working Capital	\$ 281	\$ 480	\$ 503	\$ 572	\$ 907
Long-Term Debt	\$ 97	\$ 264	\$ 301	\$ 376	\$ 609
Shareholders' Equity	\$ 598	\$ 685	\$ 784	\$ 934	\$1,336
After-Tax Return on Average Equity (%)	7.0	9.8	9.5	7.8	5.2

## Operating Performance (Fiscal Year Ending March 31)

	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
Sales	\$1,564	\$2,000	\$2,224	\$2,690	\$3,714
Japanese Sales	\$1,061	\$1,319	\$1,354	\$1,624	\$2,442
Non-Japanese Sales	\$ 503	\$ 681	\$ 870	\$1,066	\$1,272
Cost of Sales	\$ 999	\$1,270	\$1,421	\$1,713	\$2,389
R&D Expense	\$ 77	\$ 98	\$ 119	\$ 164	\$ 229
SG&A Expense	\$ 470	\$ 588	\$ 666	\$ 833	\$1,147
Pretax Income	\$ 102	\$ 145	\$ 148	\$ 141	\$ 158
Pretax Margin (%)	6.5	7.2	6.6	5.2	4.3
Effective Tax Rate (%)	58.7	60.3	57.8	60.9	66.2
Net Income	\$ 41	\$ 64	\$ 68	\$ 70	\$ 68
Average Shares Outstanding (Millions)	353	372	397	410	433
Per Share					
Earnings*	\$ 0.10	\$ 0.15	\$ 0.14	\$ 0.14	\$ 0.15
Dividend*	\$ 0.03	\$ 0.04	\$ 0.04	\$ 0.04	\$ 0.06
Book Value	\$ 1.69	\$ 1.84	\$ 1.97	\$ 2.28	\$ 3.08
Price Range	N/A	N/A	N/A	N/A	N/A
Total Employees	N/A	N/A	N/A	N/A	N/A
Capital Expenditures	\$ 122	\$ 130	\$ 205	\$ 219	\$ 156
Exchange Rate (Yen per US\$)	249.1	235.7	245.3	220.8	159.5

\*Retroactive adjustments have been made for free share distributions in 1984 and 1987.

N/A = Not Available

Source: Ricoh Company, Ltd.  
Dataquest  
March 1988

# Ricoh Company, Ltd.

## THE COMPANY

### Background

Ricoh Company, Ltd., founded in 1936 by Kiyoshi Ichimura, is a \$1.7 billion manufacturer of cameras, office equipment, related supplies, and electronic devices. Ricoh produced its first cameras in 1938. In 1950, it marketed the "Ricoh-Flex" twin-lens reflecting camera, which is credited with triggering the postwar camera boom. Ricoh entered the business machine market by introducing a diazo copier in 1955. The Company introduced a plain paper copier in 1972, facsimile machines in 1974, text/graphic image editing systems and ink-jet printers in 1980, and laser beam printers in 1983. During the 1960s and 1970s, Ricoh opened overseas subsidiaries in Canada, the Netherlands, Taiwan, and the United States.

In 1975, the Company won the prestigious Deming Prize for the "Top Quality Control" program in Japan. It established the Ricoh Numazu Research and Development Laboratory in 1979 to pursue product development. In April 1981, the Ricoh Electronics Development Center was opened to develop ICs and MOS LSIs, including BICMOS LSIs for specialized applications and CMOS and H-CMOS LSIs for arithmetic operations, processing control, and memory.

### Company Organization

Ricoh is not a member of any larger industrial group, or keiretsu. The Company is organized along product and regional lines, with centralized North American and European manufacturing and marketing organizations.

### Investment in the Company

Major shareholders of Ricoh include Nippon Life Insurance (6.3 percent), Sumitomo Trust (4.2 percent), Asahi Mutual Life Insurance (4.0 percent), Fuji Bank (3.4 percent), Tokai Bank (3.4 percent), Toho Mutual Life Insurance (3.3 percent), Mitsubishi Bank (3.3 percent), and Koa Fire and Marine Insurance (3.2 percent). Non-Japanese ownership is 7.7 percent. Ricoh is listed on the Tokyo, Osaka, Nagoya, Amsterdam, Frankfurt, and Paris stock exchanges.

# Ricoh Company, Ltd.

## OPERATIONS

Ricoh's fiscal 1987 net income was ¥10.9 billion (\$68 million) on sales of ¥592.4 billion (\$3,714 million). The Company has three major lines of business: copiers and related supplies, facsimile equipment, and data processing systems. Semiconductors are included in its "Other products" category. Revenue by line of business is shown in Table 1. Figure 1 shows the relative shift in lines of business between fiscal 1983 and fiscal 1987.

Table 1  
Ricoh Company, Ltd.  
Revenue by Line of Business  
(Billions of Yen)

	Fiscal Year Ending March 31				
	1983	1984	1985	1986	1987
Copiers and Related Supplies	¥263.1	¥317.9	¥340.0	¥360.0	¥343.6
Facsimile Equipment	40.0	54.7	72.3	86.0	84.4
Data Processing Systems	43.1	52.9	60.8	74.2	86.2
Other Products	<u>43.5</u>	<u>45.9</u>	<u>72.4</u>	<u>73.7</u>	<u>78.2</u>
Total	¥389.7	¥471.4	¥545.5	¥593.9	¥592.4
Exchange Rate (Yen per US\$)	249.1	235.7	245.3	220.8	159.5
Total (US\$M)	\$1,564	\$2,000	\$2,224	\$2,690	\$3,714

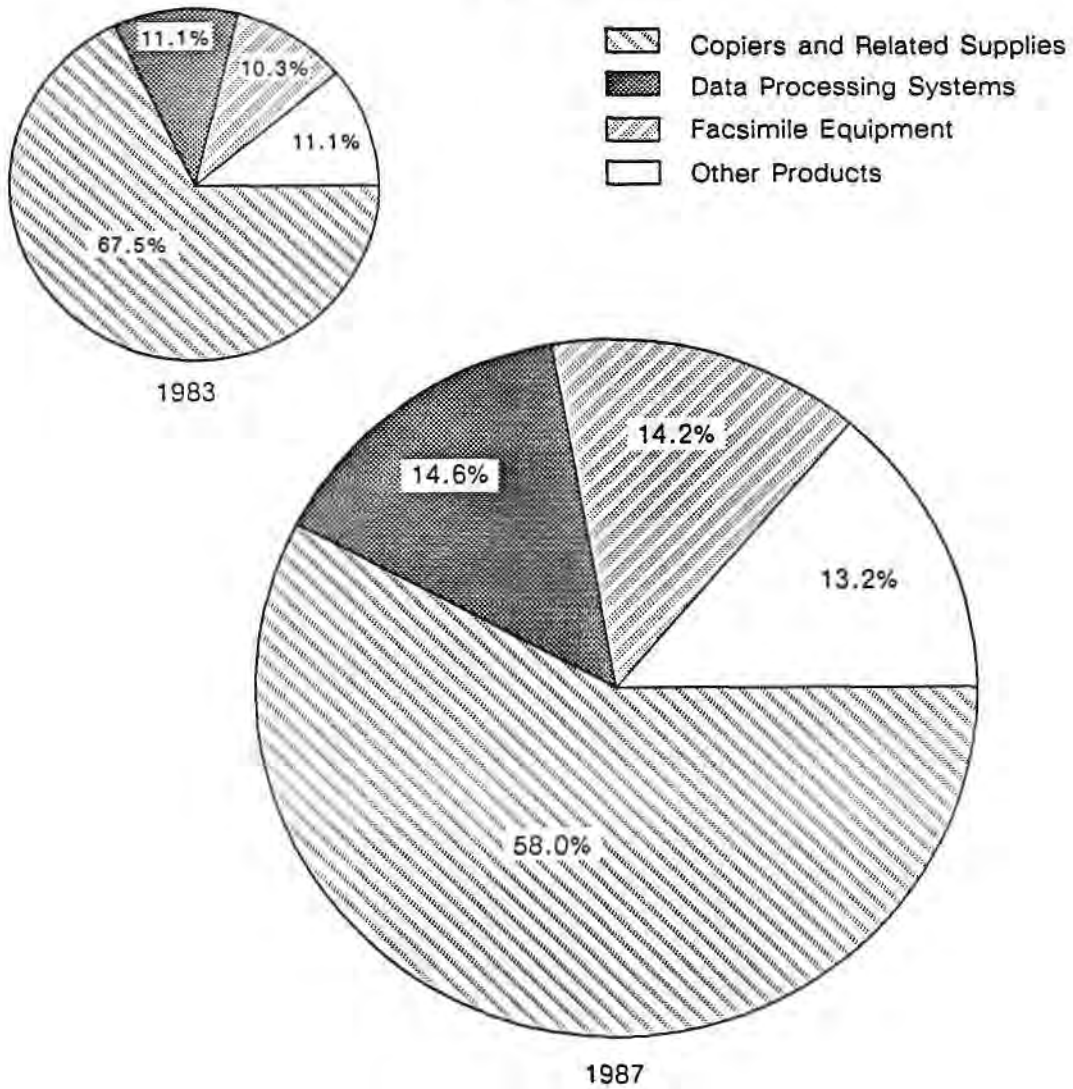
Source: Ricoh Company, Ltd.  
Annual Reports  
Dataquest  
March 1988



# Ricoh Company, Ltd.

Figure 1

**Ricoh Company, Ltd.  
Revenue by Line of Business  
Fiscal 1983 and 1987  
(Percent)**



Source: Ricoh Company, Ltd.  
Annual Report  
Dataquest  
March 1988

# Ricoh Company, Ltd.

## SEMICONDUCTORS

Ricoh offers a variety of CMOS, NMOS, and BICMOS memory, microdevices, and logic. Products include ROMs, gate arrays, cell-based ICs, electrically programmable logic (EPL), and microperipherals.

As shown in Table 2, Dataquest estimates that Ricoh had semiconductor revenue of \$65 million in 1987, half of which was MOS logic.

Table 2

**Ricoh Company, Ltd.  
Estimated Semiconductor Revenue  
1987  
(Millions of Dollars)**

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
Total Semiconductor							55	65
Total Integrated Circuit							55	65
Bipolar Digital (Technology)								
TTL								
ECL								
Other Bipolar Digital								
Bipolar Digital (Function)								
Bipolar Digital Memory								
Bipolar Digital Logic								
MOS (Technology)							55	65
NMOS							34	39
PMOS								
CMOS							21	26
MOS (Function)							55	65
MOS Memory							18	18
MOS Micro Devices							11	14
MOS Logic							26	33
Linear								
Total Discrete								
Transistor								
Small Signal Transistor								
Power Transistor								
Diode								
Small Signal Diode								
Power Diode								
Zener Diode								
Thyristor								
Other Discrete								
Total Optoelectronic								
LED Lamps								
LED Displays								
Optical Couplers								
Other Optoelectronics								
Exchange Rate (Yen/US\$)					237	238	167	144

Source: Dataquest  
March 1988

# Ricoh Company, Ltd.

We estimate that 92 percent of the Company's semiconductor sales were in Japan, 3 percent were in Europe, 3 percent were in the ROW countries, and the remaining 2 percent were in the United States. This distribution is shown in Table 3.

Table 3

**Ricoh Company, Ltd.  
Estimated Semiconductor Revenue  
by Geographic Region  
1987  
(Millions of Dollars)**

	<b>United States</b>	<b>Japan</b>	<b>Europe</b>	<b>ROW</b>	<b>Total</b>
<b>Total Semiconductor</b>	1	60	2	2	65
<b>Total IC</b>	1	60	2	2	65
Bipolar Digital	0	0	0	0	0
MOS	1	60	2	2	65
Linear	0	0	0	0	0
<b>Discrete</b>	0	0	0	0	0
<b>Optoelectronic</b>	0	0	0	0	0

Source: Dataquest  
March 1988

## **New Products and Technologies**

Early in 1987, Ricoh introduced a high-speed, electrically programmable logic (EPL) device with 25ns propagation delay time. This marked the Company's debut as a participant in all three categories of semicustom ASIC devices—gate arrays, cell-based ICs, and programmable logic.

## **Alliances**

In February 1987, Ricoh signed a five-year contract with Advanced Silicon Corporation of the Netherlands, regarding custom IC production. Under the agreement, Ricoh will fabricate Advanced Silicon's custom ICs, the first time Ricoh has done foundry work for a European company.

# Ricoh Company, Ltd.

Other Ricoh alliances include the following:

- Custom MOS Arrays (March 1984)—Wafer foundry of gate arrays, with Custom MOS Arrays providing gate array design in exchange for Ricoh's CMOS wafer processing
- VLSI Technology, Inc. (VTI) (December 1983)—Technology exchange contract in which VTI will license its 64K, 128K, and 256K NMOS mask ROMs for Ricoh's CMOS mask ROMs of the same capacity
- Rockwell International Corporation Semiconductor Products Division (December 1982)—Licensing agreement in which Rockwell granted rights to its 8-bit CMOS MPU (R65C02) and peripherals in exchange for Ricoh's 32K and 64K CMOS EPROMs

## **MANUFACTURING FACILITIES**

Ricoh's major semiconductor manufacturing lines are located at its Ikeda factory in Osaka, which began operations in 1971. In 1984, a 6-inch wafer line was added to the Ikeda Works plant.

## **INTERNATIONAL OPERATIONS**

Ricoh has major subsidiaries in Europe and the United States. These subsidiaries manufacture copiers and facsimiles and sell them and other Ricoh products into the local markets.

Ricoh's Taiwanese subsidiary manufactures cameras for worldwide sale, and its Korean subsidiary manufactures copiers and facsimile machines.

The Company's non-Japanese sales in fiscal 1987 were ¥202.9 billion (\$1,272 million), or 34 percent of total sales. These sales fell 14 percent in 1987, which the Company attributed primarily to the rapid appreciation of the yen.

Table 4 shows the Company's revenue by major geographic region. Figure 2 shows the shift to more export dependence between fiscal 1983 and 1987.

# Ricoh Company, Ltd.

Table 4

Ricoh Company, Ltd.  
Revenue by Geographic Region  
(Billions of Yen)

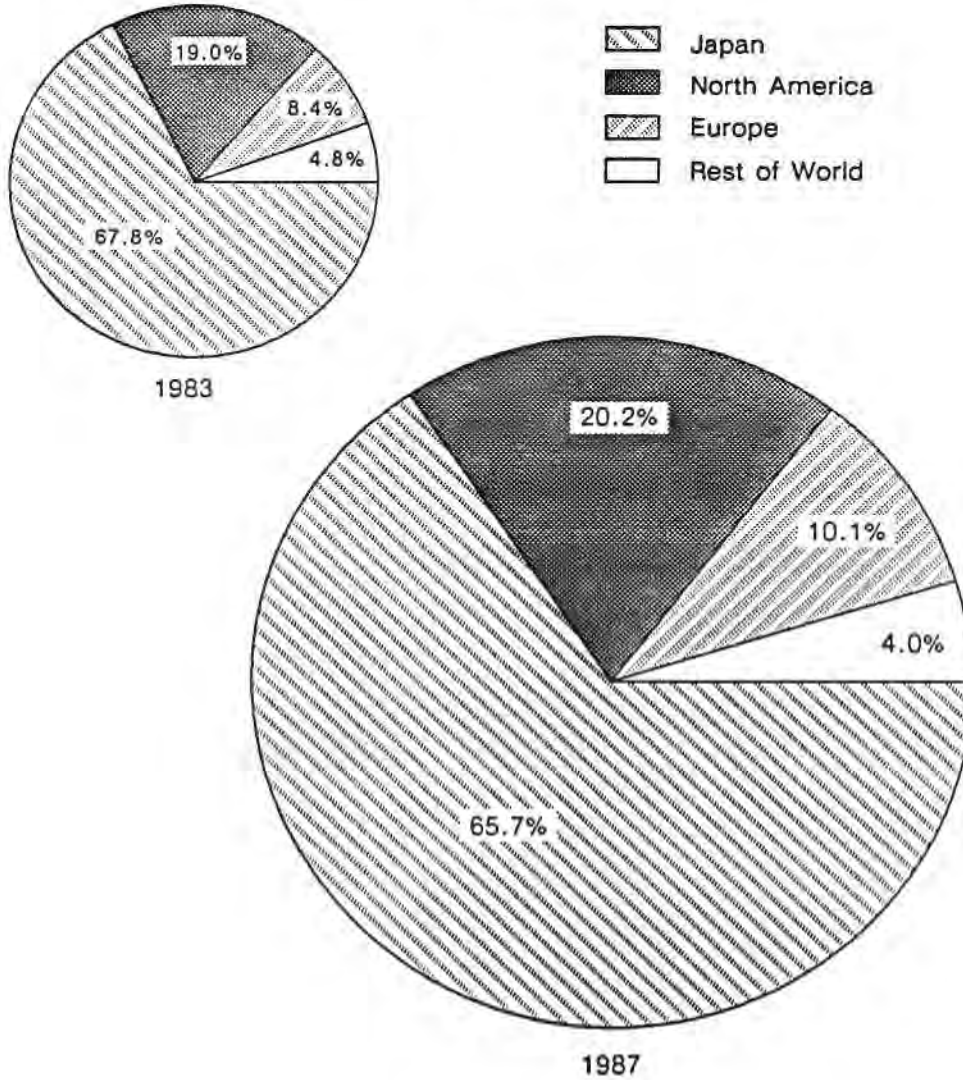
	<u>Fiscal Year Ending March 31</u>				
	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
Japan	¥264.4	¥310.8	¥332.2	¥358.5	¥389.5
North America	74.0	103.5	148.1	149.4	119.7
Europe	32.7	38.0	41.8	59.0	60.0
Rest of World	<u>18.6</u>	<u>19.1</u>	<u>23.4</u>	<u>27.0</u>	<u>23.2</u>
Total	¥389.7	¥471.4	¥545.5	¥593.9	¥592.4
Exchange Rate (Yen per US\$)	249.1	235.7	245.3	220.8	159.5
Total (US\$M)	\$1,564	\$2,000	\$2,224	\$2,690	\$3,714

Source: Ricoh Company, Ltd.  
Annual Reports  
Dataquest  
March 1988

# Ricoh Company, Ltd.

Figure 2

Ricoh Company, Ltd.  
Revenue by Geographic Region  
Fiscal 1983 and 1987  
(Percent)



Source: Ricoh Company, Ltd.  
Annual Reports  
Dataquest  
March 1988

# Ricoh Company, Ltd.

Head Office: 15-5, Minami-Aoyama 1-chome, Minato-ku, Tokyo 107  
Tel: (03) 479-3111 Telex: 242-5415  
Fax: (03) 479-2900

No. of Employees: 19,000

## BACKGROUND

Ricoh Company, Ltd., founded in 1936 by Kiyoshi Ichimura, is a \$1.7 billion manufacturer of cameras, office equipment, educational equipment, utility meters, and semiconductors. Ricoh produced its first cameras in 1938. In 1950 it marketed the "Ricoh-Flex" twin-lens reflecting camera, which is credited with triggering the postwar camera boom. Ricoh entered the business machine market by introducing a diazo copier in 1955. The Company introduced a plain paper copier in 1972, facsimile machines in 1973, and text/graphic image editing systems and ink-jet printers in 1980. During the 1960s and 1970s, Ricoh opened overseas subsidiaries in Canada, the Netherlands, Taiwan, and the United States.

In 1975, the Company won the prestigious Deming Prize for the "Top Quality Control" program in Japan. It established the Ricoh Numazu Research and Development Laboratory in 1979 to pursue product development. In April 1981, the Ricoh Electronics Development Center was opened to develop ICs and MOS LSIs, including Bi-CMOS LSIs for specialized applications and CMOS and H-CMOS LSIs for arithmetic operations, processing control, and memory.

Ricoh set up a semiconductor facility in Osaka in late 1981 for in-house consumption and began selling semiconductors into the merchant market in 1982. The Company has been a major supplier of CMOS wafers to VLSI Technology and Custom MOS Arrays, two Silicon Valley start-up companies. Ricoh has signed agreements with the following companies:

- Rockwell International Corporation Semiconductor Products Division (December 1982)--Licensing agreement in which Rockwell granted rights to its 8-bit CMOS MPU (R65C02) and peripherals in exchange for Ricoh's 32K and 64K CMOS EPROMs
- VLSI Technology Inc. (VTI) (December 1983)--Technology exchange contract in which VTI will license its 64K, 128K, and 256K NMOS mask ROMs for Ricoh's CMOS mask ROMs of the same capacity

---

## Ricoh Company, Ltd.

---

- Custom MOS Arrays (March 1984)--Joint production of gate arrays, with Custom MOS Arrays providing gate array design and CAD techniques in exchange for Ricoh's CMOS wafer processing
- Vitelic (June 1984)--Ricoh terminated its plans to jointly produce application specific ICs (ASICs) with Vitelic
- Convergent Technology Corporation (June 1984)--Partnership in which Ricoh will produce substrates for computer memories. Production will begin in August at Ricoh's Hatano plant in Kanagawa prefecture
- Modular Semiconductor and Panatec R&D Corporation (September 1984)--A five-year contract to produce and ship CMOS 256K DRAMs and 16K SRAMs
- Panatec R&D Corporation (September 1984)--A sales-agent agreement to sell Ricoh semiconductors in the United States
- Ixys Corporation (December 1984)--Partnership to jointly develop MOS FETs and thyristor MOS FETs

In February 1984, Ricoh formed a North American sales and marketing group at Ricoh Systems of San Jose, California, and signed agreements with two representatives, Access Systems Corp. (Amherst, New Hampshire) and El Dorado Sales Company (Redondo Beach, California). Ricoh plans to add regional sales offices in the United States to market its CMOS EPROMs, MPUs, signal-processor peripheral chips, and thermal printers.

### ORGANIZATION

Ricoh Company, Ltd., is the head company for the Ricoh Group, which consists of 20 subsidiaries in Japan, 9 overseas consolidated subsidiaries, and 5 overseas affiliates (not consolidated in the Company reports). Ricoh's manufacturing subsidiaries in Japan, its overseas subsidiaries, and its overseas affiliates are listed in Tables 1, 2, and 3, respectively. In addition, Ricoh has sales representatives in Florida, Illinois, New York, and Texas.



# Ricoh Company, Ltd.

Table 1

## MANUFACTURING SUBSIDIARIES IN JAPAN

<u>Company</u>	<u>Activity</u>
Hasama Ricoh Co., Ltd. (Tome-gun, Miyagi)	Copier parts, photographic equipment
Ricoh Denshi Co., Ltd. (Chuo-ku, Tokyo)	Data processing equipment
Ricoh Educational Equipment Co., Ltd. (Shibuya-ku, Tokyo)	Educational equipment
Ricoh Keiki Co., Ltd. (Saga City, Saga)	Copier parts, data processing equipment
Ricoh Optical Industries Co., Ltd. (Hanamaki City, Iwate)	Photographic equipment
Ricoh Tokki Co., Ltd. (Yashio City, Saitama)	Facsimile equipment, copiers, and microfilm equipment
Tohoku Ricoh Co., Ltd. (Shibata-gun, Miyagi)	Offset printers, stencil duplicators, educational equipment, printers

Source: Ricoh Company, Ltd.,  
Annual Report

# Ricoh Company, Ltd.

Table 2

## OVERSEAS CONSOLIDATED SUBSIDIARIES

<u>Company</u>	<u>Activity</u>
Rapicom, Inc. (1973) Fairfield, New Jersey	Manufacture and sales of facsimile equipment
Rapifax of Canada, Inc. Ottawa, Ontario	Canadian sales of Rapicom products
Ricoh of America, Inc. (1963) Fairfield, New Jersey	U.S. sales and market research
Ricoh Development of California, Inc. Gardena, California	Operation of a shopping center complex
Ricoh Electronics, Inc. (1973) Irvine, California	Manufacture of copiers
Ricoh Nederland B.V. (1972) Amstelveen, Holland	European sales and market research
Ricoh Systems, Inc. (1984) San Jose, California	North American sales and marketing
Scientific Telecommunication Systems, Inc. (1979) Santa Clara, California	Facsimile equipment R&D
Taiwan-Ricoh Co., Ltd. (1966) Taipei, Taiwan	Manufacture of photographic equipment

Source: Ricoh Company, Ltd.,  
Annual Report

---

# Ricoh Company, Ltd.

---

Table 3

OVERSEAS AFFILIATES (UNCONSOLIDATED)

<u>Company</u>	<u>Activity</u>
Ricoh America Latina, Ind. E. Com. Ltda. (1980) Sao Paulo, Brazil	Sales in Latin America
Ricoh Business Machines, Ltd. (1978) Hong Kong	Sales in Southeast Asia
Ricoh Deutschland GmbH (1978) West Germany	European sales
Ricoh U.K., Ltd. (1980) (London, United Kingdom)	European sales
Shindo Ricoh Co., Ltd. (1970) Seoul, South Korea	Joint venture

Source: Ricoh Company, Ltd.,  
Annual Report

## CUSTOMER BASE

Ricoh produces semiconductor devices for its in-house copier, personal computer, and office automation divisions. The Company has a policy of using its newly developed devices for in-house use, while purchasing general-purpose devices from the merchant market.

In July 1984, Ricoh began supplying CMOS 64K EPROMs to Rockwell International. In August, Ricoh shipped samples of its CMOS 8-bit MPU, the 65C02, to Apple Computer for the Apple IIc. The device is bus-compatible with Motorola's MC68000 series.

## SEMICONDUCTOR PRODUCT LINE

Ricoh offers a variety of semiconductor products, including 8-bit CMOS MPUs, 16K CMOS SRAMs, CMOS mask ROMs, 32K and 64K CMOS EPROMs, NMOS mask ROMs (64K, 128K, and 256K), peripheral ICs, and hybrid ICs. The

---

## **Ricoh Company, Ltd.**

---

Company markets a CMOS gate array product family and two gate array families that offer a unique Bi-CMOS process (bipolar analog circuitry for inputs and outputs, and CMOS internal logic).

In May 1983, Ricoh introduced 64K EPROMs that are pin compatible with Motorola (24 pins) and Intel (28 pins) devices. In March 1984, Ricoh began sales of its 8-bit MPU (RP65C02) which was developed under a technology exchange contract with Rockwell International. The model is compatible with Rockwell's R65C02 and bus compatible with Motorola's M68000.

In 1984, Ricoh introduced five models of mask ROMs, two NMOS versions (512K and 1Mb) and three CMOS versions (64K, 128K, and 256K).

Ricoh has established a system for designing custom ICs, gate arrays, and standard cells. The Company added CMOS gate arrays with 500, 1,000, 1,500, 2,500, and 3,800 gates to its existing 400 to 1,500 gate array series. It will receive orders for 5,500- and 8,000-gate arrays in March 1985. A standard cell library of 130 CMOS models using 2.0-2.5 micron geometries has been developed, and sales are already under way. In 1985, Ricoh plans to put CPU, ROM, and RAM in the library, which will be expanded to 200 cells.

Ricoh also has plans to introduce a one-chip CRT controller and other devices in the future.

### **MARKET ESTIMATE**

In fiscal 1984, Ricoh had semiconductor revenues of ¥8 billion (\$33 million), up 100 percent from fiscal 1983. All of its semiconductor production was MOS integrated circuits. About 80 percent of its semiconductor production was for captive use.

### **RESEARCH AND DEVELOPMENT**

Through its technology exchange agreements with Rockwell International, VLSI Technology, and Custom MOS Arrays, Ricoh has been developing its own MPUs, high-capacity mask ROMs, and gate arrays. In April 1984, Ricoh announced a nonmetal organic material which will be used in its OA filing system optical disks. In October, Ricoh established the Ricoh Techno Research Institute in Tokyo to study state-of-the-art materials. In December, the Company announced a system for designing large, custom, single-chip MCUs using standard cells and a core processor with a CMOS 8-bit 65C02. Sample shipments for the system began in February 1985.

# Ricoh Company, Ltd.

## PLANT AND EQUIPMENT INVESTMENT

Ricoh recently invested ¥7.5 billion (\$31.9 million) in a new semiconductor center in its Osaka plant to produce devices for its in-house facsimile, office computer, and camera divisions. This center is equipped with an integrated mass production line for front-end processing through back-end processing, although the line is still small scale.

In fiscal 1984, Ricoh invested ¥4.0 to ¥4.5 billion (\$16 million to \$18 million) in plants and equipment, centering on CAD and wafer processing equipment. In fiscal 1985, Ricoh plans to invest around ¥4.5 billion (\$17.3 million), of which 20 to 30 percent will be spent on a new central laboratory.

In September 1984, Ricoh set up a 6-inch wafer line to produce 256K mask ROMs at its Ikeda Works plant in Osaka prefecture. Ricoh will add ¥1 billion (\$4 million) to the initial ¥4 billion (\$16 million) spent on the new line in fiscal 1984.

# Robert Bosch GmbH

Robert Bosch GmbH  
Postfach 50  
7000 Stuttgart 1  
West Germany  
Telephone: +49 711 8111

## THE COMPANY

### Background

Robert Bosch, founder of Robert Bosch GmbH, was born on September 23, 1861, in Albeck, near Ulm, Germany. In 1886, with two employees, he opened his first workshop for precision mechanical and electrical engineering in Stuttgart. The Company grew and developed products until the Second World War. Bosch produced mainly power tools and products for automotive applications, such as a low-voltage magneto for a stationary gas engine, an ignition system, a complete electric motor vehicle system, and injection pumps for diesel engines. In the late 1920s, the Company started to diversify--into television, photographic equipment, and household appliances.

By the end of the Second World War, 60 percent of the Bosch works had been destroyed. The Company very quickly rebuilt, however, and development of products and markets continued throughout the 1950s and 1960s. In 1967, the electronically controlled gasoline injection system Jetronic was mass-produced for the first time. By the late 1960s, Bosch had opened technical centers for automotive electronics and other research.

In 1973, Bosch began to establish a presence in the United States, with the building of a production plant in Charleston, South Carolina. The Company then acquired an interest in Borg-Warner Corporation of Chicago, Illinois. In 1980, Bosch acquired a production plant for power tools in New Bern, North Carolina.

In order to open up the Japanese market for antilock brake systems (ABS), Bosch and the Nippon Airbrake Company Limited founded Nippon ABS Limited in Tokyo, Japan, in 1984.

Company developments in West Germany included extension of the technical center for microelectronics in Reutlingen in 1983. In 1985, a production site for electronic control units was set up in Salzgitter, West Germany.

The various Company entities that were formed between 1886 and 1985 consolidated to form the Bosch Group.

# Robert Bosch GmbH

## Operations

In 1985, consolidated worldwide sales of the Bosch Group increased 16 percent to DM 21,223 million. The foreign share of consolidated worldwide sales of the Bosch Group increased to 54 percent in 1985, from 53 percent in 1984. Sales for the Bosch Group, including the subsidiary Telenorma, are listed by major regions in Table 1.

Table 1

**BOSCH GROUP SALES BY MAJOR REGIONS**  
(Millions of Deutsche Marks)

	<u>1983</u>	<u>1984</u>	<u>1985</u>
EEC	DM 10,902	DM 11,913	DM 13,626
Other Europe	2,045	2,245	2,555
North and Latin America	1,840	2,733	3,543
Other	<u>1,339</u>	<u>1,482</u>	<u>1,499</u>
Total	DM 16,126	DM 18,373	DM 21,223

Source: Robert Bosch GmbH  
Annual Report

In 1984, the seven-week-long labor conflict in the German metalworking industry had a considerable impact on the Company's business performance. During this period, regular working time was reduced in the Company's domestic plants by approximately 20 percent. This resulted in loss of orders amounting to approximately DM 600 million, which, in turn, had a noticeable impact on earnings. After settlement of the strike, domestic customers, in particular, substantially increased their orders at short notice. This meant that the Company had to make considerable efforts in the third quarter in order to minimize back orders as much as possible.

The concern with reducing the amount of pollutants in exhaust gas emissions in West Germany and other European countries gave an additional boost to demand for Bosch's broad line of fuel injection systems for gasoline and diesel engines. Sales of antilock braking systems also increased.

# Robert Bosch GmbH

In 1985, the Bosch Group increased investments by more than 25 percent over 1984. This was to keep pace with rapid technological advances and to maintain the Company's competitiveness on the world market. More than DM 1.4 billion was invested worldwide, and investments as a percentage of sales increased from 6.1 percent in 1984 to 6.6 percent in 1985, as illustrated in Table 2.

A substantial part of these investments was allotted to the automotive products sector, the communications technology sector also received special attention. DM 1,444 million was invested for new machinery and equipment, mainly for development and manufacture of new products, but also to enlarge production capacities, quality assurance, and improved overall efficiency.

Table 2

## BOSCH GROUP CAPITAL INVESTMENT (Millions of Deutsche Marks)

	<u>1983</u>	<u>1984</u>	<u>1985</u>
Domestic Bosch Group	DM 626	DM 789	DM 1,031
Regional Subsidiaries	<u>269</u>	<u>340</u>	<u>375</u>
Total	DM 895	DM 1,129	DM 1,406

Source: Robert Bosch GmbH  
Annual Report

### Research and Development

In 1985, the domestic Bosch Group allocated DM 1,017 million to research and development (R&D), equivalent to 6.3 percent of sales. The investment was primarily made in high-technology products and production processes. There are approximately 8,000 employees in Germany and 924 employees in the Company's regional subsidiaries who are working in applied research, advanced engineering, and product development. The German Federal Ministry of Research and Technology contributed about DM 8.9 million to promote selected R&D projects in the Bosch Group.

In automotive engineering, electrical mechanical components are being improved through the use of microelectronic assemblies, and they are being increasingly replaced by microelectronic systems. Areas such as fuel metering, variable ignition timing, antilock systems, and wheel slip control



# Robert Bosch GmbH

systems all use microelectronic components. Microelectronic sensors and control systems increase the performance of machine tools, industrial robots, assembly systems, and packaging machinery.

All these applications are researched in the Company's Product Divisions, in close cooperation with the Bosch Microelectronics Technical Center, which is associated with the semiconductor plant in Reutlingen. Most integrated circuits crucial for the Company's products have been developed in-house for other divisions of the Bosch Group. Components are assembled, tested, and inspected on site.

The Company has installed a data transmission network to increase emphasis on the training of personnel. The Company also increased cooperation with leading semiconductor manufacturers in order to utilize the rapid technical development over the broadest possible spectrum, and to direct it in accordance with the Company's needs.

In the communications area, Bosch has conducted extensive basic research and development in the area of digital technology and for broadband integrated transmission networks, utilizing fiber optic cables and satellites.

In the materials sector, Bosch is researching sintered materials and the methods utilized to manufacture sintered parts. The Company also has improved the electronic test methods used to investigate corrosion processes in metallic materials.

Bosch also undertakes research and development in measurement and testing, where the Company is adapting a PAD function tester to operate the component tester for evaluating the characteristics and operational integrity of analog and digital components. In computer R&D, the Company has pilot installations of CAD systems for mechanical parts and products; in production technology and quality assurance, the Company is using microelectronics to improve production technology and to integrate quality assurance from both a technical and an organizational point of view; and in environmental protection, research is conducted to reduce the pollutants emitted from internal combustion engines.

## Employees

At the end of 1985, the consolidated Bosch Group worldwide employed 142,923 persons. This was an increase of 6.2 percent over 1984. The number of employees outside West Germany increased by 10.1 percent, from 43,345 in 1984 to 47,739 in 1985.

# Robert Bosch GmbH

## Company Structure

Bosch is a limited company. More than 90 percent of its shares are held by a charitable foundation, while the remainder is held by the Bosch family. The profit that is not put back into the Company is almost all spent on hospitals, social welfare, and the arts. Because the foundation has no involvement in business activities, it has turned over its voting rights to Robert Bosch Industrietreuhand KG. The head of this partnership is also the head of the Bosch Group.

In 1984, Dr. Marcus Bierich succeeded Dr. Hans Merkle as head of the Company. In the 21 years of Dr. Merkle's leadership, Bosch had been diversifying strongly into fast-growing high-technology sectors. With semiconductors as the core, the Company has applied this knowledge to communications, production technology, and energy saving. Although Bosch remains Europe's largest producer of automotive equipment, this sector now accounts for approximately 57 percent of total sales, compared with about 70 percent in the 1960s. Bosch is becoming less dependent on the fluctuating vehicle sector and increasingly moving toward the communications sector, where sales accounted for 26 percent of the total turnover in 1984. Table 3 shows percentage sales by product group.

Table 3

### BOSCH GROUP SALES BY PRODUCT GROUPS

<u>Group</u>	<u>1984</u>	<u>1985</u>
Automotive Equipment	52.5%	54.6%
Communications Technology	24.1	22.4
Consumer Goods	19.1	18.6
Capital Goods	<u>4.3</u>	<u>4.4</u>
Total	100.0%	100.0%

Source: Robert Bosch GmbH  
Annual Report

## Automotive Equipment Division

The Automotive Equipment Division has been developing and manufacturing products to comply with increasingly stringent laws on the reduction of pollutants and automotive exhaust gases, while at the same time endeavoring to keep fuel consumption down. The Company's plan for 1985 was to invest approximately DM 400 million in fuel injection systems, an increase of 48 percent over the 1984 total of DM 270 million.

# Robert Bosch GmbH

In 1985, construction was started on a new plant in Immerstadt/Allgäu to help meet the increasing demand for antilock braking systems. Additional mass production of major components of the ABS system were planned in autumn 1986. Early in 1986, Bosch started manufacturing an integrated ABS3 and antilock braking system that prevents spinning of the drive wheels, resulting in improved vehicle stability and traction on slippery road surfaces.

The division is developing optoelectronic driver information systems consisting of sensors, a microcomputer for data processing, and a display unit. It also manufactures electric starter motors; alternators; maintenance-free, lead-calcium batteries; automobile headlights; windshield wiper systems; and antiskid systems for cars, buses, trucks, and trailers. The Company's test track in Schwieberdingen, West Germany, has undergone considerable expansion. Five parallel straight lanes with different surfaces permit braking tests under all types of conditions.

In electronics, the West Berlin facility manufactures car telephones, two-way mobile radios, and electronic windshield/rear window antennae.

In test equipment, this division supplies both workshops and the automotive industry with engine testers, exhaust gas analyzers, diesel engine testers, wheel alignment systems, headlight aiming systems, brake test stands, dynamometers, injection pump test stands, and starter and alternator test stands. The test systems are mostly electronic, to automate test procedures.

The Automotive Equipment division expanded its domestic and foreign manufacturing capacity in 1984. Between 1984 and 1986, the Company is forecast to invest approximately DM 2.5 billion in plants in the automotive equipment sector. This will relate particularly to plants in Bamberg, Hamburg, Reutlingen, Salzgitter, and Stuttgart, West Germany. Outside Germany, the Company is expanding production capacity in the United States, France, and Spain.

In 1984, Bosch signed a licensing agreement with China for diesel fuel injection equipment. A license for diesel distributor fuel injection pumps was awarded by the German Democratic Republic. In Japan, the Company owns 35 percent of the newly founded Nippon ABS Limited, which develops, manufactures, and markets the ABS antilock system.

Also in 1984, the Company expanded domestic and foreign sales and customer service organizations. As of December 1984, about 7,500 independent service centers were operating worldwide. Bosch maintains continuous contact with these outlets, installing improved equipment and training personnel as necessary.

# Robert Bosch GmbH

## Communications Technology Division

Sales in this division grew by 7.1 percent in 1985, to DM 5.2 billion. Within this division, the electronics sector produces equipment and systems for radio communications, broadband communications, automobile antennae, and electronic medical equipment. Over the next few years, the Company foresees growth in cable systems for distributing programs transmitted via telecommunications satellites. The Company is active in satellite reception technology, broadband distribution network for radio and television programs, and the development of new products for future communications systems for both public and private sectors. ASICs, developed at the Microelectronics Technical Center in Reutlingen, are used in these products.

In the consumer electronics sector of the division, the Company manufactures car radio/traffic-routing systems, radio/television products, and communications equipment. A focal point of development was the cordless telephone designed to specifications of the German Postal Service and scheduled for volume production in 1986. In addition, a unique system for data transmission in mobile radio networks was developed.

In the medical electronic equipment sector, positive growth was recorded--particularly in hearing aids using microprocessors with reduced size, reduced weight, and increased reliability.

In 1984, the Company acquired a majority shareholding in Telefonbau und Normalzeit Lehner & Co. (subsequently known as Telenorma) and a 40.8 percent equity in ANT Nachrichtentechnik GmbH. The Company also has a 75 percent equity in Blaupunkt-Werke GmbH, manufacturer of car radios, audio and TV equipment, videotext installations, and monitors.

## Production Technology Division

Products manufactured by this division include industrial equipment (flexible automation systems, electronic control systems, and drives for machinery and automation equipment); packaging machinery (for foodstuffs, beverages, pharmaceutical and chemical products, and confectionary); power tools; analog and digital testing systems (for circuit boards, electronic assemblies, and electronic equipment); plastic products (for electronics, automotive equipment, and motor vehicle construction); metal products (light alloy castings, sintered metal parts, and oxide components).

## Bosch Household Appliances

Bosch manufactures electrical household appliances, such as kitchen, audio, and video equipment, through its Bosch-Siemens Hausgeräte GmbH Company. In 1985, this company increased sales by 12 percent to DM 3,400 million.

# Robert Bosch GmbH

Sales in the refrigeration area increased due to strong demand for energy-saving appliances. Although facing intense competition in the home entertainment equipment field, sales increased due to new television sets with large screens and high export sales of Bosch television and video equipment.

## PRODUCTS

### Semiconductor Products

The Company manufactures and uses semiconductor products for automotive, telecommunications, and industrial applications.

Bosch manufactures three broad types of circuit in-house:

- Integrated circuits
  - Bipolar and CMOS ASICs
- Hybrid devices
  - Hybrid modules and hybrid integrated control units
- Power devices
  - Rectifiers, transistors, and integrated power modules

### Other Products

Other products of the Company include:

- Coating powders for decorative surface protection, for electrical insulation, and for corrosion protection
- Electrical household appliances, kitchen appliances, and audio and video equipment
- Water heaters and controls, electric water heaters, gas-fired water heaters, gas-fired hot-water tanks, boilers and burners, heat pumps, heating system controls, radiator valves, space heaters, bathroom furniture, and shower partitions
- High-frequency and pneumatic power tools for home and industrial use

# Robert Bosch GmbH

## SUMMARY

Bosch is a broad-product-based manufacturer, developing goods and services for key growth market sectors. The Company is also continually developing components and technologies that support the end product thrusts, with continued emphasis placed on product and business efficiency to meet the market challenges of the 1990s. Thus, Dataquest expects Bosch to remain a major contributor to the worldwide electronics industry.

## Robert Bosch Group

Postfach 50  
7000 Stuttgart 1  
Germany

Telephone: +49 711 8111

Fax: Not Available

Dun's Number: Not Available

*Date Founded: 1886*

---

### CORPORATE STRATEGIC DIRECTION

In 1886, Robert Bosch opened his first workshop for precision mechanical and electrical engineering in Stuttgart, Germany. The Company grew and developed products and new markets until the Second World War. By the end of the war, over 60 percent of the Company's works had been destroyed. The Company rebuilt quickly, however, developing new products for diversified markets. By 1973, the Bosch Group began to establish a presence in the United States with the building of a production plant in Charleston, South Carolina. The Company then acquired an interest in Borg-Warner Corporation of Chicago, Illinois. In 1980, the Company acquired a production plant for power tools in New Bern, North Carolina, and in 1984 it acquired a majority shareholding in Telenorma Telefonbau und Normalzeit Lehner & Co., a telecommunications company known as Telenorma.

The Bosch Group is a limited company. More than 90 percent of its shares are held by a charitable foundation; the remainder is held by the Bosch family. The profit that is not retained by the Company is almost entirely spent on hospitals, social welfare, and the arts.

The Company comprises four product groups: Automotive Equipment, Communications Technology, Consumer Goods, and Capital Goods. In fiscal 1989, total revenue increased 10.5 percent to DM 30.6 billion (US\$16.3 billion) from DM 27.7 billion (US\$15.7 billion) in fiscal 1988. Net income increased nearly 36 percent, reaching DM 302.0 million (US\$160.6 million) compared with DM 222.5 million (US\$126.4 million) in fiscal 1988. (Percentage changes refer only to DM amounts; US\$ percentage changes will differ because of fluctuations in Dataquest exchange rates.)

R&D expenditure totaled DM 1.8 billion (US\$959.0 million), representing 5.9 percent of total revenue, for fiscal 1989. This is an increase of nearly 10 percent over the previous year's figure of DM 1.6 billion (US\$931.8 million). The Company plans to enter into a joint venture with VEB Elektrowerkzeuge Sebnitz that includes product development.

Capital expenditure totaled DM 2.1 billion (US\$1.1 billion), representing 6.8 percent of total revenue for fiscal 1989. This is an increase of 6.5 percent over the previous year's figure of DM 1.9 billion (US\$1.1 billion), representing 7.0 percent of total revenue. The Robert Bosch Group employed 174,742 people at the close of fiscal 1989.

More detailed financial information is available in Tables 1 and 2, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region. Information on revenue by distribution channel is not available. Tables 3 and 4, comprehensive financial statements, are at the end of this backgrounder. Due to the Company's accounting policies and procedures, a financial ratio analysis is not available.

---

### BUSINESS SEGMENT STRATEGIC DIRECTION

#### Communications Technology Group

The Communications Technology Product Group consists of four divisions. The Mobile Communications Division manufactures car radio systems, traffic information and guidance systems, radio communications, and audio system electronics. The Telenorma Telefonbau und Normalzeit Lehner & Co. Division manufactures and markets private and public communications systems and information systems.

Telenorma is the leading supplier of Integrated Services Digital Network (ISDN) communications systems in Germany. Telenorma has four areas of business: Private Communications Systems, Public Communications Systems, Information Systems, and Security Systems.

The third division, Ant Nachrichtentechnik GmbH, manufactures multiplex systems, radio relay systems, satellite and mobile radio systems, fiber-optic telecommunications systems, electroacoustic systems, and location and navigation systems. The fourth division, the Broadcast Television Systems GmbH Division (BTS), manufactures stationary and mobile systems for TV studios and equipment and components for applied television.

Dataquest estimates that the Telenorma Division ranked third in the European PBX market with a 10.5 percent market share and 801,400 lines for 1989.

#### Automotive Equipment Group

The Automotive Equipment Group has eight divisions. Division 1 manufactures and markets antilock braking systems (ABSs), chassis systems, and safety systems. Division 2 is involved in lighting technology; Division 3 manufactures gasoline fuel-injection equipment and ignition systems; Division 4, wipers and wiper motors; Division 5, diesel fuel-injection equipment; Division 8, semiconductors and electronic control units; and Division 9, starting motors and alternators. The remaining division is a combination of Divisions 6 and 7 called the Automotive Aftermarket Division, which distributes automotive products and contributes after-sales service.

#### Consumer Goods Group

The Consumer Goods Group consists of three divisions. Bosch-Siemens Hausgerate GmbH manufactures and markets electric household and kitchen appliances and audio and video equipment. The Power Tools Division manufactures home tools, electric power tools for the trades, and industrial power tools. The Junkers Division manufactures hot water equipment, heating system controls, blower burners, gas controls, and bathroom fixtures.

#### Capital Goods Group

The Capital Goods Group comprises four divisions. The Industrial Equipment Division manufactures industry electronics, assembly, and handling equipment; deburring equipment; and test equipment and technology. The Packaging Machinery Division manufactures packaging machines and machinery for candy production. The Hydraulics and Pneumatics Division manufactures hydraulic and pneumatic products for mobile and stationary applications and electronic fluid-control technology. The Synthetic and Metal Products Division manufactures technical components; semifinished durometer, elastomer, and thermoplastic products; light alloy castings; carbon brushes; oxide magnets; and sintered metal parts.

#### Further Information

For further information about the Bosch Group's business segments, please contact the appropriate Dataquest industry service.



**Table 1**  
**Corporate Highlights (Millions of US Dollars)\***

	1986	1987	1988	1989
Four-Year Revenue	\$10,971.0	\$14,091.7	\$15,724.4	\$16,270.2
Percent Change	-	28.45	11.59	3.47
Capital Expenditure	\$835.5	\$1,119.4	\$1,100.6	\$1,097.9
Percent of Revenue	7.62	7.94	7.00	6.75
R&D Expenditure	\$581.6	\$791.7	\$931.8	\$959.0
Percent of Revenue	5.30	5.62	5.93	5.89
Number of Employees	158,142	161,434	165,732	174,742
Revenue (\$K)/Employee	\$69	\$87	\$95	\$93
Net Income	\$101.4	\$123.6	\$126.4	\$160.6
Percent Change	-	21.93	2.27	27.07
Exchange Rate (US\$1=DM)	DM 2.17	DM 1.80	DM 1.76	DM 1.88
1989 Calendar Year	Q1	Q2	Q3	Q4
Quarterly Revenue	NA	NA	NA	NA
Quarterly Profit	NA	NA	NA	NA

\*Financials for 1985 were not available.  
 NA = Not available

Source: Robert Bosch Group  
 Annual Reports and Forms 10-K  
 Dataquest (1990)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1986	1987	1988	1989
German	50.00	50.00	49.00	48.00
All Others	50.00	50.00	51.00	52.00

Source: Robert Bosch Group  
 Annual Reports and Forms 10-K  
 Dataquest (1990)

---

## 1989 SALES OFFICE LOCATIONS

North America—1  
Europe—7  
Asia/Pacific—2  
ROW—2

---

## MANUFACTURING LOCATIONS

### *North America*

Charleston, South Carolina  
Automotive products

---

## SUBSIDIARIES

### *North America*

Airflow Research & Manufacturing (United States)  
Racine Fluid Power Inc. (United States)  
Robert Bosch Capital Corporation (United States)  
Robert Bosch Corporation (United States)  
Robert Bosch Inc. (Canada)  
Robert Bosch Power Tool Corporation (United States)  
Weldun International Inc. (United States)

### *Europe*

AB ROBO (Sweden)  
Blaupunkt SA (France)  
Compagnie Parisienne D'Outillage a Air Comprime  
SA (France)  
Fabrica Espanola Magnetos SA (Spain)  
JS Telecommunications SA (France)  
NV Robert Bosch SA (Belgium)  
Robert Bosch AB (Sweden)  
Robert Bosch AG (Austria)  
Robert Bosch AG (Switzerland)  
Robert Bosch A/S (Denmark)  
Robert Bosch A/S (Norway)  
Robert Bosch Comercial Espanola SA (Spain)  
Robert Bosch Lda (Portugal)  
Robert Bosch Ltd. (United Kingdom)  
Robert Bosch Motorlu Araclar Yan Sanayi ve Ticaret  
AS (Turkey)  
Robert Bosch Produktie NV (Belgium)  
Robert Bosch SA (France)

Robert Bosch SpA (Italy)  
Scintilla AG (Switzerland)

### *Asia/Pacific*

Bosch K.K. (Japan)  
Motor Industries Co. Ltd., MICO (India)  
Robert Bosch Pte. Ltd. (Singapore)  
Robert Bosch Pty. Ltd. (Australia)  
Robert Bosch Sdn. Bhd. (Malaysia)

### *ROW*

Automagneto SA de CV (Mexico)  
Robert Bosch Argentina SA (Argentina)  
Robert Bosch Ltda (Brazil)  
Robert Bosch Pty. Ltd. (South Africa)  
Robert Bosch SA de CV (Mexico)  
WAPSA Auto Pecas Ltda (Brazil)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

### *1990*

#### **TDK**

Robert Bosch GmbH plans a joint venture with TDK for the production of permanent magnets. Each partner will hold 50 percent; however, Bosch plans to retire the joint venture in five years.

#### **Zavody Vseobecneho Strojirenstvi (ZVI)**

Robert Bosch will cooperate with ZVI in the production of antilocking systems for power line connected vehicles.

#### **FER Fahrzeugelektrik**

Robert Bosch and FER Fahrzeugelektrik will jointly form Robert Bosch Autelektrik Eisenach to manufacture automotive electrical equipment.

#### **Daewoo Precision Industries**

Daewoo will begin making BOGE gas shock absorbers through a technical agreement with Bosch of Germany.

#### **VEB Elektrowerkzeuge Sebnitz**

Robert Bosch plans a development, production, and marketing joint venture with VEB Elektrowerkzeuge Sebnitz. VEB will assemble Bosch electric tools.

**Intel**

Robert Bosch and Intel will jointly produce ICs that Intel and Bosch have dubbed application-specific standard products (ASSPs).

**Intel**

Robert Bosch and Intel have reached an agreement under which Bosch will develop ASIC versions of Intel's MCS-96 16-bit microcontrollers.

**Nippondenso**

Associated Fuel Pump Systems has been jointly formed by Robert Bosch and Nippondenso. The new, equally owned joint venture company will produce fuel pumps in a new plant that will start manufacturing fuel pumps by the end of 1992.

**Gunter Bensinger**

Member of the board

**Karl Gutbrod**

Member of the board

**Hansjorg Manger**

Member of the board

**Friedrich Scholl**

Member of the board

**Herman Scholl**

Member of the board

**Herbert Weber**

Member of the board

**Herman Eisele**

Member of the board

**Wolfgang Hugo**

Member of the board

**Joachime Koch**

Member of the board

---

## MERGERS AND ACQUISITIONS

1990

**NovAtel Communications**

Robert Bosch has acquired a 50 percent interest in NovAtel Communications of Calgary, Canada. Bosch aims to expand its international presence in the mobile communications market and strengthen its position among leading worldwide suppliers.

**Airflow Research and Manufacturing**

Robert Bosch has purchased Airflow Research and Manufacturing, a ventilator and fan manufacturer. Airflow develops, produces, and markets ventilators in North America, primarily for cars.

---

## PRINCIPAL INVESTORS

Robert Bosch family—Approximately 10 percent  
State Charities—Remaining 90 percent

---



---

## KEY OFFICERS

**Marcus Bierich**

Chairman

---

## FOUNDERS

Robert Bosch

**Table 3**  
**Comprehensive Financial Statement\***  
**Fiscal Year Ending December**  
**(Millions of US Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Total Current Assets</b>	\$2,707.8	\$7,788.3	\$8,277.1	NA
Cash	NA	1,142.8	1,452.3	NA
Receivables	1,048.8	2,570.2	2,904.1	NA
Marketable Securities	583.9	1,253.5	1,258.2	NA
Inventory	NA	1,820.4	2,015.2	NA
Other Current Assets	1,075.1	1,001.4	647.3	NA
Net Property, Plants	\$1,504.1	\$2,243.5	\$2,597.4	NA
Other Assets	NA	\$245.2	\$659.7	NA
<b>Total Assets</b>	<b>\$4,212.0</b>	<b>\$9,035.0</b>	<b>\$11,534.2</b>	<b>\$11,811.2</b>
<b>Total Current Liabilities</b>	NA	\$3,100.6	\$3,299.3	NA
Long-Term Debt	NA	\$1,005.0	\$737.3	NA
Other Liabilities	NA	\$101.7	\$34.1	NA
<b>Total Liabilities</b>	<b>NA</b>	<b>\$4,207.2</b>	<b>\$4,070.7</b>	<b>NA</b>
<b>Total Shareholders' Equity</b>	NA	\$4,827.8	\$7,463.5	\$11,811.2
Converted Preferred Stock	NA	NA	NA	NA
Common Stock	NA	NA	NA	NA
Other Equity	NA	NA	NA	NA
Retained Earnings	NA	NA	NA	NA
<b>Total Liabilities and Shareholders' Equity</b>	<b>NA</b>	<b>\$9,035.0</b>	<b>\$11,534.2</b>	<b>\$11,811.2</b>
<b>Income Statement</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Revenue</b>	\$10,971.0	\$14,091.7	\$15,724.4	\$16,270.2
German Revenue	5,485.5	7,045.8	7,704.9	7,809.7
All Others	5,485.5	7,045.8	8,019.5	8,460.5
Cost of Sales	NA	NA	NA	NA
R&D Expense	\$581.6	\$791.7	\$931.8	\$959.0
SG&A Expense	NA	NA	NA	NA
Capital Expense	\$835.5	\$1,119.4	\$1,100.6	\$1,097.9
Pretax Income	NA	\$621.3	\$740.6	NA
Pretax Margin (%)	NA	4.41	4.71	NA
Effective Tax Rate (%)	NA	NA	NA	NA
Net Income	\$101.4	\$123.6	\$126.4	\$160.6
Shares Outstanding, Millions	NA	NA	NA	NA
<b>Per Share Data</b>				
Earnings	NA	NA	NA	NA
Dividend	NA	NA	NA	NA
Book Value	NA	NA	NA	NA
<b>Exchange Rate (US\$1=DM)</b>	<b>DM 2.17</b>	<b>DM 1.80</b>	<b>DM 1.76</b>	<b>DM 1.88</b>

\*Financials for 1985 were not available.  
 NA = Not available

Source: Robert Bosch Group  
 Annual Reports and Forms 10-K  
 Dataquest (1990)

**Table 4**  
**Comprehensive Financial Statement\***  
**Fiscal Year Ending December**  
**(Millions of Deutsche Marks, except Per Share Data)**

<b>Balance Sheet</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Total Current Assets	DM 5,876.0	DM 14,019.0	DM 14,567.7	NA
Cash	NA	2,057.0	2,556.0	NA
Receivables	2,276.0	4626.4	5,111.2	NA
Marketable Securities	1,267.0	2,256.3	2,214.5	NA
Inventory	NA	3,276.7	3,546.8	NA
Other Current Assets	2,333.0	1,802.6	1,139.2	NA
Net Property, Plants	DM 3,264.0	DM 4038.3	DM 4,571.5	NA
Other Assets	NA	DM 441.4	DM 1,161.0	NA
<b>Total Assets</b>	<b>DM 9,140.0</b>	<b>DM 16,263.0</b>	<b>DM 20,300.2</b>	<b>DM 22,205.0</b>
Total Current Liabilities	NA	DM 5,581.0	DM 5,806.8	NA
Long-Term Debt	NA	DM 1,809.0	DM 1,297.7	NA
Other Liabilities	NA	DM 183.0	DM 60.0	NA
<b>Total Liabilities</b>	<b>NA</b>	<b>DM 7,573.0</b>	<b>DM 7,164.5</b>	<b>NA</b>
Total Shareholders' Equity	NA	DM 8,690.0	DM 13,135.7	DM 22,205.0
Converted Preferred Stock	NA	NA	NA	NA
Common Stock	NA	NA	NA	NA
Other Equity	NA	NA	NA	NA
Retained Earnings	NA	NA	NA	NA
<b>Total Liabilities and Shareholders' Equity</b>	<b>NA</b>	<b>DM 16,263.0</b>	<b>DM 20,300.2</b>	<b>DM 22,205.0</b>
<b>Income Statement</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Revenue	DM 23,807.0	DM 25,365.0	DM 27,675.0	DM 30,588.0
German Revenue	11,903.5	12,682.5	13,560.7	14,682.3
International Revenue	11,903.5	12,682.5	14,114.3	15,905.7
Cost of Sales	NA	NA	NA	NA
R&D Expense	DM 1,262.0	DM 1,425.0	DM 1,640.0	DM 1,803.0
SG&A Expense	NA	NA	NA	NA
Capital Expense	DM 1,813.0	DM 2,015.0	DM 1,937.0	DM 2,064.0
Pretax Income	NA	DM 1,118.3	DM 1,303.4	NA
Pretax Margin (%)	NA	4.41	4.71	NA
Effective Tax Rate (%)	NA	NA	NA	NA
Net Income	DM 220.0	DM 222.5	DM 222.5	DM 302.0
Shares Outstanding, Millions	NA	NA	NA	NA
<b>Per Share Data</b>				
Earnings	NA	NA	NA	NA
Dividend	NA	NA	NA	NA
Book Value	NA	NA	NA	NA
<b>Exchange Rate (US\$1=DM)</b>	<b>DM 2.17</b>	<b>DM 1.80</b>	<b>DM 1.76</b>	<b>DM 1.88</b>

\*Financials for 1985 were not available.  
 NA = Not available

Source: Robert Bosch Group  
 Annual Reports and Forms 10-K  
 Dataquest (1990)

## Rockwell International Corporation

600 Grant Street  
Pittsburgh, Pennsylvania 15219  
Telephone: (412) 565-2000  
Fax: (412) 565-7388  
Dun's Number: 00-825-5523

*Date Founded: 1928*

---

### CORPORATE STRATEGIC DIRECTION

Rockwell International Corporation is a multi-industry company engaged in the research, development, manufacturing, and marketing of products for commercial and government markets.

Revenue totaled \$12.5 billion \*in 1989, a 4.8 percent increase over the previous year's revenue of \$11.9 billion. This increase was because of higher sales in the electronics, automotive, and graphics industries, as well as in space systems operations within the aerospace industry. The mix of the Company's sales in 1989 showed growth in the commercial industry, including international, while the sales to the US government decreased 3 percent to 44 percent of total sales. US commercial business sales totaled \$4.0 billion while international commercial sales totaled \$3.0 billion. The US government sales totaled \$5.5 billion, with the Department of Defense and National Aeronautics and Space Administration (NASA) responsible for \$3.5 billion and \$2.0 billion, respectively.

The Company encompasses four product divisions: Aerospace, Electronics, Automotive, and Graphics. An important shift is taking place in the Company's structure. Electronics is now the largest sector, and growth is coming increasingly from commercial and international markets. The Electronics Division is responsible for 39.2 percent (\$4.9 billion) of total revenue for fiscal 1989. In electronics, through its subsidiary Allen-Bradley, Rockwell is a leader in global industrial automation technologies. Avionics supplies instrumentation, communication, and navigation for air transport and business aircraft manufactured outside the Soviet Union. Rockwell Telecommunications provides hardware used by most long

distance telephone operating companies and communications networks in the United States. The Company produces defense-related electronic systems that play mission-critical roles in sea/air/land strategic communication.

The Aerospace Division is responsible for 31.2 percent (\$3.9 billion) of total revenue. Within this division are two segments, the Space Systems and Aircraft, that accounted for \$2.8 billion and \$1.1 billion, respectively. Under the Space Systems segment are the Space Transportation Systems Division, the Rocketdyne Division, and the Rockwell Space Operations Company, all of which contract out to NASA and the US government.

The Automotive Division's revenue totaled \$2.4 billion and represented 19.4 percent of total revenue. This division is segmented into two groups, Heavy Vehicles and Light Vehicles. More than two-thirds of division sales volume worldwide is derived from the Heavy Vehicles business—axles, brakes, and other components for medium- and heavy-duty trucks, buses, trailers, and off-highway users. In fiscal 1989, the largest percentage sales growth was shown by Light Vehicles, which is served by the Automotive Body & Chassis Systems organization. This group serves passenger-car and light-truck original equipment manufacturers (OEMs) in Europe, North America, Brazil, and Australia, providing total-design engineering and manufacturing expertise for products including door-window system modules and sunroof systems.

The Graphics Division's sales exceeded \$1 billion for the first time, totaling \$1.1 billion, or 8.9 percent of total revenue. Technologically advanced new products accounted for approximately 40 percent of the total. These products include the Colorliner and Headliner Offset T70 presses for large-circulation

---

\*All dollar amounts are in US dollars.

newspapers. In 1989, the Graphics Division acquired the Baker Perkins printing machinery business from APV Plc. This business is now named Rockwell PMC and serves the high-quality and high-volume publication and commercial printing markets.

The remaining 2.3 percent of total revenue comprises other income and gains on sales of businesses.

Net income of \$734.9 million for fiscal 1989 showed a decrease of 9.5 percent, down from \$811.9 million in fiscal 1988. Earnings from the electronics businesses for 1989 were up 29 percent from 1988, primarily reflecting significant volume improvements in avionics and the Allen-Bradley industrial automation businesses. Aerospace earnings decreased 15 percent in fiscal 1989, while automotive earnings showed a slight decrease. Graphics increased 98 percent over fiscal 1988, reflecting the successful introduction of new products.

Capital expenditure in 1989 totaled \$609 million and was used primarily for facilities and equipment dedicated to new products, improving quality, and increasing productivity. The Company expects capital expenditure to be about the same in fiscal 1990. Rockwell International employed 108,715 people in 1989.

R&D expenditure in 1989 totaled \$1.7 billion, posting a 6.3 percent increase over fiscal 1988 while representing 13.6 percent of total revenue. Of the \$1.7 billion, \$476 million was Company-initiated and the remainder was related to contracts with the US government.

More detailed information is available in Tables 1 and 2, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region. Information on revenue by distribution channel is not available. Table 3, a comprehensive financial statement, is at the end of this background.

---

## BUSINESS SEGMENT STRATEGIC DIRECTION

### Electronics

The Electronics Division represents defense electronics, telecom, avionics, and Allen-Bradley industrial

automation. The US defense electronics budget is expecting zero to negative real growth over the next several years, thus affecting Rockwell's Electronics Division.

In telecommunications, Rockwell is one of the nation's principal suppliers of transmission systems, switching systems, and line conditioning and line termination equipment to telephone companies. Dataquest estimates that the Company ranks first in the standalone automatic call distributors (ACDs) market, with 57.4 percent share in 1989. During 1989, Rockwell became active in the Far East market for the first time with sales to Nippon Telegraph and Telephone of Japan. Rockwell International is one of the world's leading suppliers of image modems for facsimile machines. Modems are the central focus of the Company's semiconductor product business, which derives 60 percent of its sales internationally, the majority coming from Japan.

In avionics, the Company plans to sustain fleet growth in the large commercial aircraft and regional airline segment of the general aviation market. Rockwell introduced systems for automatic flight control, in-flight monitoring, and maintenance information displays to broaden the existing product range from a base in communications and navigation equipment. According to Rockwell, the Company has gained market share and holds the leading position with about 40 percent of the addressed market.

Allen-Bradley industrial automation showed strong performances from both its expanding lines of industrial automation products and its traditional lines of electromechanical industrial control devices. In 1989, Allen-Bradley began shipping the Pyramid Integrator, which consists of a family of automation products developed in partnership with Digital Equipment Corporation (DEC) and incorporating its MicroVAX computer. Allen-Bradley acquired Creonics, Inc., to broaden its motion control product line. Also, a new joint venture with Hyundai Electronics Industries is manufacturing, selling, and supporting programmable controllers in South Korea.

### Aerospace

Rockwell's Aerospace Division engages in the research, development, and manufacture of military aircraft, manned and unmanned space systems, rocket engines, advanced space-based surveillance systems, and high-energy laser and other directed-energy programs.

Dataquest estimates that Rockwell obtained a 2.5 percent share with \$2.2 billion in revenue in the military aerospace electronic equipment market. The major focus of this division in 1989 was the construction of a new shuttle orbiter (the Endeavour) and its main engines. Rockwell's subsidiary Rocketdyne is under contract with NASA to build the Space Station Freedom's power system. Engines for expendable launch vehicles constitute an increase in the large rocket engine business. The Company is currently producing 28 NAVSTAR Global Positioning System (GPS) satellites. The Company is also competing for design of the National Aero Space Plane (NASP) airframe and for its propulsion system.

### Graphics

The Graphics Division surpassed \$1 billion for the first time in fiscal 1989. This was largely because of the introduction of the Goss Colorliner press and the Headliner Offset T70 press. These two new presses are used in the production of colored newspapers. In an effort to serve the Japanese newspaper press market more effectively, Rockwell purchased from Ikegai

Corporation its 50 percent interest in its former Ikegai-Goss joint venture.

### Automotive

The Automotive Division continued to increase its presence on international markets, from which 44 percent of its sales come. In 1989, Rockwell expanded its heavy vehicle drive-train product line to include a new family of manual transmissions for North American 1990 models. Also introduced in 1989 were clutches for heavy-duty trucks. To add to the Company's strong plastics market presence, Rockwell acquired Butler Polymet, a major supplier of structural thermoplastic composites. This expanded capability supplements the existing sheet molding compound business, which supplies exterior body panels used on nearly 40 percent of the heavy-duty trucks manufactured in North America.

### Further Information

For further information on the Company's business segments, please contact the appropriate Dataquest industry service.



**Table 1**  
**Five-Year Corporate Highlights (Millions of US Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$11,337.6	\$12,295.7	\$12,123.4	\$11,946.3	\$12,518.1
Percent Change	-	8.45	(1.40)	(1.46)	4.79
Capital Expenditure	\$614.4	\$543.6	\$474.1	\$554.8	\$609.0
Percent of Revenue	5.42	4.42	3.91	4.64	4.86
R&D Expenditure	\$1,500.0	\$1,400.0	\$1,400.0	\$1,600.0	\$1,700.0
Percent of Revenue	13.23	11.39	11.55	13.39	13.58
Number of Employees	123,266	121,194	116,148	112,160	108,715
Revenue (\$K)/Employee	\$91.98	\$101.45	\$104.38	\$106.51	\$115.15
Net Income	\$595.3	\$611.2	\$635.1	\$811.9	\$734.9
Percent Change	-	2.67	3.91	27.84	(9.48)
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	
Quarterly Revenue	\$2,869.3	\$3,161.7	\$3,212.1	\$3,275.0	
Quarterly Profit	\$160.0	\$270.7	\$178.1	\$126.1	

Source: Rockwell International Corporation  
 Annual Reports  
 Dataquest (1990)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1985	1986	1987	1988	1989
North America	92.00	89.00	89.00	84.00	85.60
International	8.00	11.00	11.00	16.00	14.4
Europe	5.00	7.00	7.00	10.00	10.20
All Others	1.00	1.00	1.00	3.00	4.20

Source: Rockwell International Corporation  
 Annual Reports

---

## 1989 SALES OFFICE LOCATIONS (Corporate Offices Only)

North America—13  
Europe—2  
Asia/Pacific—2  
Japan—1

---

## MANUFACTURING LOCATIONS

### *North America*

Autonetics ICBM System Division, Anaheim, California

Guidance and control systems

Autonetics Marine System Division, Anaheim, California

Submarine navigation systems

Autonetics Sensors and Aircraft Division, Anaheim, California

Tactical and strategic sensor systems, ground electrical systems

Collins Defense Communications Division, Santa Ana, California

Airplane console radios, radio transmitters, transportable radio systems, defense communications systems

Collins Defense Communications Division, Cedar Rapids, Iowa

Airplane console radios, radio transmitters, transportable radio systems, defense communications systems

Collins Defense Communications Division, Richardson, Texas

Airplane console radios, radio transmitters, transportable radio systems, defense communications systems

Collins General and Air Transport Aviation Division, Cedar Rapids, Iowa

Test equipment/ATE, ground support equipment, cockpit instrumentation

Collins Government Avionics Division, Cedar Rapids, Iowa

Functional ATE, portable/field service ATE, avionics test equipment for military aircraft, cockpit instrumentation

Electronic Components Division, El Paso, Texas

Passive components

Maine Electronic Group, Lisbon, Maine

Connectors/packaging

Missile Systems Division, Duluth, Georgia

Nuclear missiles, missile components

North American Aircraft Operations, Los Angeles, California

Conventional missiles, military aircraft, airframe structures, spacecraft

Rocketdyne Division, Canoga Park, California

Nuclear missiles, nuclear energy components, space stations, engine systems, rocket engines, space shuttle main engines, space power systems

Rockwell DEL, Inc., Huntington Beach, California

EW communications systems, parallel tube transmitters, airborne jamming systems, combat simulation systems, optical collimators, RF environmental generators

Satellite and Space Electronics Division, Seal Beach, California

Spaceborne processors, surveillance satellites, laser radar, space-based laser R&D, signal/data processing equipment for space, satellite transponders, spaceborne receivers, navigation satellites, laser radar, infrared sensors

Semiconductor Products Division, Newport Beach, California

Microcomputers, intelligent display controllers, computer ICs, microprocessors, modem chip sets, data modem modules, image modem modules, secure communications ICs, cell-based ICs

Space Transportation Systems Division, Downey, California

Advanced launch systems, national aerospace planes, space shuttle orbiter, shuttle C, space-based interceptors

Strategic Defense Center, El Segundo, California

EW equipment, defense/government services, design engineering services

---

## SUBSIDIARIES

### *North America*

Allen-Bradley Company, Inc. (United States)

DataMyte Corporation (United States)

Decision Software Co., Inc. (United States)

Electronics Corp. (United States)

Rocketdyne (United States)

Rockwell Financial Service Corporation (United States)

Rockwell Graphic Systems, Inc. (United States)  
Rockwell International & Suspension Systems Co.,  
Inc. (United States)  
Rockwell International Finance Corporation (United  
States)  
Rockwell International of Canada Ltd. (Canada)  
Science Center (United States)  
Springs & Stampings (United States)

*Europe*

Rockwell Compagnie Industrielle de Mecanismes,  
S.A. (France)  
Rockwell CVC S.R.L. (Italy)

*ROW*

Rockwell do Brazil Industria e Comercio Ltda.  
(Brazil)

Creonics, Inc.  
Allen-Bradley Group purchased Creonics to  
broaden its motion control product line.

Butler Polymet  
Rockwell International acquired Butler Polymet to  
add to the Company's plastic presence.

*1987*

Valeo of France  
Rockwell acquired Soma Europe Transmissions  
from Valeo of France.

Communications Machinery  
Rockwell acquired Communications Machinery for  
\$40 million.

---

**ALLIANCES, JOINT VENTURES, AND  
LICENSING AGREEMENTS**

*1989*

Hyundai Electronics Industries  
Rockwell and Hyundai agreed to have Hyundai  
manufacture, sell, and support programmable con-  
trollers.

*1988*

Digital Equipment Corporation (DEC)  
DEC licensed Rockwell's Allen-Bradley Division  
to build its VAX computers for use in industrial  
automation systems.

Microelectronics & Computer Corporation  
(MCC)—Research Consortium  
Since 1982, Rockwell has been a member of the  
MCC, a corporate research venture conducting  
R&D in microelectronics and computer technology  
owned by 19 US companies.

---

**MERGERS AND ACQUISITIONS**

*1989*

Baker Perkins Inc.  
Rockwell International acquired the Baker Perkins  
printing machinery business from APV Plc and  
renamed it Rockwell PMC.

---

**KEY OFFICERS**

Donald Beall  
Chairman of the board, chief executive officer

Kent Black  
Executive vice president

Robert A. de Palma  
Senior vice president, chief financial officer

Sam Iacobellis  
Executive vice president

J. Tracy O'Rourke  
Executive vice president

---

**PRINCIPAL INVESTORS**

Information is not available.

---

**FOUNDERS**

Information is not available.

**Table 3**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending September**  
**(Millions of US Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Total Current Assets	\$3,492.7	\$3,837.5	\$4,622.0	\$4,924.8	\$4,366.8
Cash	451.5	756.9	1,103.4	899.7	332.4
Receivables	1,724.9	1,703.2	1,990.1	2,209.0	2,137.2
Inventory	1,240.5	1,300.3	1,451.6	1,526.7	1,574.1
Other Current Assets	75.8	77.1	76.9	289.4	323.1
Investments	\$146.1	\$156.4	0	0	0
Net Property, Plants	\$2,523.8	\$2,620.4	\$2,669.1	\$2,640.4	\$2,594.2
Other Assets	\$1,170.2	\$1,089.1	\$1,448.1	\$1,643.3	\$1,977.8
<b>Total Assets</b>	<b>\$7,332.8</b>	<b>\$7,703.4</b>	<b>\$8,739.2</b>	<b>\$9,208.5</b>	<b>\$8,938.8</b>
Total Current Liabilities	\$3,317.5	\$3,411.4	\$3,992.4	\$3,795.9	\$3,482.2
Long-Term Debt	\$647.5	\$627.4	\$762.6	\$745.3	\$552.1
Other Liabilities	\$419.5	\$502.5	\$670.0	\$974.3	\$926.9
<b>Total Liabilities</b>	<b>\$4,384.5</b>	<b>\$4,541.3</b>	<b>\$5,425.0</b>	<b>\$5,515.5</b>	<b>\$4,961.2</b>
Total Shareholders' Equity	\$2,948.3	\$3,162.1	\$3,314.2	\$3,693.0	\$3,977.6
Converted Preferred Stock	1.6	1.4	2.5	2.3	2.1
Common Stock	155.3	155.3	190.8	200.2	209.5
Class A Common Stock	0	0	88.7	79.4	69.9
Other Equity	(51.8)	(265.0)	(67.4)	(305.1)	(541.0)
Retained Earnings	2,843.2	3,270.4	3,099.6	3,716.2	4,237.1
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$7,332.8</b>	<b>\$7,703.4</b>	<b>\$8,739.2</b>	<b>\$9,208.5</b>	<b>\$8,938.8</b>
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Revenue	\$11,337.6	\$12,295.7	\$12,123.4	\$11,946.3	\$12,518.1
US Revenue	10,381.0	11,115.0	10,798.0	9,986.0	10,310.0
Non-US Revenue	956.6	1,180.7	1,325.4	1,960.3	2,208.1
Cost of Sales	\$9,090.7	\$9,913.0	\$9,560.3	\$9,508.8	\$9,986.2
R&D Expense	\$1,500.0	\$1,400.0	\$1,400.0	\$1,600.0	\$1,700.0
SG&A Expense	\$1,218.3	\$1,318.1	\$1,363.1	\$1,435.4	\$1,472.8
Capital Expense	\$614.4	\$543.6	\$474.1	\$554.8	\$609.0
Pretax Income	\$1,062.5	\$1,058.6	\$1,186.7	\$1,053.0	\$1,205.7
Pretax Margin (%)	9.37	8.61	9.79	8.81	9.63
Effective Tax Rate (%)	44.00	42.30	46.50	22.90	39.00
Net Income	\$595.3	\$611.2	\$635.1	\$811.9	\$734.9
Shares Outstanding, Millions	148.7	148.3	280.0	266.6	255.6
<b>Per Share Data</b>					
Earnings	\$4.00	\$4.12	\$2.27	\$3.04	\$2.87
Dividend	\$1.06	\$1.16	\$0.65	\$0.71	\$0.75
Book Value	\$19.83	\$21.32	\$11.84	\$13.85	\$15.56

**Table 3 (Continued)**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending September**  
**(Millions of US Dollars, except Per Share Data)**

Key Financial Ratios	1985	1986	1987	1988	1989
<i>Liquidity</i>					
Current (Times)	1.05	1.12	1.16	1.30	1.25
Quick (Times)	0.68	0.74	0.79	0.90	0.80
Fixed Assets/Equity (%)	85.60	82.87	80.54	71.50	65.22
Current Liabilities/Equity (%)	112.52	107.88	120.46	102.79	87.55
Total Liabilities/Equity (%)	148.71	143.62	163.69	149.35	124.73
<i>Profitability (%)</i>					
Return on Assets	-	8.13	7.73	9.05	8.10
Return on Equity	-	20.01	19.61	23.17	19.16
Profit Margin	5.25	4.97	5.24	6.80	5.87
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	13.23	11.39	11.55	13.39	13.58
Capital Spending % of Revenue	5.42	4.42	3.91	4.64	4.86
Employees	123,266	121,194	116,148	112,160	108,715
Revenue (\$K)/Employee	\$91.98	\$101.45	\$104.38	\$106.51	\$115.15
Capital Spending % of Assets	8.38	7.06	5.42	6.02	6.81

Source: Rockwell International Corporation  
Annual Reports  
Dataquest (1990)

# Rockwell International Corporation

600 Grant Street  
Pittsburgh, Pennsylvania 15219  
Telephone: (412) 565-2000  
Fax: (412) 565-7388  
Dun's Number: 00-825-5523

*Date Founded: 1928*

---

## CORPORATE STRATEGIC DIRECTION

Rockwell International Corporation is an \$11.9 billion,\* multi-industry company engaged in the research, development, manufacturing, and marketing of many products for commercial and government markets.

Rockwell applies advanced technology to a wide range of products in the aerospace, electronics, automotive, and general industries businesses. Rockwell's Electronics segment represents the majority of its revenue, 38 percent; the Aerospace segment, 33 percent; the Automotive segment, 18 percent; and General Industries, 11 percent.

To better respond to market competition and tightening demand due to the Department of Defense's (DOD's) budget restrictions, Rockwell's defense electronics operations have been restructured and reorganized. The Company consolidated its satellite systems divisions, electronics operations, electro-optical systems, and strategic defense division to form a new Satellite and Space Electronics Division. Rockwell intends to expand its position in international defense electronics markets.

Although the B-1B production program was completed in 1988, modifications and spare parts production are expected to generate sales of approximately \$500 million annually into the next century. The B-1B set 36 world records for speed, payload, and distance over two courses at average speeds of 670 and 655 miles per hour.

At fiscal year end 1988, Rockwell reported a 1 percent decrease in total revenue of \$11.9 billion,

\*All dollar amounts are in U.S. dollars.

down from \$12.1 billion in fiscal 1987. Net income rose 28 percent in fiscal 1988 to \$811.9 million.

Rockwell performs research and development under both Company-initiated programs and contracts with others, primarily the U.S. government. Company-initiated programs include R&D for commercial products as well as independent R&D and bid and proposal work related to government products and services. A large portion of the cost incurred for the independent R&D and bid and proposal work is recoverable through overhead cost allowances on government contracts.

Research and development costs incurred by the Company aggregated approximately \$1.6 billion, of which \$430 million was initiated by Rockwell and the remainder related to U.S. government contracts. Rockwell's capital expenditures amounted to \$554.8 million during fiscal 1988, or 5 percent of revenue.

Rockwell conducts operations in the United States and in 30 foreign countries. The Company's principal foreign markets are in Australia, Brazil, Canada, France, Italy, Japan, Saudi Arabia, the United Kingdom, and West Germany. North America accounted for most of Rockwell's 1988 sales, 84 percent, followed by Europe with 10 percent, Canada with 3 percent, and South America and all other countries with the rest.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region and distribution channel. Table 4, a comprehensive financial statement, is at the end of this profile.

## BUSINESS SEGMENT STRATEGIC DIRECTION

### Aerospace

Rockwell's Aerospace segment engages in the research, development, and manufacture of military aircraft, manned and unmanned space systems, rocket engines, advanced space-based surveillance systems, and high-energy laser and other directed-energy programs.

Aerospace 1988 earnings of \$493 million were 30 percent lower than 1987 earnings due primarily to the completion during the year of B-1B aircraft production. A reserve for potential cost problems on a weapons systems modernization program was a further factor in the lower aerospace earnings. Aerospace benefited, however, from an increase in a space systems earnings, principally reflecting increased volume in the space shuttle program.

Rockwell's space operation's first priority has been to work with NASA to return the space shuttle to flight status. The Company is also working on designs for the Shuttle-C, a heavy-lift, unmanned launch system derived from shuttle technology. The Company's Rocketdyne Division is the major supplier of liquid fuel propulsion systems.

### Electronics

The Electronics segment represents defense electronics, telecom, avionics, and Allen-Bradley industrial automation. Earnings for 1988 were \$378 million, reflecting significant sales and earnings improvements in the avionics and Allen-Bradley industrial automation businesses. However, the Company's electronics earnings were up only slightly from the prior year due principally to less favorable product mix and performance in telecommunications and plant restructuring costs in defense electronics.

### Avionics

Guidance and navigation programs form the largest sector of Rockwell's defense electronics business. Under a \$190 million contract from the Air Force, the

Company continued production of Peacekeeper guidance and control systems. Rockwell also qualified as the second source for the MX inertial measurement unit for fiscal year 1988. The Company is delivering improved guidance systems for the deployed Minuteman force and is also developing systems for the new generation of Small Intercontinental Ballistic Missiles (SICBM). Early in 1989, the Company was awarded a \$162 million contract for the launch control system for the Rail Garrison MX program.

In one of Rockwell's key roles as the leader in commercial and defense avionics, the Company is developing avionics systems with flat-panel, liquid-crystal cockpit displays and integrated digital technology for the next generation of commercial airliners and general aviation aircraft. Rockwell's new-generation, lightweight digital avionics systems are standard or standard options on business jet and turboprop aircraft.

### Telecommunications

In telecommunications, Rockwell is one of the nation's principal suppliers of transmission systems, switching systems, and line conditioning and line termination equipment to telephone companies. The Company has become a leading supplier of lightwave systems to the telephone industry and is the nation's second largest independent supplier of microwave communications systems. Dataquest estimated Rockwell to have 12 percent of the automatic call distributors (ACDs) market share, behind Northern Telecom and AT&T.

### Semiconductors

Rockwell ranked with the top 40 semiconductor vendors for 1988. Dataquest estimates that Rockwell's semiconductor revenue for 1988 totaled \$174 million, 29 percent of which was in microdevices and 71 percent in logic devices.

### Industrial Automation

On October 4, 1988, Allen-Bradley Company (Rockwell's industrial automation subsidiary) and Digital Equipment Corporation moved to improve information flow with the announcement of their jointly developed Pyramid Integrator MicroVAX. The Pyramid Integrator is a family of industrial control

products that will link the factory floor with enterprise-wide information management. For Allen-Bradley, the Pyramid Integrator is, most importantly, a way in which to sell additional communications equipment, quality management systems, and control products. Not only can Allen-Bradley sell into its own installed base, but also, through joint sales calls, it will gain an entree into many new Digital Equipment accounts looking for an improved enterprise-wide networking solution.

#### **Automotive**

Rockwell's automotive 1988 earnings totaled \$183 million, up 12 percent from 1987, due to volume improvements in both the heavy-duty truck and passenger car components businesses.

The Automotive segment is engaged in the research, development, and manufacture of components for heavy- and medium-duty trucks, buses, trailers, heavy-duty off-highway vehicles, light trucks, and passenger cars.

#### **General Industries**

Earnings from the Company's General Industries businesses in 1988 were \$144 million, an increase of 29 percent over 1987, primarily reflecting higher earnings by the energy operations and a gain from the sale of the industrial sewing machine business.

In March 1989, Rockwell sold its Measurement and Flow Control Division.

The General Industries segment is engaged in the research, development, and manufacture of high-speed printing presses and related graphic arts equipment, and measurement and flow control equipment for energy markets including the utility, oil, gas, and nuclear industries.

#### **Further Information**

For further information on the company's business segments, please contact the appropriate industry service.



**Table 1**  
**Five-Year Corporate Highlights (Millions of U.S. Dollars)**

	1984	1985	1986	1987	1988
Five-Year Revenue	\$9,322.1	\$11,337.6	\$12,295.7	\$12,123.4	\$11,946.3
Percent Change	-	21.62	8.45	(1.40)	(1.46)
Capital Expenditure	\$567.1	\$614.4	\$543.6	\$474.1	\$554.8
Percent of Revenue	6.08	5.42	4.42	3.91	4.64
R&D Expenditure	\$1,100.0	\$1,500.0	\$1,400.0	\$1,400.0	\$1,600.0
Percent of Revenue	11.80	13.23	11.39	11.55	13.39
Number of Employees	105,759	123,266	121,194	116,148	112,160
Revenue (\$K)/Employee	\$88.14	\$91.98	\$101.45	\$104.38	\$106.51
Net Income	\$496.5	\$595.3	\$611.2	\$635.1	\$811.9
Percent Change	-	19.90	2.67	3.91	27.84
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	
Quarterly Revenue	\$3,337.5	\$3,212.1	\$3,275.00	N/A	
Quarterly Profit	\$270.70	\$178.10	\$126.10	N/A	

N/A = Not Available

Source: Rockwell International  
Annual Reports  
Dataquest  
January 1990

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1984	1985	1986	1987	1988
North America	91.00	92.00	89.00	89.00	84.00
International	9.00	8.00	11.00	11.00	16.00
Europe	5.00	5.00	7.00	7.00	10.00
Canada	3.00	3.00	3.00	3.00	3.00
All Others	1.00	1.00	1.00	1.00	3.00

Source: Rockwell International  
Annual Reports

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1987	1988
Direct Sales	N/A	N/A
Indirect Sales	N/A	N/A

N/A = Not Available

Source: Rockwell International  
Annual Reports

---

## 1988 SALES OFFICE LOCATIONS (Corporate Offices Only)

North America—13  
Japan—1  
Europe—2  
Asia/Pacific—2

---

## MANUFACTURING LOCATIONS

### *North America*

Autonetics ICBM System Division, Anaheim, California  
Guidance and control systems

Autonetics Marine System Division, Anaheim, California  
Submarine navigation systems

Autonetics Sensors and Aircraft Division, Anaheim, California  
Tactical and strategical sensor systems, ground electrical systems

Collins Defense Communications Division, Santa Ana, California  
Airplane console radios, radio transmitters, transportable radio systems, defense communications systems

Collins Defense Communications Division, Cedar Rapids, Iowa  
Airplane console radios, radio transmitters, transportable radio systems, defense communications systems

Collins Defense Communications Division, Richardson, Texas  
Airplane console radios, radio transmitters, transportable radio systems, defense communications systems

Collins General and Air Transport Aviation Division, Cedar Rapids, Iowa  
Test equipment/ATE, ground support equipment, cockpit instrumentation

Collins Government Avionics Division, Cedar Rapids, Iowa  
Functional ATE, portable/field service ATE, avionics test equipment for military aircraft, cockpit instrumentation

Electronic Components Division, El Paso, Texas  
Passive components

Maine Electronic Group, Lisbon, Maine  
Connectors/packaging

Missile Systems Division, Duluth, Georgia  
Nuclear missiles, missile components

North American Aircraft Operations, Los Angeles, California  
Conventional missiles, military aircraft, airframe structures, spacecraft

Rocketdyne Division, Canoga Park, California  
Nuclear missiles, nuclear energy components, space stations, engine systems, rocket engines, space shuttle main engines, space power systems

Rockwell DEL, Inc., Huntington Beach, California  
EW communications systems, parallel tube transmitters, airborne jamming systems, combat simulation systems, optical collimators, RF environmental generators

Satellite and Space Electronics Division, Seal Beach, California  
Spaceborne processors, surveillance satellites, laser radar, space-based laser R&D, signal/data processing equipment for space, satellite transponders, spaceborne receivers, navigation satellites, laser radar, infrared sensors

Semiconductor Products Division, Newport Beach, California  
Microcomputers, intelligent display controllers, computer ICs, microprocessors, modem chip sets, data modem modules, image modem modules, secure communication ICs, cell-based ICs

Space Transportation Systems Division, Downey, California  
Advanced launch systems, national aerospace planes, space shuttle orbiter, shuttle C, space-based interceptors

Strategic Defense Center, El Segundo, California  
EW equipment, defense/government services, design engineering services

---

## SUBSIDIARIES

### *North America*

Allen-Bradley Company, Inc. (United States)  
DataMyte Corporation (United States)

Decision Software Co., Inc. (United States)  
Electronics Corp. (United States)  
Rockwell Financial Service Corporation (United States)  
Rockwell Graphic Systems, Inc. (United States)  
Rockwell Int. & Suspension Systems Co., Inc. (United States)  
Rockwell International Finance Corporation (United States)  
Rockwell International of Canada Ltd. (Canada)  
Science Center (United States)  
Springs & Stampings (United States)

*Europe*

Rockwell Compagnie Industrielle de Mecanismes, S.A. (France)  
Rockwell CVC S.R.L. (Italy)

*ROW*

Rockwell do Brazil Industria e Comercio Ltda. (Brazil)

---

**ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS**

*October 1988*

**Digital Equipment**

Digital licensed Rockwell's Allen-Bradley Division to build its VAX computers for use in industrial automation systems.

**Microelectronics & Computer Corporation (MCC)—Research Consortium**

Rockwell has been a member of the MCC since 1982, a corporate research venture conducting R&D in microelectronics and computer technology owned by 19 U.S. companies.

---

**MERGERS AND ACQUISITIONS**

*1987*

**Valeo of France**

Rockwell acquired Soma Europe Transmissions from Valeo of France.

**Communications Machinery**

Rockwell acquired Communications Machinery for \$40 million.

---

**KEY OFFICERS**

**Robert Anderson**

Executive officer

**Donald Beall**

Chairman of the board, president, chief executive officer

**Richard W. Bohlen**

Senior vice president, Operations

**Lee H. Cramer**

Vice president, treasurer

**Robert A. dePalma**

Senior vice president, chief financial officer

**Lawrence J. Komatz**

Vice president, controller

---

**PRINCIPAL INVESTORS**

First Interstate Bank of California  
The Northern Trust Company

**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending September 30**  
**(Millions of U.S. Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
Total Current Assets	\$3,612.8	\$3,492.7	\$3,837.5	\$4,622.0	\$4,924.8
Cash	1,148.4	451.5	756.9	1,103.4	899.7
Receivables	1,519.9	1,724.9	1,703.2	1,990.1	2,209.0
Inventory	896.1	1,240.5	1,300.3	1,451.6	1,526.7
Other Current Assets	48.4	75.8	77.1	76.9	289.4
Investments	140.6	146.1	156.4	0	0
Net Property, Plants	\$1,990.3	\$2,523.8	\$2,620.4	\$2,669.1	\$2,640.4
Other Assets	\$125.8	\$1,170.2	\$1,089.1	\$1,448.1	\$1,643.3
<b>Total Assets</b>	<b>\$5,869.5</b>	<b>\$7,332.8</b>	<b>\$7,703.4</b>	<b>\$8,739.2</b>	<b>\$9,208.5</b>
Total Current Liabilities	\$2,839.5	\$3,317.5	\$3,411.4	\$3,992.4	\$3,795.9
Long-Term Debt	\$218.6	\$647.5	\$627.4	\$762.6	\$745.3
Other Liabilities	\$289.8	\$419.5	\$502.5	\$670.0	\$974.3
<b>Total Liabilities</b>	<b>\$3,347.9</b>	<b>\$4,384.5</b>	<b>\$4,541.3</b>	<b>\$5,425.0</b>	<b>\$5,515.5</b>
Total Shareholders' Equity	\$2,521.6	\$2,948.3	\$3,162.1	\$3,314.2	\$3,693.0
Converted Preferred Stock	2.8	1.6	1.4	2.5	2.3
Common Stock	155.3	155.3	155.3	190.8	200.2
Class A Common Stock	0	0	0	88.7	79.4
Other Equity	(77.1)	(51.8)	(265.0)	(67.4)	(305.1)
Retained Earnings	2,440.6	2,843.2	3,270.4	3,099.6	3,716.2
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$5,869.5</b>	<b>\$7,332.8</b>	<b>\$7,703.4</b>	<b>\$8,739.2</b>	<b>\$9,208.5</b>
<b>Income Statement</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
Revenue	\$9,322.1	\$11,337.6	\$12,295.7	\$12,123.4	\$11,946.3
U.S. Revenue	8,521.1	10,381.0	11,115.0	10,798.0	9,986.0
Non-U.S. Revenue	801.0	956.6	1,180.7	1,325.4	1,960.3
Cost of Sales	\$7,562.4	\$9,090.7	\$9,913.0	\$9,560.3	\$9,508.8
R&D Expense	\$1,100.0	\$1,500.0	\$1,400.0	\$1,400.0	\$1,600.0
SG&A Expense	\$961.4	\$1,218.3	\$1,318.1	\$1,363.1	\$1,435.4
Capital Expense	\$567.1	\$614.4	\$543.6	\$474.1	\$554.8
Pretax Income	\$899.5	\$1,062.5	\$1,058.6	\$1,186.7	\$1,053.0
Pretax Margin (%)	9.65	9.37	8.61	9.79	8.81
Effective Tax Rate (%)	44.80	44.00	42.30	46.50	22.90
Net Income	\$496.5	\$595.3	\$611.2	\$635.1	\$811.9
Shares Outstanding, Millions	152.3	148.7	148.3	280.0	266.6
<b>Per Share Data</b>					
Earnings	\$3.25	\$4.00	\$4.12	\$2.27	\$3.04
Dividends	\$0.94	\$1.06	\$1.16	\$0.65	\$0.71
Book Value	\$16.56	\$19.83	\$21.32	\$11.84	\$13.85

**Table 4 (Continued)**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending September 30**  
**(Millions of U.S. Dollars, except Per Share Data)**

<b>Key Financial Ratios</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
<i>Liquidity</i>					
Current (Times)	1.27	1.05	1.12	1.16	1.30
Quick (Times)	0.96	0.68	0.74	0.79	0.90
Fixed Assets/Equity (%)	78.93	85.60	82.87	80.54	71.50
Current Liabilities/Equity (%)	112.61	112.52	107.88	120.46	102.79
Total Liabilities/Equity (%)	132.77	148.71	143.62	163.69	149.35
<i>Profitability (%)</i>					
Return on Assets	-	9.02	8.13	7.73	9.05
Return on Equity	-	21.77	20.01	19.61	23.17
Profit Margin	5.33	5.25	4.97	5.24	6.80
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	11.80	13.23	11.39	11.55	13.39
Capital Spending % of Revenue	6.08	5.42	4.42	3.91	4.64
Employees	105,759	123,266	121,194	116,148	112,160
Revenue (\$K)/Employee	\$88.14	\$91.98	\$101.45	\$104.38	\$106.51
Capital Spending % of Assets	9.66	8.38	7.06	5.42	6.02

Source: Rockwell International  
Annual Reports  
Dataquest  
January 1990

# Rockwell International Corporation

Table 1

**Estimated Worldwide Semiconductor Revenue by Calendar Year  
(Millions of Dollars)**

	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
Total Semiconductor	57	57	44	124	172	174
Total Integrated Circuit	57	57	44	124	172	174
Bipolar Digital (Function)						
Bipolar Digital Memory						
Bipolar Digital Logic						
MOS (Function)	57	57	44	65	172	174
MOS Memory	16	9	2	1		
MOS Microdevices	25	32	26	40	46	51
MOS Logic	16	16	16	24	126	123
Analog				59		
Total Discrete						
Total Optoelectronic						

Table 2

**Rockwell International Corporation  
1988 Worldwide Ranking by Semiconductor Markets  
(Revenue in Millions of Dollars)**

	<u>1988</u>	<u>1987</u>	<u>1988</u>	<u>Sales</u>	<u>Industry</u>
	<u>Rank</u>	<u>Rank</u>	<u>Revenue</u>	<u>% Change</u>	<u>% Change</u>
				<u>1987-1988</u>	<u>1987-1988</u>
Total Semiconductor	38	34	\$174	1.2%	33.0%
Total Integrated Circuit	32	29	\$174	1.2%	37.4%
MOS (Function)	27	21	\$174	1.2%	54.5%
MOS Microdevices	24	21	51	10.9%	39.9%
MOS Logic	21	18	123	(2.4%)	29.2%

Source: Dataquest  
December 1989

# Rockwell International Corporation

Table 3

Rockwell International Corporation  
Estimated 1988 Semiconductor Revenue by Geographic Region  
(Millions of Dollars)

	<u>U.S.</u>	<u>Japan</u>	<u>Europe</u>	<u>ROW</u>
Total Semiconductor	\$58	\$88	\$18	\$10
Total Integrated Circuit	\$58	\$88	\$18	\$10
Bipolar Digital (Function)				
Bipolar Digital Memory				
Bipolar Digital Logic				
MOS (Function)	\$58	\$88	\$18	\$10
MOS Memory				
MOS Microdevices	34		11	6
MOS Logic	24	88	7	4
Analog				
Total Discrete				
Total Optoelectronic				

Source: Dataquest  
December 1989

# Rockwell MRDC

Rockwell Microelectronics Research and  
Development Center (MRDC)  
3370 Miraloma Avenue  
Anaheim, CA 92803  
(714) 762-4074  
(818) 700-1233 (Thousand Oaks facility)

Established 1975  
Number of Employees: N/A

## **BACKGROUND**

Rockwell International is a multi-industry corporation engaged in R&D and the manufacture and sale of products for government and commercial markets. It was prime contractor for the B1 bomber. Its principal space activity is the space shuttle program for NASA.

Rockwell developed the first DOD-sponsored GaAs foundry capability via Defense Advance Resolution Project Agency and other funding. The cost of the facility was \$16 million. Its production schedule is 100 3-inch wafers per shift per week in 1987 with a total planned capacity of 250 wafers per shift per week. The plant includes LEC crystal production, wafer preparation, device R&D, CAD systems, and complete fab capabilities.

## **COMPANY EXECUTIVES**

- Vice President/Center Director—Dr. Eugene E. Pentecost
- Marketing Director—Phillip A. Dee

## **SERVICES**

The Company has a GaAs foundry.

## **PROCESS TECHNOLOGY**

The Company uses GaAs MESFET technology.



# Rockwell MRDC

## **PRODUCTS**

- MMICs
- DigICs including 16K SRAMs
- 6,000-gate gate arrays for operational use by DARPA

## **Applications**

- Military electronics
- Aerospace electronics

## **FACILITIES**

Rockwell MRDC's Thousand Oaks, California, facility has 40,700 square feet, including 12,200 square feet of controlled environment.

---

# Rockwell International Corporation

## THE COMPANY

### Background

Rockwell International Corporation is a multi-industry company that manufactures a wide range of high-technology products in four major business areas: Aerospace, Automotive, Electronics, and General Industries. Rockwell was originally incorporated under the laws of the State of Delaware in 1928 as Rockwell-Standard.

The Semiconductor Products Division, formerly the Electronic Devices Division, is part of the Electronics business segment. The Electronics Devices Division was originally formed from the Autonetics Division of North American Aviation, Inc., which merged with Rockwell-Standard in 1967 to form North American Rockwell. In 1972, North American Rockwell acquired Collins Radio Company to form Rockwell International Corporation.

Rockwell's Semiconductor Products Division designs, develops, manufactures, and markets a wide range of semiconductor integrated circuits and modules for the computer, consumer, industrial, and telecommunications markets.

### Operations

The August 1983 reorganization of Rockwell's Semiconductor Products Division is reflected in the organization chart shown in Figure 1. The reorganization was intended to reflect a more specific focus on the semiconductor market and customer requirements.

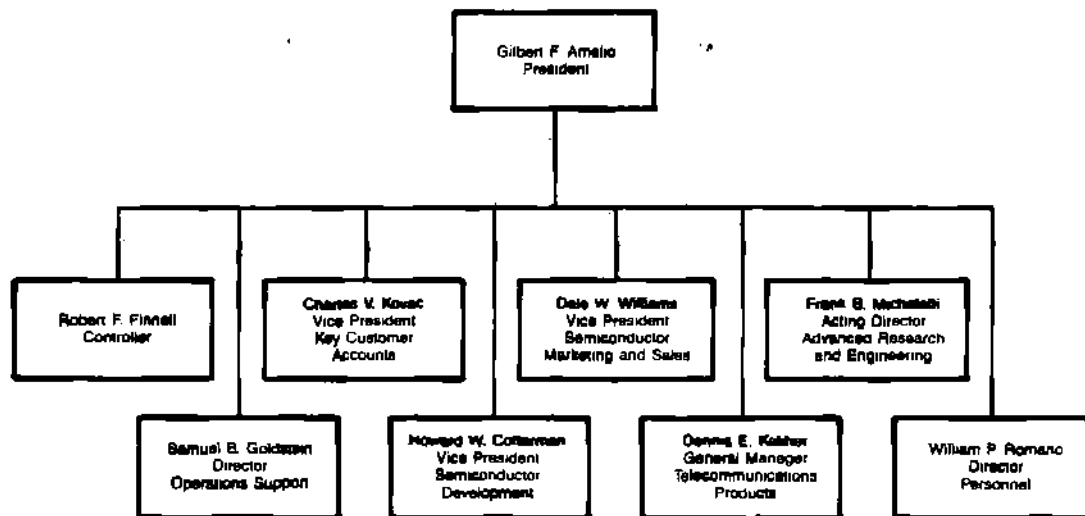
The Semiconductor Products Division's headquarters are in Newport Beach, California. This 630,000-square-foot building houses the marketing and sales organization as well as engineering and wafer processing activities. The division's 43,000-square-foot assembly facility is located in Mexicali, Mexico.

Rockwell has six wafer fabrication lines, five of which are for standard products and one for custom devices. Rockwell has fabrication capability for NMOS, PMOS, CMOS, CMOS/SOS, silicon-gate CMOS, and gallium arsenide devices. In early 1983 the Company began operating a new \$39 million CMOS wafer fabrication facility that uses 4-inch wafers but has the potential for upgrade to 5-inch wafers. The Company also operates remote design centers in San Diego, California, and Dallas, Texas.

# Rockwell International Corporation

Figure 1

## Rockwell International Corporation Semiconductor Products Division ORGANIZATION CHART



Source: Rockwell International Corporation  
DATAQUEST  
September 1983

### Process Technology

Rockwell plans to develop 2-micron NMOS capability by 1985. The Company is working on a 10 to 20 percent shrink of its ROM products. In the PMOS area, Rockwell intends to limit its support to existing products without undertaking any new development.

Rockwell is emphasizing its CMOS processes. The Company expects to be working with 2-micron geometries by late 1984, and with geometries of less than 2 microns by 1985.

# Rockwell International Corporation

## Marketing

Rockwell's Semiconductor Products Division uses manufacturer's representatives and distributors to sell its products, as well as selling directly to original equipment manufacturers (OEMs).

The division's marketing and sales headquarters are as follows:

### United States

Rockwell International Corporation  
Semiconductor Products Division  
4311 Jamboree Road  
P.O. Box C  
Newport Beach, CA 92660

Telephone: (714) 833-4600  
TWX: 910-591-1698

### Europe

Rockwell International GmbH  
Fraunhoferstrasse 11  
D-8033 Martinsried-Munchen  
Federal Republic of Germany

Telephone: 011-49-89-857-6016  
Telex: 521-2650 (ARIMD)

### Japan

Rockwell International Overseas Corporation  
Ithphia Hirakawa - Cho Building  
2-7-6 Hirakawa-Cho  
Chiyoda-ku  
Tokyo, 102  
Japan

Telephone: 011-81-3-265-8804  
Telex: 22-198 (ROCKWELL J)

## Research and Development

On a company-wide basis, Rockwell's company-initiated research and development (R&D) expenditures total approximately 3 percent of sales, as shown in Table 1. However, the Semiconductor Products Division commits 8 or 9 percent of total sales per year to R&D. In 1983, Rockwell's major focus for semiconductor products is on microperipherals, microcontrollers, and non-volatile memories.

## Employees

Rockwell's Semiconductor Products Division employs approximately 2,000 people, most of whom are located in the United States. In the Company as a whole, 16 percent of the workforce is composed of engineers and scientists.

# Rockwell International Corporation

Table 1

Rockwell International Corporation  
COMPANY-INITIATED RESEARCH & DEVELOPMENT  
EXPENDITURES  
(Millions of Dollars)

<u>Year</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Total Sales	\$5,309	\$6,176	\$6,907	\$7,040	\$7,395
R&D Expenditures	\$ 161	\$ 189	\$ 206	\$ 201	\$ 222
R&D as a Percentage of Total Sales	3.04%	3.05%	2.98%	2.85%	3.00%

Source: Rockwell International Corporation  
DATAQUEST  
September 1983

## SEMICONDUCTOR PRODUCTS

The main focus of Rockwell's Semiconductor Products Division is in the area of memories and microprocessors. The division also produces a range of microprocessor peripherals and board-level telecommunications products.

Although the ROM market is depressed due to the decline in video-game cartridges demand, Rockwell is still a major participant in this area. The Company also offers other memory devices including EPROMs and EEPROMs. In 1982 Rockwell initiated a product-exchange agreement with Ricoh Company Ltd., a Japan-based semiconductor company. Rockwell's first product based on this agreement is a 32K CMOS EPROM that began sampling in the third quarter of 1983.

Rockwell also has a license agreement with SEEQ Technology under which Rockwell is producing EEPROMs designed by SEEQ. Rockwell paid SEEQ \$2 million for its EEPROM technology. In the third quarter of 1983 Rockwell began producing 16K devices and plans to sample 64K EEPROMs early in 1984. The Company is also involved with SEEQ in the design and development of a 256K EEPROM.

Rockwell offers a broad line of single-chip R6500 microcomputer and microprocessor devices. Under a cross-licensing agreement, NCR Corporation is second-sourcing Rockwell's single-chip microcomputers. Rockwell also manufactures a range of multichip CMOS CPU and peripheral devices in the 6500 family.

# Rockwell International Corporation

Rockwell is designated as a second-source for the 68000 microprocessor family. Other products include microperipherals, 4-bit microcomputers, and telecommunications devices.

Rockwell Semiconductor Products Division regards its microcomputer and microprocessor devices as the core of its product range and is focusing considerable attention on the production of CMOS.

Apart from its production of integrated circuits, Rockwell's Semiconductor Products Division also manufactures a range of board-level products. The range includes 6500-based single-board microcomputers and OEM microcomputers with on-board keyboard, printer, and display peripherals.

To assist in developing programs for these OEM computers, Rockwell provides FORTH and Microsoft BASIC as ROM-based firmware.

## OTHER ACTIVITIES

### Aerospace

The principal space activity of Rockwell's aerospace business segment is the space shuttle program for the National Aeronautics and Space Administration (NASA). Other projects include the NAVSTAR Global Positioning System for the U.S. Department of Defense, and the B-1B long-range combat aircraft for the U.S. Air Force.

### Automotive

Rockwell's automotive business segment's principal business is the manufacture and sale of various proprietary components for heavy-duty vehicles used on and off the highway. These components include axles, brake assemblies, drives, transmissions, universal joints, and drivelines.

### Electronics

In addition to semiconductors, the segment also manufactures a wide range of avionics, telecommunications, and defense electronics equipment.

# Rockwell International Corporation

## General Industries

The general industries business segment participates in two major business areas. The first business area involves the development, manufacture, and marketing of energy products and systems including flow control and distribution products for utilities; energy generation and environmental control systems for utilities; components for the oil, gas, and nuclear industries; and nuclear-related work for the U.S. Government. The second business area is the development, manufacture, and marketing of graphics and industrial presses and related graphic arts equipment, industrial sewing machines, and power tools.

## FINANCIAL INFORMATION

The following tables show information on Rockwell's financial status. The attached financial statement gives general coverage of the Company's balance sheet. Table 2 shows estimated sales by business segment for the past five years, and Table 3 shows DATAQUEST estimates of Rockwell's semiconductor production by broad product category.

# Rockwell International Corporation

Rockwell International Corporation  
 600 Grant Street  
 Pittsburgh, Pennsylvania 15219  
 Telephone: (412) 565-2000 Telex: 866213  
 (Millions of Dollars Except Per Share Data)

## Balance Sheet (September 30, 1982)

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Working Capital	\$ 811	\$ 848	\$ 900	\$ 712
Long-Term Debt	\$ 431	\$ 364	\$ 293	\$ 233
Shareholders' Equity	\$1,539	\$1,740	\$1,911	\$2,097
After-Tax Return on Average Equity (%)	184.04	17.08	15.34	16.57

## Operating Performance (Fiscal Year Ending September 30, 1982)

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Revenue	\$6,176	\$6,907	\$7,040	\$7,395
U.S. Revenue	\$5,409	\$5,923	\$6,230	\$6,622
Non-U.S. Revenue	\$ 767	\$ 984	\$ 810	\$ 773
Cost of Revenue	\$4,972	\$5,605	\$5,778	\$5,993
R&D Expense	\$ 189	\$ 206	\$ 201	\$ 222
SG&A Expense	\$ 579	\$ 669	\$ 654	\$ 728
Pretax Income	\$ 486	\$ 526	\$ 586	\$ 631
Pretax Margin (%)	7.87	7.62	8.32	8.53
Effective Tax Rate (%)	46.3	46.7	45.6	47.4
Net Income	\$ 261	\$ 280	\$ 319	\$ 332
Average Shares Outstanding (Millions)	70.0	73.7	75.6	76.2
Per Share				
Earnings	\$ 3.38	\$ 3.59	\$ 4.07	\$ 4.22
Dividends	\$ 1.25	\$ 1.35	\$ 1.44	\$ 1.56
Book Value	\$21.99	\$23.61	\$25.28	\$27.52
Price Range	\$ 8 7/8- 12 1/8	\$11 - 22 3/4	\$23 5/8- 45 3/8	\$25 1/8- 41
Total Employees	114,452	108,199	103,455	100,271

Source: Rockwell International Corporation  
 Annual Reports  
 DATAQUEST Estimates  
 September 1983



# Rockwell International Corporation

Table 2

**Rockwell International Corporation  
ESTIMATED SALES BY BUSINESS SEGMENT  
(Millions of Dollars)**

<u>Business Segment</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Aerospace	\$1,453	\$1,625	\$2,042	\$2,280	\$2,808
Automotive	\$1,485	\$1,838	\$1,735	\$1,538	\$1,358
Electronics	\$1,263	\$1,530	\$1,696	\$1,791	\$2,031
General Industries	\$1,108	\$1,183	\$1,434	\$1,431	\$1,198

Source: Rockwell International Corporation  
Annual Reports  
September 1983

Table 3

**Rockwell International Corporation  
ESTIMATED SEMICONDUCTOR REVENUES  
(Millions of Dollars)**

	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Total Semiconductor	\$52	\$70	\$75	\$70	\$80
Total Integrated Circuit	\$52	\$70	\$75	\$70	\$80
MOS (Technology)	\$52	\$70	\$75	\$70	\$80
NMOS	-	32	35	32	45
PMOS	-	38	40	38	35
CMOS	-	-	-	-	-
MOS (Function)	\$52	\$70	\$75	\$70	\$80
Memory	-	35	37	35	40
Microprocessor	-	10	12	10	18
Logic	-	25	26	25	22

Source: DATAQUEST  
September 1983

## ROHM Company, Ltd.

21, Saiin Mizosaki-cho  
Ukyo-ku, Kyoto 615, Japan  
Telephone: (075) 311-2121  
Fax: (075) 315-0241  
Dun's Number: 05-383-5914

*Date Founded: September 1958*

### CORPORATE STRATEGIC DIRECTION

ROHM Company, Ltd., is a major manufacturer of custom ICs and thermal printheads, and offers a line of 700 products to consumer and industrial OEMs. ROHM produces a full range of electronic components including monolithic ICs, hybrid ICs, transistors, diodes, light-emitting diodes (LEDs), resistors, printheads, capacitors, semiconductor lasers, and other products. During the past few years, ROHM has focused on expanding gate arrays and microprocessors. The ROHM Group consists of 21 companies located around the world, each operating as an independent enterprise. Sales offices are located worldwide, with 28 in Japan.

ROHM strives to fully incorporate a vendor-customer partnership in its approach to business throughout the world, encouraging customers to work closely with ROHM product managers and participate in the design process. ROHM is not a vertically integrated manufacturer; i.e., the majority of ROHM's products do not go into its consumer products. Rather, they are sold in the merchant semiconductor market.

In 1970, the Company opened ROHM Corporation in Irvine, California, to serve the US market. In 1971, ROHM opened Exar Integrated Systems, which is located in San Jose, California. Exar researches, develops, manufactures, and sells standard and custom ICs. Exel Microelectronics, Inc., also located in San Jose, is a wholly owned subsidiary of ROHM Company, Ltd., and is applying E2 technology in nonvolatile memories and programmable logic devices.

During 1990, ROHM merged its three US components subsidiaries—Exel Microelectronics, ROHM Corp., and ROHM U.S.A. Inc.—into a single company. The new company, to be known as ROHM

Corporation, will be solely owned by a new holding company, ROHM U.S.A. The holding company will also control ROHM's existing interests in Exar Corporation (46.4 percent ownership) and Xetel Corporation. Heading the ROHM Corporation is Kozo Sato, chairman of the board of ROHM U.S.A. and managing director of International Operations for ROHM Company, Ltd. Each of the new divisions will report directly to Mr. Sato and continue to be operated as independent divisions of ROHM Corporation.

ROHM vigorously pursues research in various fields, resulting in high-quality laser diodes for consumer products. Its R&D costs totaled ¥6.8 billion (US\$53.0 million) in fiscal 1989, or 4.8 percent of revenue. In 1980, the Company introduced a zener diode, a stack diode, and a semiconductor device protector capable of preventing breakdowns from load shorts on LSIs. In 1983, ROHM began developing laser diodes using molecular beam epitaxy (MBE) technology. In 1986, ROHM became the first company to develop a hybrid IC with the basic functions of a telephone built in. Now ROHM is following the semiconductor manufacturing trends of 1989—miniaturization and integration. Recently, ROHM developed ultrahigh-speed gallium arsenide ICs for computer and telecommunications applications.

ROHM is a true custom design manufacturer, producing everything in-house, from design and development of a product to the production systems and facilities. This allows ROHM to be flexible in its production facilities, developing products according to customer needs. Its design centers are located in Tokyo and Kyoto, Japan, and San Jose, California.

ROHM is expanding its worldwide production facilities to respond to the growing demand in all its product areas. The Company intends to increase

production 20 percent per year over the next five years in order to support this growth. Production facilities were constructed during 1988 in Thailand and Malaysia. The Company is expanding and upgrading manufacturing facilities in Japan as well as in other locations. In order to raise the capital for these projects, ROHM issued dollar-denominated bonds and Swiss franc-denominated convertible notes in 1988. Capital expenditure for fiscal 1989 totaled ¥40.7 billion (US\$317.9 million), or 28.7 percent of ROHM's revenue.

ROHM's product categories include discrete semiconductor devices, ICs, resistors, printheads, and other products. Sales by product category for fiscal 1989 were discrete semiconductor devices, 34.2 percent of revenue, ICs 32.9 percent, resistors 15.8 percent, and printheads and other products 17.1 percent.

Total revenue for fiscal 1989 increased 17.7 percent over fiscal 1988 to ¥141 billion (US\$1.1 billion). Net income rose 37.1 percent to ¥6.3 billion (US\$49.2 million) in fiscal 1989. ROHM employs 11,527 people worldwide.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region and distribution channel. A comprehensive financial statement is not available.

---

## BUSINESS SEGMENT STRATEGIC DIRECTION

### Semiconductors

Dataquest estimates ROHM's worldwide 1989 semiconductor revenue at ¥94.9 billion (US\$740 million), with a concentration in Japan of ¥76.9 billion (US\$600 million). North America accounted for ¥5.0 billion (US\$39 million), Europe ¥2.8 billion (US\$22 million), and Rest of World the remainder, or ¥10.1 billion (US\$79 million). ROHM maintained its ranking as 22nd in the overall world semiconductor market from 1988 to 1989.

In 1989, ROHM ranked 15th in the total analog market with revenue of ¥35.5 billion (US\$277 million), or 37 percent of its semiconductor revenue,

according to Dataquest's estimate. In the total 1989 discrete market, ROHM ranked 8th with revenue of ¥38.6 billion (US\$301 million), or 41 percent of its semiconductor revenue.

ROHM offers standard and custom IC products, including custom monolithic ICs such as MOS microcontrollers and gate arrays, linear ICs, transistors, custom hybrid ICs, diodes, and transistors. Most of its hybrid ICs and 60 to 70 percent of its monolithic ICs are customized. ROHM's IC production is growing rapidly, reaching ¥49.3 billion (US\$343 million) in 1989 from ¥31.8 billion (US\$248 million) in 1988. Logic accounts for 12 percent, microcomponents 5 percent, and memory 3 percent of total IC revenue.

ROHM also offers surface-mount (flat-type) transistors, ideal for automated insertion, and minimolded transistors, suitable for high-density installations using automated surface-mount production.

The Company entered the microprocessor market in 1985 with an original CMOS 4-bit microprocessor. The Company also is licensed by Fairchild to manufacture an 8-bit microprocessor developed by Fairchild, which is processed using ROHM's CMOS technology.

### Peripherals

ROHM has developed a full line of thin- and thick-film thermal printheads that are used in word processors and facsimile terminals. Current R&D efforts are focused on new modular printhead designs, large thick-film heads, and halftone printing capabilities for facsimile terminals. The Company's LED printhead technology combines a VLSI process with state-of-the-art technologies from other fields to produce a compact printhead featuring high reliability, a long service life, and minimum dispersion of optical output. This new printhead is the first of an entire family of simple, easy-to-use, printheads now being developed at ROHM.

### Further Information

For further information on the Company's business segments, please contact the appropriate Dataquest industry service.

**Table 1**  
**Five-Year Corporate Highlights (Millions of US Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$410.4	\$543.4	\$734.2	\$940.6	\$1,106.9
Percent Change	-	32.41	35.11	28.11	17.68
Capital Expenditure	\$103.9	\$84.4	\$93.5	\$130.9	\$317.9
Percent of Revenue	25.32	15.53	12.73	13.92	28.72
R&D Expenditure	\$18.3	\$31.9	\$39.5	\$47.3	\$53.0
Percent of Revenue	4.46	5.87	5.38	5.03	4.79
Number of Employees	8,448	8,805	9,976	11,055	11,527
Revenue (\$K)/Employee	\$48.58	\$61.71	\$73.60	\$85.08	\$96.03
Net Income	\$34.8	\$12.4	\$10.4	\$35.9	\$49.2
Percent Change	-	(64.37)	(16.13)	245.19	37.05
Exchange Rate (US\$1=¥)	¥243.53	¥221.26	¥159.51	¥138.02	¥128.25
1989 Calendar Year	Q1	Q2	Q3	Q4	
Quarterly Revenue	NA	NA	NA	NA	
Quarterly Profit	NA	NA	NA	NA	

NA = Not available

Source: ROHM Company, Ltd.  
Annual Reports  
Dataquest (1990)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1985	1986	1987	1988	1989
North America	21.00	18.00	14.00	14.00	12.00
International	79.00	82.00	86.00	86.00	88.00
Europe	3.00	3.00	7.00	5.00	7.00
Asia/Pacific	76.00	79.00	79.00	81.00	81.00
Japan	70.00	73.00	70.00	70.00	69.00

Source: ROHM Company, Ltd.  
Annual Reports

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1988	1989
Direct Sales	0	0
Indirect Sales	100.00	100.00
Manufacturers' Representatives	80.00	80.00
Distributors	20.00	20.00

Source: ROHM Company, Ltd.

---

## 1989 SALES OFFICE LOCATIONS

North America—2  
Europe—1  
Asia/Pacific—29  
Japan—28  
ROW—1

---

## MANUFACTURING LOCATIONS

### *North America*

Exar Corporation, United States  
CMOS, bipolar ICs  
Exel Microelectronics, United States  
Memory ICs (EEPROMS)  
Xetel Corporation, United States  
Design and assembly of surface-mount circuit boards

### *Asia/Pacific*

Alpha Electronics Industrial, Japan  
Electronic components  
Aoi Electronics, Japan  
Electronic components  
Apollo Electronics, Japan  
Electronic components  
Apollo Electronics Thailand  
Transistors  
Chita Electronic Industrial, Japan  
Resistor materials  
ROHM Amagi, Japan  
Electronic components  
ROHM AVX, Japan  
Laminated ceramic capacitors  
ROHM Fukuoka, Japan  
Resistors  
ROHM Korea  
Bipolar ICs, monolithic ICs, discrete components  
Thinko Electric, Japan  
Electronic components  
Uemura Giken, Japan  
Measuring instruments  
Wako Electric, Japan  
Electronic components

Wako Electronics Malaysia  
Resistors

### *ROW*

ROHM Amazonia Electronica  
Electronic parts  
ROHM Industria Electronica  
Capacitors, diodes, resistors, optoelectronics

---

## SUBSIDIARIES

### *North America*

Exar Corporation (United States)  
Exel Microelectronics, Inc. (United States)  
ROHM Corporation (United States)  
Xetel Corporation (United States)

### *Europe*

ROHM Electronics GmbH (Germany)

### *Asia/Pacific*

Alpha Electronics Industry, Inc. (Japan)  
Aoi Electronics Co., Ltd. (Japan)  
Apollo Electronics Co., Ltd. (Japan)  
Apollo Electronics (Thailand) Co., Ltd. (Thailand)  
Chita Electronic Industrial Co., Ltd. (Japan)  
ROHM Amagi Co., Ltd. (Japan)  
ROHM AVX Co., Ltd. (Japan)  
ROHM Distribution Center Co., Ltd. (Japan)  
ROHM Electronics Co. (Singapore) Pte. Ltd.  
(Singapore)  
ROHM Electronics (H.K.) Co., Ltd. (Hong Kong)  
ROHM Electronics Taiwan Co., Ltd. (Taiwan)  
ROHM Fukuoka Co., Ltd. (Japan)  
ROHM Korea Corporation (South Korea)  
Thinko Electric Co., Ltd. (Japan)  
Uemura Giken Co., Ltd. (Japan)  
Wako Electric Co., Ltd. (Japan)  
Wako Electronics (Malaysia) Sdn. Bhd. (Malaysia)

### *ROW*

ROHM Amazonia Electronica Ltda. (South America)  
ROHM Industria Electronica Ltda. (South America)

---

**ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS**

1988

**Exel Microelectronics**

ROHM entered into a joint marketing agreement to sell the entire Exel line in Europe.

**Filipino investors**

ROHM Electronics Phil (Philippines), ROHM Company, Ltd., and several private Filipino investors entered into a joint venture to manufacture integrated circuits for ROHM to sell worldwide.

---

**MERGERS AND ACQUISITIONS**

1989

**Excel Microelectronics**

Excel became a wholly owned subsidiary of ROHM Company, Ltd., when it purchased the remaining interest in Exar.

1988

**Exel Microelectronics Exar**

ROHM acquired 81 percent of Exel from Exar for \$40 million.

1987

**Exar Telmos Inc.**

Exar acquired Telmos Inc., a US manufacturer of bipolar ICs.

**Xetel Inc.**

ROHM acquired a circuit board manufacturing capability by acquiring majority interest in Xetel.

---

**KEY OFFICERS**

**Ken Sato**  
President

**Yukikazu Fujiwara**  
Senior managing director, Production and Engineering

**Kozaburo Yoshimi**  
Managing director, Marketing and Sales

**Yagoro Ashida**  
Managing director, Sales Headquarters

**Kozo Sato**  
Managing director, International Operations

**Rokuro Kimura**  
Managing director, Administration

---

**PRINCIPAL INVESTORS**

Keninchiro Sata—15.7 percent  
Mitsubishi Trust & Banking—4.7 percent  
Baring Brothers—3.6 percent  
Daiwa Bank—3.5 percent  
Sumitomo Trust & Banking—3.1 percent

---

**FOUNDERS**

Information is not available.

# Rohm Co., Ltd.

Table 1

**Estimated Worldwide Semiconductor Revenue by Calendar Year  
(Billions of Yen)**

	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
Total Semiconductor	35.3	59.6	58.9	69.0	74.7	94.0
Total Integrated Circuit	13.6	26.3	24.7	31.0	35.9	42.4
Bipolar Digital (Function)	2.3	3.6				
Bipolar Digital Memory						
Bipolar Digital Logic	2.3	3.6				
MOS (Function)	0.4	1.1	1.1	1.3	1.8	7.0
MOS Memory						1.0
MOS Microdevices	0.2	0.4	0.2	0.3	0.4	2.1
MOS Logic	0.2	0.7	0.9	1.0	1.4	3.9
Analog	10.9	21.6	23.6	29.7	34.0	35.3
Total Discrete	17.3	26.5	26.2	28.6	28.8	37.4
Total Optoelectronic	4.4	6.8	8.0	9.4	10.0	14.2

Table 2

**Estimated Worldwide Semiconductor Revenue by Calendar Year  
(Millions of Dollars)**

	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
Total Semiconductor	151	252	247	413	518	721
Total Integrated Circuit	58	111	104	186	248	325
Bipolar Digital (Function)	10	15				
Bipolar Digital Memory						
Bipolar Digital Logic	10	15				
MOS (Function)	2	5	5	8	13	54
MOS Memory						8
MOS Microdevices	1	2	1	2	3	16
MOS Logic	1	3	4	6	10	30
Analog	46	91	99	178	235	271
Total Discrete	74	112	110	171	200	287
Total Optoelectronic	19	29	34	56	70	109

Source: Dataquest  
December 1989

# Rohm Co., Ltd.

Table 3

**Rohm Co., Ltd.**  
**1988 Worldwide Ranking by Semiconductor Markets**  
**(Revenue in Millions of Dollars)**

	<u>1988</u> <u>Rank</u>	<u>1987</u> <u>Rank</u>	<u>1988</u> <u>Revenue</u>	<u>Sales</u> <u>% Change</u> <u>1987-1988</u>	<u>Industry</u> <u>% Change</u> <u>1987-1988</u>
Total Semiconductor	21	21	\$721	39.2%	33.0%
Total Integrated Circuit	26	25	\$325	31.0%	37.4%
MOS (Function)	49	69	\$ 54	315.4%	54.5%
MOS Memory	44	53	8		93.1%
MOS Microdevices	37	42	16	433.3%	39.9%
MOS Logic	43	60	30	200.0%	29.2%
Analog	14	13	\$271	15.3%	16.0%
Total Discrete	8	13	\$287	43.5%	14.4%
Total Optoelectronic	6	10	\$109	55.7%	27.5%

Source: Dataquest  
December 1989



# Rohm Co., Ltd.

**Table 4**

**Rohm Co., Ltd.  
Estimated 1988 Semiconductor Revenue by Geographic Region  
(Millions of Dollars)**

	<u>U.S.</u>	<u>Japan</u>	<u>Europe</u>	<u>ROW</u>
<b>Total Semiconductor</b>	\$37	\$592	\$16	\$76
<b>Total Integrated Circuit</b>	\$18	\$262	\$ 6	\$39
Bipolar Digital (Function)				
Bipolar Digital Memory				
Bipolar Digital Logic				
MOS (Function)	\$ 2	\$ 47		\$ 5
MOS Memory		8		
MOS Microdevices		16		
MOS Logic	2	23		5
Analog	\$16	\$215	\$ 6	\$34
<b>Total Discrete</b>	\$16	\$230	\$10	\$31
<b>Total Optoelectronic</b>	\$ 3	\$100		\$ 6

Source: Dataquest  
December 1989

# Rohm Co., Ltd.

Rohm Co., Ltd.  
21, Sain Mizosaki-cho  
Ukyo-ku, Kyoto 615, Japan  
Telephone: (075) 311-2121 Telex: J5422-027  
(Billions of Yen Except per Share)

## Balance Sheet (March 31)

	<u>1985</u>	<u>1986</u>
Working Capital	¥ 37.9	¥ 34.0
Long-Term Debt	¥ 17.4	¥ 15.2
Shareholders' Equity	¥ 65.5	¥ 65.5
After-Tax Return on Average Equity (%)	13.3	3.4

## Operating Performance (Fiscal Year Ending March 31)

	<u>1985</u>	<u>1986</u>
Sales	¥ 103.0	¥ 97.8
Japanese Sales	¥ 75.5*	¥ 71.7
Non-Japanese Sales	¥ 27.5*	¥ 26.1
Cost of Sales	¥ 67.9	¥ 74.7
R&D Expense	¥ 4.6	¥ 5.7
SG&A Expense	¥ 13.9	¥ 16.3
Pretax Income	¥ 19.6	¥ 7.2
Pretax Margin (%)	19.0	7.4
Effective Tax Rate (%)	55.3	69.0
Net Income	¥ 8.7	¥ 2.2
Average Shares Outstanding (Millions)	17.8	52.9
Per Share		
Earnings	¥ 308.15	¥ 73.51
Dividend	¥ 11.00	¥ 11.00
Book Value	¥3,679.78	¥1,238.19
Price Range	¥ 2,530-	N/A
	¥ 5,130	
Total Employees	N/A	2,116
Capital Expenditures	¥ 26.1	¥ 15.2
Exchange Rate (Yen per US\$)	245	221

N/A = Not Available

\*Estimated

Source: Rohm Co., Ltd.,  
Annual Reports  
Japan Company Handbook  
Dataquest  
June 1987

# Rohm Co., Ltd.

Rohm Co., Ltd.  
21, Saiin Mizosaki-cho  
Ukyo-ku, Kyoto 615, Japan  
Telephone: (075) 311-2121 Telex: J5422-027  
(Millions of Dollars Except per Share)

## Balance Sheet (March 31)

	<u>1985</u>	<u>1986</u>
Working Capital	\$ 155	\$ 154
Long-Term Debt	\$ 71	\$ 69
Shareholders' Equity	\$ 267	\$ 296
After-Tax Return on Average Equity (%)	13.3	\$ 3.4

## Operating Performance (Fiscal Year Ending March 31)

	<u>1985</u>	<u>1986</u>
Sales	\$ 420	\$ 443
Japanese Sales	\$ 308	\$ 324
Non-Japanese Sales	\$ 112	\$ 119
Cost of Sales	\$ 277	\$ 338
R&D Expense	\$ 19	\$ 26
SG&A Expense	\$ 57	\$ 74
Pretax Income	\$ 80	\$ 326
Pretax Margin (%)	19.0	7.4
Effective Tax Rate (%)	55.3	69.0
Net Income	\$ 36	\$ 10
Average Shares Outstanding (Millions)	17.8	52.9
Per Share		
Earnings	\$ 1.26	\$0.33
Dividend	\$ 0.04	\$0.05
Book Value	\$15.02	\$5.60
Price Range	\$10.33- \$20.94	N/A
Total Employees	N/A	2,116
Capital Expenditures	\$ 107	\$ 69
Exchange Rate (Yen per US\$)	245	221

N/A = Not Available

\*Estimated

Source: Rohm Co., Ltd.,  
Annual Reports  
Japan Company Handbook  
Dataquest  
June 1987

# Rohm Co., Ltd.

## THE COMPANY

### Background

Rohm Company Ltd. is a major manufacturer of custom ICs and thermal printer heads, and offers a line of 700 products to consumer and industrial OEMs. Founded in 1954 by its current president, Kenichiro Sato, Rohm was Japan's eleventh largest semiconductor maker in 1986, with total corporate sales of about ¥97.8 billion (\$443 million), down 5 percent (in yen) from 1985. Semiconductor revenue in 1986 was ¥63.1 billion (\$378 million), or 65 percent of total sales, of which ICs accounted for ¥27.1 billion (\$162 million). About 30 percent of total sales were custom and semicustom ICs.

The Company opened Rohm Corporation, a sales office, in Irvine, California, in 1970. In 1971, Rohm became the first Japanese semiconductor maker to enter Silicon Valley when it opened Exar Integrated Systems in Sunnyvale, California, to research, develop, manufacture, and sell semicustom ICs. Exar is widely regarded as a pioneer in gate arrays. Rohm Electronics GmbH was opened in West Germany in 1971, followed by subsidiaries in Korea and Brazil in 1972, in Hong Kong in 1974, and in Singapore in 1979. Rohm was listed on the Tokyo and Osaka stock exchanges in November 1983, where the Company hoped to raise ¥10.5 billion (\$46 million). In late 1985, Exar became the first Japanese-owned U.S. firm to go public, with an initial public offering of 1.38 million shares.

### Company Organization

The Rohm Group consists of 17 companies in 7 countries, each operating as an independent enterprise. There are 23 sales offices worldwide, of which 18 are located in Japan. Rohm conducts the wafer processing and final testing, while its subsidiaries assemble the chips. Rohm's subsidiaries are listed in Table 1.

Exar's net semiconductor sales in fiscal 1986 were \$38 million.

# Rohm Co., Ltd.

Table 1

## ROHM SUBSIDIARIES

### Japan

Rohm Distribution Center Co., Ltd.  
(Tokyo)  
Rohm Fukuoka Co., Ltd. (Fukuoka)  
Rohm Amagi Co., Ltd. (Fukuoka)  
Wako Denki Co., Ltd. (Okayama)  
Aoi Electronics Co., Ltd. (Kagawa)  
Apollo Electronics Co., Ltd. (Fukuoka)  
Alpha Electronics Industry Ltd. (Okayama)  
Chita Electronic Industrial Co. (Aichi)  
Thinko Electric Co., Ltd. (Okayama)

### Overseas

Rohm Corporation (Irvine, CA)  
Exar Corporation (Sunnyvale, CA)  
Exel Microelectronics, Inc.  
(San Jose, CA)  
Rohm Industria Electronica Ltda.  
(Sao Paulo, Brazil)  
Rohm Electronics GmbH (W. Germany)  
Rohm Korea Corporation (Seoul)  
Rohm Electronics Co., Ltd.  
(Hong Kong)  
Rohm Electronics Co. Pte.

Source: Rohm Co., Ltd.

## CUSTOMER BASE

Rohm and Exar market both standard and custom/semicustom devices. Exar sells ICs for satellites, heart pacemakers, and other sophisticated products. Its customers include Delco Electronics, GTE, Kyocera, L.M. Ericsson, Northern Telecom, and TRW. Rohm's customers include General Electric, IBM Japan, Philips, and Japanese manufacturers of home appliances, machinery, optical goods, and audio equipment. Rohm supplies chips to the consumer video and audio markets, office automation market, and telecommunications market. It specializes in automatic control equipment and measuring instruments and has a reputation as a producer of custom ICs for facsimiles.

## SEMICONDUCTOR PRODUCT LINE

Rohm offers standard and semicustom IC products, including custom monolithic ICs such as bipolar and MOS microcontrollers and gate arrays, linear ICs, transistors, custom hybrid ICs, LEDs, diodes, and other discretes. All of its hybrid ICs and 60 to 70 percent of its monolithic ICs are customized.

# Rohm Co., Ltd.

Rohm also offers flat-type transistors, ideal for automated insertion, and minimolded transistors, suitable for high-density installations using automated chip mounting.

Rohm entered the microprocessor market in 1985, with an original CMOS 4-bit microprocessor. The Company also is licensed by Fairchild to manufacture an 8-bit microprocessor developed by Fairchild, which will be processed using Rohm's CMOS technology.

In January 1985, the Company made a technical breakthrough in manufacturing semiconductor lasers for compact disk players by using molecular beam epitaxy. Rohm also introduced the world's first single-chip encoder for converting discrete, red-green-blue (RGB) signals into composite video signals for television transmission.

The Company has recently broadened its line of single digital transistors by adding transistor arrays containing multiple resistors.

## MARKET ESTIMATES

As shown in Table 2, Rohm sold \$378 million worth of semiconductors in 1986, up 53 percent from 1985. Although discrete devices account for 57 percent of its semiconductor products, IC production is growing rapidly. Since 1981, IC sales have grown at a CAGR of 33 percent, compared with 24 percent for discretes. MOS IC production began in 1983 in order to capitalize on the strong demand for ASICs. It is expected to account for a growing share of Rohm's product line, although in 1985 MOS ICs represented only 2.4 percent of semiconductor sales.

## RESEARCH AND DEVELOPMENT

Rohm vigorously pursues research in various fields. In 1980, it introduced a zener diode, a stack diode, and a semiconductor device protector to prevent breakdown from load shorts on LSIs. In 1983, Rohm invested ¥5 billion (\$21 million) in a semiconductor research center at its head office and began developing VLSIs using molecular beam epitaxy growth technology. Rohm's new LED products include phototransistors, photodiodes, photosensors, photointerrupters, and GaAs Hall devices. In 1983, Rohm developed and marketed chip resistors, leadless diodes, and RF switching diodes. Recently, Rohm introduced telecom LSIs such as tone and pulse dialers to enter the fast-growing telecommunications market.

# Rohm Co., Ltd.

Table 2

Rohm Co., Ltd.  
ESTIMATED CALENDAR YEAR SEMICONDUCTOR REVENUE\*  
(Millions of Dollars)

	1979	1980	1981	1982	1983	1984	1985	1986
Total Semiconductor	51	79	113	100	151	252	247	378
Total Integrated Circuit	21	29	39	40	58	111	104	162
Bipolar Digital (Technology)	5	6	7	8	10	15	15	25
TTL							15	25
ECL						15		
Other Bipolar Digital								
Bipolar Digital (Function)	5	6	7	8	10	15	15	25
Bipolar Digital Memory								
Bipolar Digital Logic	5	6	7	8	10	15	15	25
MOS (Technology)					2	5	5	9
NMOS					1	3	3	6
PMOS								
CMOS					1	2	2	3
MOS (Function)					2	5	5	9
MOS Memory								
MOS Micro Devices					1	2	2	5
MOS Logic					1	3	3	4
Linear	16	23	32	32	46	91	85	129
Total Discrete	23	39	61	48	74	112	110	180
Transistor	10	18	29	20	31	74	76	105
Small Signal Transistor							74	102
Power Transistor						74	2	3
Diode	12	19	27	19	29	38	34	55
Small Signal Diode							33	51
Power Diode						35		
Zener Diode						3	2	4
Thyristor								
Other Discrete	1	2	5	8	14			
Total Optoelectronic	7	11	13	13	19	29	34	56
LED Lamps						29	17	31
LED Displays							18	26
Optical Couplers								
Other Optoelectronics								
Exchange Rate (Yen/US\$)	219	227	221	248	235	237	238	167

\*Excludes sales by Exar Corporation, Rohm's U.S. subsidiary.

Source: Dataquest  
June 1987

## Rohm Co., Ltd.

In 1983, Rohm opened its Semiconductor Research Center in Kyoto. The Research Center is a training ground for Rohm engineers, and has led the Company's efforts in circuit design, wafer processing, fabrication, and process control. During fiscal 1985, the Tokyo Design Center was opened at Rohm's Tokyo branch office.

Rohm hired 74 engineers in fiscal 1985, 45 in fiscal 1984, and 41 in fiscal 1983. New product developments in fiscal 1986 included a CMOS floppy disk drive controller chip integrating all the necessary gates and circuitry to control the stepping motor, spindle motor head code, and LEDs.

### PLANT AND EQUIPMENT INVESTMENT

Rohm made capital investments of ¥15.2 billion (\$69 million) in fiscal 1986, most of it in the semiconductor area. The Company's new Fukuoka, Kyushu plant opened in June 1984 (Rohm Amagi Co., Ltd.). Production capacity was expanded at Rohm Fukuoka Co., Ltd. (also in Fukuoka). Production capacity was increased at Rohm Korea Corporation (in Korea) in fiscal 1986. Rohm Industria Electronica Ltda., in Brazil, is scheduled for expansion in fiscal 1987.



## **QMS, Incorporated**

One Magnum Pass  
Mobile, Alabama 36618  
Telephone: (205) 633-4300  
Fax: (205) 633-0020  
Dun's Number: 08-654-7338

*Date Founded: 1977*

---

### **CORPORATE STRATEGIC DIRECTION**

QMS, Incorporated, designs, manufactures, and markets products that enhance the intelligence of computer imaging systems. QMS focuses on the manufacturing of laser printers, intelligent controllers, and electronic publishing equipment. Its product market is interdependent on the computer systems market. The Company targets current end users such as Fortune 1500 companies, governmental agencies, religious organizations, and educational institutions. QMS utilizes a variety of sales channels including direct sales, distributors, original equipment manufacturers, value-added resellers, and retail dealers.

For fiscal years 1988 and 1989, revenue by direct sales channel accounted for 20.3 percent and 22.8 percent, respectively; indirect sales channels accounted for 79.7 percent and 77.2 percent, respectively, of revenue for fiscal year 1988 and 1989.

Total revenue increased 15.6 percent to \$215.8 million\* for fiscal year 1989, from \$186.7 million for fiscal year 1988. Net income increased 305.6 percent to \$8.9 million for fiscal year 1989, from a net loss of \$4.3 million for fiscal year 1988. Internationally, sales for fiscal years 1989, 1988, and 1987 totaled \$63.6 million, \$48.3 million, and \$26.1 million, respectively. These figures represent approximately 29, 26, and 22 percent, respectively, of total net revenue. As these figures show, QMS has been steadily increasing its amount of business internationally. International sales revenue comes principally from the areas of Australia, Great Britain, Scandinavia, New Zealand, and Western Europe. QMS employs 1,027 people.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights

\*All dollar amounts are in US dollars.

and revenue by region and distribution channel. Table 4, a comprehensive financial statement, is at the end of this profile.

---

### **BUSINESS SEGMENT STRATEGIC DIRECTION**

#### **Nonimpact Printing Products**

QMS manufactures intelligent nonimpact print systems that include purchase print engines, proprietary hardware and applications firmware, and intelligent printer-to-computer interfaces. During fiscal year 1989, QMS added products to its QMS-PS, MAGNUM, and QMS ColorScript 100 product offerings. New product introductions consisted of the following: the QMS-PS 2200 print system, a medium-duty monochrome PostScript printer; the QMS-PS 810 turbo and QMS-PS 820 turbo printers, which represent performance-enhanced versions of the QMS-PS 810 and QMS-PS 820 systems; the MAGNUM 4003 controller boards, which add MAGNUM bar code and label printing capabilities to Printronix P3040 and other Printronix MVP printers; and the QMS ColorScript 100 Model 10 system, which provides color PostScript printing on paper and transparencies. QMS also carries the QMSWriter PM10 color printer, the QMS ColorScript 100 Model 30 print system; the QMS ColorScript 100 Model 20 print system; the QMS-PS monochrome imaging systems, including the QMS-PS 810, the QMS-PS 820, and the QMS-PS 1500; the QMS SmartWriter 150 printer; the X320 ImageServer XP systems; and the QMS Lasergrafix monochrome laser print system. QMS also sells accessories, add-ons, and software for use with its nonimpact printing systems, and offers spare parts, fonts, and consumables, maintenance services, and other support for its nonimpact printing products.

**Processors**

QMS sells proprietary intelligent processor products used primarily with impact printers for interfacing and industrial graphics applications. The applications include distribution and warehousing, process control, and product labeling useful for the automotive, retail merchandising, food chain, pharmaceutical, and general manufacturing industries.

**Further Information**

For more information about QMS' business segments, please contact Dataquest's Western European Printer Industry Service or Electronic Printer Industry Service.

**Table 1**  
**Five-Year Corporate Highlights (Thousands of US Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$47,900.0	\$73,633.0	\$119,399.0	\$186,725.0	\$215,817.0
Percent Change	-	53.72	62.15	56.39	15.58
Capital Expenditure	NA	NA	NA	NA	NA
Percent of Revenue	NA	NA	NA	NA	NA
R&D Expenditure	\$3,322.0	\$5,605.0	\$3,035.0	\$5,829.0	\$5,511.0
Percent of Revenue	6.94	7.61	2.54	3.12	2.55
Number of Employees	470	721	800	900	1,027
Revenue (\$K)/Employee	\$102.00	\$102.00	\$149.00	\$207.00	\$210.00
Net Income	\$5,731.0	\$7,492.0	\$8,671.0	(\$4,346.0)	\$8,936.0
Percent Change	-	30.73	15.74	(150.12)	305.61
<b>1989 Calendar Year*</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	
Quarterly Revenue	\$48.77	\$51.87	\$54.02	\$61.16	
Quarterly Profit	\$1.32	\$1.68	\$2.47	\$3.46	

\*Based on fiscal year rather than calendar year.  
 NA = Not available

Source: QMS, Incorporated  
 Annual Reports and Forms 10-K  
 Dataquest (1990)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1985	1986	1987	1988	1989
North America	NA	84.47	78.14	74.13	70.53
International	NA	15.53	21.86	25.87	29.47
Europe	NA	15.53	21.86	25.87	29.32
Asia/Pacific	NA	0	0	0	0.15

NA = Not available

Source: QMS, Incorporated  
 Annual Reports and Forms 10-K  
 Dataquest (1990)

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1988	1989
Direct Sales	20.27	22.82
Indirect Sales	79.73	77.18

Source: Dataquest (1990)

---

## 1989 SALES OFFICE LOCATIONS

North America—31  
Europe—3  
Asia/Pacific—2

---

## MANUFACTURING LOCATIONS

### *North America*

#### **Mobile, Alabama**

All products are manufactured at the Company's plant in Mobile, Alabama.

### *Europe*

#### **Utrecht, The Netherlands**

All products are also manufactured at the Company's plant in Utrecht, The Netherlands.

---

## SUBSIDIARIES

### *North America*

Imagen Corporation (United States)  
Laser Connection Inc. (United States)  
QMS Canada Inc. (Canada)  
QMS Circuits Inc. (United States)  
QMS Foreign Sales Inc. (United States)

### *Europe*

Imagen GmbH (Germany)  
QMS Eastern Hemisphere Operations  
QMS Europe B.V. (The Netherlands)  
QMS International GmbH (Germany)  
QMS Ltd. (United Kingdom)  
QMS S.A.R.L. (France)  
QMS Winterthur A.G.

### *Asia/Pacific*

QMS New Zealand Limited (New Zealand)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

### *1989*

#### **Panton, Inc.**

QMS and Panton entered into a licensing agreement under which QMS becomes the first hardware company to offer certified hard copy simulations of Panton colors. QMS will incorporate the resulting technology into its ColorScript 100 print system.

### *1988*

#### **Process Software Corporation**

QMS and Process entered into an international distribution agreement entitling QMS to act as a reseller of Process Software TCP/IP networking software products.

#### **Dodwell BMS Ltd.**

QMS and Dodwell entered into an agreement in which Dodwell will market QMS' PS1500 black-and-white printer and QMS' ColorScript printer in Japan.

#### **Arbor Text, Inc.**

QMS and Arbor entered into an international distribution agreement that links the publishing tools of Arbor Text's Tex software with QMS Lasergrafix and QMS-PS printers. The agreement specifies QMS as a supplier of Arbor Text's The Publisher, DVILaser/QMS and DVILaser/PS software products.

#### **Canon Europa N.V.**

An international marketing agreement was entered into in which Adobe PostScript functionality will be made available to Canon LBP-8II printer series users in Europe.

#### **Siemens AG**

QMS and Siemens entered into an agreement covering Siemens' purchase of QMS laser printers for resale through Siemens' worldwide sales channels.

### *1987*

#### **Adobe System Incorporated**

QMS and Adobe entered into a licensing agreement in which QMS will be the first company to have usage rights to Adobe's color PostScript software technology.

**American Components**

American Components has been licensed to sell QMS' laser printers in India.

---

**MERGERS AND ACQUISITIONS**

1988

**Imagen**

QMS acquired Imagen, an image-processing system maker. Imagen will operate as a wholly owned QMS subsidiary.

1987

**Watson Computer Products**

QMS acquired Watson Computer Products, a supplier of computer peripherals and related equipment. The name was changed to QMS Canada, Inc., which is headquartered in Montreal.

---

**KEY OFFICERS**

**James L. Busby**

President, chief executive officer, and chairman of the board

**Jack R. Altherr**

Executive vice president, Sales

**Franklin J. Lassman**

Vice president, European Operations

**Donald L. Parker**

Executive vice president, Products and Technology

**Allen F. Yuhas**

Vice president, North American Sales and Service

**Raymond A. Rosewall**

Executive vice president, Operations

---

**PRINCIPAL INVESTORS**

James L. Busby—5.7 percent

---

**FOUNDERS**

Information is not available.

**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending September**  
**(Thousands of US Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Total Current Assets</b>	\$29,118.0	\$57,233.0	\$87,958.0	\$98,921.0	\$112,746.0
Cash	957.0	92.0	1,532.0	1,337.0	1,922.0
Receivables	12,903.0	18,678.0	29,913.0	35,589.0	42,418.0
Marketable Securities	301.0	NA	NA	NA	NA
Inventory	14,603.0	36,746.0	54,078.0	59,021.0	64,237.0
Other Current Assets	354.0	1,717.0	2,435.0	2,974.0	4,169.0
<b>Net Property, Plants</b>	\$17,922.0	\$20,678.0	\$20,531.0	\$23,075.0	\$21,492.0
<b>Other Assets</b>	\$3,059.0	\$3,132.0	\$4,741.0	\$8,595.0	\$10,051.0
<b>Total Assets</b>	<b>\$50,099.0</b>	<b>\$81,043.0</b>	<b>\$113,230.0</b>	<b>\$130,591.0</b>	<b>\$144,289.0</b>
<b>Total Current Liabilities</b>	\$8,239.0	\$19,560.0	\$40,888.0	\$34,510.0	\$36,801.0
<b>Long-Term Debt</b>	\$1,400.0	\$13,050.0	\$12,724.0	\$31,120.0	\$36,834.0
<b>Other Liabilities</b>	\$1,494.0	\$1,961.0	\$4,012.0	\$4,713.0	\$3,746.0
<b>Total Liabilities</b>	<b>\$11,133.0</b>	<b>\$34,571.0</b>	<b>\$57,624.0</b>	<b>\$70,343.0</b>	<b>\$77,381.0</b>
<b>Total Shareholders' Equity</b>	\$38,966.0	\$46,472.0	\$55,606.0	\$60,248.0	\$66,908.0
Common Stock	94.0	95.0	95.0	114.0	114.0
Other Equity	22,620.0	22,633.0	23,096.0	35,431.0	33,155.0
Retained Earnings	16,252.0	23,744.0	32,415.0	24,703.0	33,639.0
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$50,099.0</b>	<b>\$81,043.0</b>	<b>\$113,230.0</b>	<b>\$130,591.0</b>	<b>\$144,289.0</b>
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Revenue</b>	\$47,900.0	\$73,633.0	\$119,399.0	\$186,725.0	\$215,817.0
US Revenue	NA	62,201.0	93,302.0	138,410.0	152,217.0
Non-US Revenue	NA	11,432.0	26,097.0	48,315.0	63,600.0
<b>Cost of Sales</b>	\$21,488.0	\$34,235.0	\$74,625.0	\$138,122.0	\$142,416.0
<b>R&amp;D Expense</b>	\$3,322.0	\$5,605.0	\$3,035.0	\$5,829.0	\$5,511.0
<b>SG&amp;A Expense</b>	\$13,512.0	\$19,593.0	\$25,068.0	\$49,078.0	\$51,555.0
<b>Capital Expense</b>	NA	NA	NA	NA	NA
<b>Pretax Income</b>	\$9,796.0	\$12,809.0	\$14,450.0	(\$10,219.0)	\$12,401.0
<b>Pretax Margin (%)</b>	20.45	17.40	12.10	(5.47)	5.75
<b>Effective Tax Rate (%)</b>	NA	NA	NA	NA	NA
<b>Net Income</b>	\$5,731.0	\$7,492.0	\$8,671.0	(\$4,346.0)	\$8,936.0
<b>Shares Outstanding, Thousands</b>	9,287.0	9,410.0	9,450.0	11,335.0	11,226.0
<b>Per Share Data</b>					
Earnings	\$0.62	\$0.80	\$0.92	(\$0.44)	\$0.73
Dividend	NA	NA	NA	NA	NA
Book Value	\$4.20	\$4.94	\$5.88	\$5.32	\$5.96

**Table 4 (Continued)**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending September**  
**(Thousands of US Dollars, except Per Share Data)**

<b>Key Financial Ratios</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<i>Liquidity</i>					
Current (Times)	3.53	2.93	2.15	2.87	3.06
Quick (Times)	1.76	1.05	0.83	1.16	1.32
Fixed Assets/Equity (%)	45.99	44.50	36.92	38.30	32.12
Current Liabilities/Equity (%)	21.14	42.09	73.53	57.28	55.00
Total Liabilities/Equity (%)	28.57	74.39	103.63	116.76	115.65
<i>Profitability (%)</i>					
Return on Assets	-	11.43	8.93	(3.56)	6.50
Return on Equity	-	17.54	16.99	(7.50)	14.06
Profit Margin	11.96	10.17	7.26	(2.33)	4.14
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	6.94	7.61	2.54	3.12	2.55
Capital Spending % of Revenue	NA	NA	NA	NA	NA
Employees	470	721	800	900	1,027
Revenue (\$K)/Employee	\$102.00	\$102.00	\$149.00	\$207.00	\$210.00
Capital Spending % of Assets	NA	NA	NA	NA	NA

NA = Not available

Source: QMS, Incorporated  
 Annual Reports and Forms 10-K  
 Dataquest (1990)

## Quadratron Systems Incorporated

141 Triunfo Canyon Road  
Westlake Village, California 91361

Telephone: (805) 494-1158

Fax: (805) 494-1721

Dun's Number: Not Available

*Date Founded: 1983*

---

### CORPORATE STRATEGIC DIRECTION

Quadratron Systems Incorporated (QSI) was founded in 1983 to produce a comprehensive series of office automation software application tools that enhance communication and increase productivity in the office environment. QSI sales are generated from both US and international markets. The Company employs approximately 90 people worldwide. According to Dataquest, QSI held 25.5 percent unit shipment share of the 1989 worldwide integrated office systems (IOS) software market. Thus, QSI ranked second among IOS software vendors during 1989.

Dataquest estimates that QSI's direct sales force accounts for approximately 45 percent of total revenue and its indirect sales channel for approximately 55 percent of total revenue. The Company's indirect channel consists of value-added resellers (VARs) and original equipment manufacturers (OEMs). Several of QSI's OEMs are Bull, Motorola, NEC, Nixdorf, and Unisys. During fiscal year 1989, international revenue closely matched North American revenue. QSI maintains four offices in North America: Westlake Village, California; Chicago, Illinois; McLean, Virginia; and Dorval, Quebec, Canada. Throughout the rest of the world, QSI has offices in Australia, France, England, Switzerland, and Germany.

QSI targets the UNIX, XENIX, and MS-DOS Office Automation market worldwide. Its software performs with UNIX, XENIX, MS-DOS, or PC-DOS operating systems and is compatible with most terminals and printers. QSI has over 900,000 users running on over 180 different types of systems in more than 16 different languages. The Company has positioned itself internationally through developing its software with a minimum of 512 characters, enabling it to be written in Hebrew, Romance languages, Greek, Arabic, and others.

QSI also had many developments internationally during 1989. The European Community (EC) completed its pilot installation of Quadratron software and began a widespread installation program that will span all 12 member countries over the next three years. In Germany, the Victoria Insurance Agency installed over 600 copies of QSI's word processing program, and PTT Bundespost started installing Quadratron software throughout the country. The United Kingdom Training Agency recently chose Quadratron OA software to automate the entire agency. Hardware manufacturers in Europe, including International Computers Ltd., Olivetti, Philips, and Siemens, are working with 14 international governments to standardize office automation on Quadratron software.

No financial statements are included because Quadratron is a privately held company.

---

### BUSINESS SEGMENT STRATEGIC DIRECTION

In February 1990, QSI announced a brand new product line called Cliq. With all new architecture, QSI's comprehensive Cliq software package includes software for desk management, an electronic message system, electronic mail, and multifunction word processing with foreign language capabilities. Optional modules are also available and consist of software for business graphics, graphics printing, executive presentations, spreadsheets, a personal telephone database, and complex business forms development.

#### Desk Management Software

The Cliq software product line begins with the Cliq-Desk. The "Desk" provides a working environment that provides an interface to tools, CliqAccessories,



and outside applications such as a database, account, or project management package. All Cliq modules are run from the Desk, which functions just like an office desk in that various objects such as calculators, documents, folders, spreadsheets, or datebooks can be placed on it. While working in any of the modules, tasks can be suspended at any point, and the user can return to the Desk to begin a different task. Several tasks can be open simultaneously.

### Word Processing Software

CliqWord is a word processor software package that features multicolumns, a thesaurus with 240,000 synonyms, an 80,000-word dictionary, plus unlimited custom dictionaries, among other features. The window feature enables viewing and editing of multiple documents. The add-on function allows query to databases using structured query language (SQL), a report writer, or other applications. CliqWord also has an interactive mail merge feature, macros, multiple rulers, case conversion, a built-in calculator, and a clipboard.

### Spreadsheet Software

CliqCalc is a Lotus 1-2-3 workalike spreadsheet that provides Lotus file compatibility along with the added integration features of Cliq. CliqCalc supports up to 16 windows, date and time formats, logical and statistical functions, and macros. Data integration is available for creating graphics. CliqCalc provides the ability to create professional graphics by using the clipboard integration with CliqChart.

### Business Graphics

CliqChart is a flexible charting program that allows the user to create presentation-quality graphics to be printed and displayed. Data for graphics can be imported from CliqWord and CliqCalc via the clipboard, or data can be used from any ASCII file. CliqChart provides a large variety of fonts, colors, and patterns. Chart types include pie, line, scatter, high-low, stacked bar, smooth curve, step, needle, and regression.

### Desk Accessories

CliqAccessories is a collection of desktop tools that include CliqCall, CliqDate, CliqMath, CliqMail, CliqMessage, and CliqNote.

### Phonebook

CliqCall offers a convenient, user-friendly way of storing and maintaining phone directories for individuals, departments, and companies. It supports up to 32,000 records and provides entry spaces for home, business FAX, and mobile phone numbers, as well as electronic mail addresses. All information can be brought into CliqWord documents via the clipboard and can be integrated with records processing (part of the CliqWord word processor) for generating mass mailings, envelopes, and labels.

### Calendar/Scheduler

CliqDate is an electronic calendar and scheduler for creating both individual and group appointments. It provides three displays to view a day, week, or month at a time. Details of any appointment can be moved, copied, or deleted. CliqDate provides different levels of permissions and allows the assignment of calendars to resources such as conference rooms or slide projectors. It works in AM/PM or 24-hour style.

### Calculator

CliqMath is a full-function calculator that provides two modes of operation: hand-held or desktop. Its fully editable tape can be saved automatically or on request. Its many other features include ten displayable memories, automatic decimal insert, repeat last entry, and user-tailorable display.

### Electronic Mail

CliqMail is an electronic mail system that maintains and sends notes, documents, or ASCII files to individuals or groups of individuals on a single system or across multiple systems. Mail messages can be created without entering the editor. CliqWord documents, CliqCalc spreadsheets, or almost any type of file may be attached to a message.

### Electronic Message

CliqMessage is a facility that can take a phone message and send it via electronic mail. Date and time of the message are recorded automatically. The message pad indicates who called, whether the call is urgent, and whether the caller will call back, just like a traditional message pad. A carbon copy is stored automatically.

**Notepad/Index**

CliqNote is a database that aids in keeping track of projects, assignments, contacts, or other routine tasks that are simplified through the use of a database, but do not require the power of a relational database. Each record in CliqNote is laid out as if it were an index card and contains the date, five customizable index fields, and 60 lines of notes. CliqNote supports up to 32,000 records and also supports the Cliq clipboard feature, enabling notes to easily be moved from one notepad to another notepad or from a notepad to a document.

**Desktop Publishing**

CliqPage is a typesetting tool that works with CliqWord to produce high-quality output. By combining CliqPage and CliqWord, documents appear to be desktop-published without using a separate package. The typesetting option offered by CliqPage allows expanded font support, character kerning, line and box drawing, rounded corners, box shadowing, fill patterns, and the ability to include graphics in a variety of formats. CliqPage supports graphics in pcx, cgm, and tif formats.

**Forms Generator**

CliqForm creates a full range of forms. The database, which can be linked to any number of forms, makes it possible to build applications with CliqForm. Drawing mode is used for lines and boxes. The dialog box to define a field allows the creation of complex fields, enabling the selection of minimum and maximum values, default values, the type of field, the locations in precise measurement, and many other parameters. The user can list the fields in the database. Forms can be built with or without databases.

**Custom Menu Tool**

CliqMenu enables the building of menus that look and work like the rest of the Cliq series and allows for integrating system tools that need an interface. CliqMenu also allows the generation of dialog boxes and pull-down menus. This application also supports the CliqDesk and the clipboard feature.

**Document Converter**

CliqDCA allows documents from many systems to be brought into the Cliq environment. CliqDCA converts CliqWord documents to IBM's DCA format. CliqDCA also converts DCA documents into CliqWord documents. Revisable form text and final form text are supported.

**Further Information**

For more information about Quadratron's business segments, please contact Dataquest's UNIX and/or Office Systems Industry Service.

---

**1989 SALES OFFICE LOCATIONS**

North America—4  
 Europe—4  
 Asia/Pacific—1

---

**MANUFACTURING LOCATIONS**

*North America*

Westlake Village, California  
 Software development

*Europe*

St. Gallen, Switzerland  
 Software development

---

**SUBSIDIARIES**

Information is not available.

---

**ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS**

Information is not available.

---

**MERGERS AND ACQUISITIONS**

Information is not available.

---

**KEY OFFICERS**

Arthur B. Sims  
 President and chief executive officer

**Karl K. Klessig**

Advisor to the president and member of the board

**Robert L. Scoville**

Senior vice president, Sales and Marketing

**Larry Lipstone**

Chief technical officer

---

**FOUNDERS**

Information is not available.

---

**PRINCIPAL INVESTORS**

Information is not available.

# Quality Technologies Corporation

Quality Technologies Corporation,  
(Formerly G.I. Opto Division)  
Optoelectronics Division  
3400 Hillview Avenue  
Palo Alto, CA 94304  
(415) 493-0400

Established 1979  
No. of Employees: 1,950

## **BACKGROUND**

This division of Quality Technologies was previously a division of General Instruments. In September 1987, General Instruments sold its Optoelectronics Division to Quality Technologies Corp., a Palo Alto, California-based holding company, reportedly for \$25 million.

The division's semiconductor products consist of discrete and opto devices, ICs including VLSI devices, and hybrids. The new ownership is committed to honoring outstanding business on the division's backlog.

## **COMPANY EXECUTIVES**

- Chairman and CEO—Robert L. Parker
- President—Fred Shuh, acting
- Executive Vice President and General Manager—Walter P. Steward
- Vice Chairman and General Counsel—Donald L. Coomber
- Vice President, Controller—Martin R. Michaud
- Vice President, Marketing/Sales—Charles Bates
- Managing Director—G.T. Tuan (Kuala Lumpur)
- Vice President, R&D Engineering—David Wells

## **PROCESS TECHNOLOGY**

The Company uses GaAs and related III-V optoelectronic device processes.

# Quality Technologies Corporation

## **PRODUCTS**

- Opto isolators
- LEDs—discrete and arrays
- Optoswitches
- III-V materials

## **Applications**

- Military electronics equipment
- Commercial electronics equipment

## **FACILITIES**

The Palo Alto, California, facility has 105,000 square feet. Additional assembly facilities are located in Malaysia.

# Quality Technologies Corporation

Quality Technologies Corporation,  
Optoelectronics Division  
(Formerly G.I. Opto Division)  
3400 Hillview Avenue  
Palo Alto, CA 94304  
(415) 493-0400

Established 1979  
No. of Employees: 2,338

## **BACKGROUND**

This division of Quality Technologies was previously a part of General Instruments. In September 1987, General Instruments sold its Optoelectronics Division to Quality Technologies Corp., a Palo Alto, California-based holding company, reportedly for \$25 million. The new name for the Company's opto division was not available at press time.

The division's semiconductor products consist of discrete and opto devices, ICs including VLSI devices, and hybrids. The new ownership is committed to honoring outstanding business on the division's backlog.

## **COMPANY EXECUTIVES**

- Vice President and General Manager—Walter P. Stewart
- Vice President, Controller—Robert M. Clarke
- Vice President, Marketing/Sales—Jeffrey A. Hendry
- Operations Director—G.T. Tuan
- Director, R&D Engrg.—Abraham K. Yung

## **PROCESS TECHNOLOGY**

The Company uses GaAs and related III-V optoelectronic device processes.

## **PRODUCTS**

- Opto isolators
- LEDs
- Optoswitches
- III-V materials

# Quality Technologies Corporation

## Applications

- Military electronics equipment
- Commercial electronics equipment

## FACILITIES

The Palo Alto, California, facility has 105,000 square feet.

## Quantum Corporation

1804 McCarthy Boulevard  
Milpitas, California 95035

Telephone: (408) 432-1100

Fax: (408) 943-0689

Dun's Number: 02-119-5540

*Date Founded: 1980*

---

### CORPORATE STRATEGIC DIRECTION

Quantum Corporation designs, manufactures, and markets rigid disk drives based on Winchester technology that are sold to original equipment manufacturers (OEMs) and distributors worldwide for use in small business computers, word processors, and intelligent terminals.

Quantum is one of several U.S. Winchester disk drive companies formed in the early 1980s by engineers who left larger disk drive manufacturers. Winchester disk drives are used in computers of all sizes to increase their memory or information storage capacity. Winchester memory is slower but less expensive than semiconductor-based memory.

Total revenue increased 10 percent to \$208.0 million\* in fiscal 1989 from \$188.5 million in fiscal 1988. Net income increased to \$12.9 million in fiscal 1989 from a net loss of \$3.2 million in fiscal 1988. Quantum employs 531 people worldwide.

The domestic sales contribution to the total revenue decreased to \$143.5 million in fiscal 1989. Domestic revenue accounted for 69 percent of the total, down from 78 percent in fiscal 1988. The overseas sales contribution to the total revenue increased to \$64.5 million in fiscal 1989, representing 31 percent of the total, up from 22 percent in fiscal 1988.

Research and development expenditures totaled \$16.8 million in fiscal 1989, representing 8 percent of revenue.

---

\*All dollar amounts are in U.S. dollars.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region and distribution channel. Table 4, a comprehensive financial statement, is at the end of this profile.

---

### BUSINESS SEGMENT STRATEGIC DIRECTION

#### Computer Storage

Quantum provides 3.5-inch hard disk drives with a wide range of capacities and interfaces. The disk drives provide storage for business personal computers, high-end single-user systems such as file servers and desktop workstations, and multiuser systems.

Through Quantum's OEM organization, the Company designs and markets its drives to major systems manufacturers including Apple Computer, Commodore International, and Sun Microsystems.

Through Plus Development Corporation, Quantum's wholly owned subsidiary, the Company develops and markets branded end-user products through 2,500 dealers in 27 countries worldwide.

#### Further Information

For more information about the Company's business segments, please contact the Dataquest Computer Storage Industry Service.



**Table 1**  
**Five-Year Corporate Highlights (Thousands of U.S. Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$120,349.0	\$121,244.0	\$120,760.0	\$188,529.0	\$208,017.0
Percent Change	-	0.74	(0.40)	56.12	10.34
Capital Expenditure	-	-	-	-	-
Percent of Revenue	-	-	-	-	-
R&D Expenditure	\$7,210.0	\$11,298.0	\$11,499.0	\$12,067.0	\$16,804.0
Percent of Revenue	5.99	9.32	9.52	6.40	8.08
Number of Employees	771	696	696	513	531
Revenue (\$K)/Employee	\$156.09	\$174.20	\$173.51	\$367.50	\$391.75
Net Income	\$20,973.0	\$22,243.0	\$8,806.0	(\$3,226.0)	\$12,887.0
Percent Change	-	6.06	(60.41)	(136.63)	499.47
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	
Quarterly Revenue	\$77,730.00	\$91,820.00	\$113,450.00	\$111,190.00	
Quarterly Profit	\$12,890.00	\$11,590.00	\$12,550.00	\$10,280.00	

Source: Quantum Corporation  
Annual Reports and Forms 10-K  
Dataquest  
1990

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1985	1986	1987	1988	1989
North America	79.00	80.00	79.00	78.00	69.00
International	21.00	20.00	21.00	22.00	31.00

Source: Quantum Corporation  
Annual Reports and Forms 10-K  
Dataquest  
1990

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1988	1989
Direct Sales	50.00	50.00
Indirect Sales	50.00	50.00

Source: Dataquest  
1990

---

## 1989 SALES OFFICE LOCATIONS

North America—4  
 Europe—3  
 ROW—1

---

## MANUFACTURING LOCATIONS

### *Milpitas, California*

The Q500, Q2080, and Q2000 series of 5.25-inch disk drives were manufactured at the Company's plant in Milpitas, California, but are now discontinued. The ProDrive 3.5-inch products with more than 105MB capacity are now made in Milpitas.

### *Japan*

The 42, 84, 105MB ProDrive products and all Hardcard, Passport, and Impulse products currently are manufactured by the Company's manufacturing partner, Matsushita Kotohuki Electronics Industries of Japan, which has sole manufacturing rights for these products.

---

## SUBSIDIARIES

### *North America*

Plus Development Corporation (United States)  
 Quantum Carob, Inc. (United States)  
 Quantum International DISC, Inc. (United States)  
 Quantum International, Inc. (United States)

### *Europe*

Quantum GmbH (West Germany)  
 Quantum Peripheral Products Ltd. (United Kingdom)  
 Quantum S.A.R.L. (France)

### *ROW*

Quantum Foreign Sales Corporation (Barbados)

SCA  
 0006717

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

1990

### **Lucky Goldstar International**

Quantum and Goldstar entered into an OEM agreement under which Quantum will provide 3.5-inch ProDrive Series disk drives for integration into Lucky's 80286- and 80386-based personal computers.

1989

### **Sun Microsystems**

Quantum and Sun entered into an OEM agreement under which Quantum will provide the Model 105S ProDrives to Sun for use in its new SPARCstation 1 and Sun-3/80 systems, as well as Desktop Disk Pack storage subsystems.

### **Matsushita Kotohuki Electronics Industries (MKE)**

Quantum and MKE of Japan entered into a manufacturing agreement under which MKE will manufacture the Quantum and Plus Development product lines.

1988

### **Arrow Electronics**

Quantum and Arrow entered into a cooperative marketing agreement. Under the agreement, Arrow will buy and market Quantum products, including the ProDrive Series of 3.5-inch hard disk drives that have formatted capacities of 42 to 168MB. The drives will incorporate SCSI, ESDI, and AT-bus interfaces. Arrow's distribution network uses 67 selling locations, backed by 52 local warehouses, 4 primary distribution centers, and more than 1,300 remote on-line terminals.

---

## MERGERS AND ACQUISITIONS

1988

### **Plus Development**

Quantum acquired Plus Development, in which it previously held an 80 percent stake. Quantum acquired the remaining 20 percent in a stock-for-stock transaction, with each share of Plus Development's stock being exchanged for half-shares of Quantum's common stock.

**KEY OFFICERS**

**Stephen M. Berkley**  
Chairman of the board and chief executive officer

**David A. Brown**  
President and chief operating officer

**Mark D. Wilson**  
Vice president, Marketing

**Ivan A. Nazario**  
Vice president, Manufacturing

**Carl F. Shelton**  
Vice president, Engineering

**Joseph C. Shepela**  
Vice president, Human Resources

**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending March**  
**(Thousands of U.S. Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Total Current Assets	\$85,577.0	\$107,189.0	\$117,631.0	\$95,987.0	\$109,900.0
Cash	46,966.0	78,017.0	77,111.0	59,107.0	50,903.0
Receivables	13,407.0	11,688.0	12,246.0	16,991.0	35,871.0
Inventory	23,014.0	15,178.0	20,956.0	15,028.0	16,607.0
Other Current Assets	2,190.0	2,306.0	7,318.0	4,861.0	6,519.0
Net Property, Plants	\$13,513.0	\$18,508.0	\$19,337.0	\$8,860.0	\$11,310.0
Other Assets	\$436.0	\$465.0	\$354.0	\$36,863.0	\$35,795.0
<b>Total Assets</b>	<b>\$99,526.0</b>	<b>\$126,162.0</b>	<b>\$137,322.0</b>	<b>\$141,710.0</b>	<b>\$157,005.0</b>
Total Current Liabilities	\$13,978.0	\$13,125.0	\$18,607.0	\$23,557.0	\$53,391.0
Long-Term Debt	-	-	-	-	-
Other Liabilities	\$3,067.0	\$7,225.0	\$10,607.0	\$4,093.0	\$3,461.0
<b>Total Liabilities</b>	<b>\$17,045.0</b>	<b>\$20,350.0</b>	<b>\$29,214.0</b>	<b>\$27,650.0</b>	<b>\$56,852.0</b>
Total Shareholders' Equity	\$82,481.0	\$105,812.0	\$108,108.0	\$114,060.0	\$100,153.0
Common Stock	44,580.0	45,668.0	46,974.0	147.0	118.0
Other Equity	-	-	-	57,236.0	45,848.0
Retained Earnings	37,901.0	60,144.0	61,134.0	56,677.0	54,187.0
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$99,526.0</b>	<b>\$126,162.0</b>	<b>\$137,322.0</b>	<b>\$141,710.0</b>	<b>\$157,005.0</b>
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Revenue	\$120,349.0	\$121,244.0	\$120,760.0	\$188,529.0	\$208,017.0
U.S. Revenue	95,076.0	96,995.0	95,400.0	147,053.0	143,532.0
Non-U.S. Revenue	25,273.0	24,249.0	25,360.0	41,476.0	64,485.0
Cost of Sales	\$73,668.0	\$72,868.0	\$79,269.0	\$148,034.0	\$148,199.0
R&D Expense	\$7,210.0	\$11,298.0	\$11,499.0	\$12,067.0	\$16,804.0
SG&A Expense	\$10,662.0	\$15,550.0	\$20,209.0	\$23,607.0	\$30,558.0
Capital Expense	-	-	-	-	-
Pretax Income	\$30,662.0	\$31,843.0	\$10,876.0	(\$4,159.0)	\$17,551.0
Pretax Margin (%)	25.48	26.26	9.01	(2.21)	8.44
Effective Tax Rate (%)	31.60	30.10	19.00	(49.30)	26.60
Net Income	\$20,973.0	\$22,243.0	\$8,806.0	(\$3,226.0)	\$12,887.0
Shares Outstanding, Thousands	9,589.0	9,673.0	13,975.0	13,917.0	14,268.0
<b>Per Share Data</b>					
Earnings	\$1.46	\$1.53	\$0.63	(\$0.23)	\$0.90
Dividends	-	-	-	-	-
Book Value	\$8.60	\$10.94	\$7.74	\$8.20	\$7.02

Table 4 (Continued)  
 Comprehensive Financial Statement  
 Fiscal Year Ending March  
 (Thousands of U.S. Dollars, except Per Share Data)

Key Financial Ratios	1985	1986	1987	1988	1989
<i>Liquidity</i>					
Current (Times)	6.12	8.17	6.32	4.07	2.06
Quick (Times)	4.48	7.01	5.20	3.44	1.75
Fixed Assets/Equity (%)	16.38	17.49	17.89	7.77	11.29
Current Liabilities/Equity (%)	16.95	12.40	17.21	20.65	53.31
Total Liabilities/Equity (%)	20.67	19.23	27.02	24.24	56.77
<i>Profitability (%)</i>					
Return on Assets	-	19.71	6.68	(2.31)	8.63
Return on Equity	-	23.63	8.23	(2.90)	12.03
Profit Margin	17.43	18.35	7.29	(1.71)	6.20
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	5.99	9.32	9.52	6.40	8.08
Capital Spending % of Revenue	0	0	0	0	0
Employees	771	696	696	513	531
Revenue (\$K)/Employee	\$156.09	\$174.20	\$173.51	\$367.50	\$391.75
Capital Spending % of Assets	-	-	-	-	-

Source: Quantum Corporation  
 Annual Reports and Forms 10-K  
 Dataquest  
 1990

## Qume Corporation

500 Yosemite Drive  
Milpitas, California 95035  
Telephone: (408) 924-4000  
Fax: (408) 942-4052  
Dun's Number: Not Available

*Date Founded: 1973*

### CORPORATE STRATEGIC DIRECTION

Qume Corporation was founded by David S. Lee in 1973 as a manufacturer of daisywheel printers. In 1978, Qume was acquired by ITT Corporation and became a unit of the ITT Business Systems Group. ITT Qume expanded its product offerings to include peripherals such as page printers, display terminals, and printer supplies and accessories. Mr. Lee left ITT's Business Systems Group in 1985 to join Data Technology Corporation (DTC). In 1987, ITT Qume was acquired by Alcatel N.V. as a result of a merger between ITT Corporation and Compagnie Generale d'Electricite of France. DTC acquired Qume in June 1988. The two companies' operations were combined under the Qume Corporation name and reorganized as two divisions, Data Technology and Qume Peripherals.

Founded in 1979, DTC began as an independent designer, developer, and marketer of intelligent storage controllers and chip sets. In 1987, DTC entered the page printer market. In December that year, DTC acquired Compac Microelectronics, Inc., a distributor of microcomputer products and peripherals.

Today, Qume Corporation designs, manufactures, and markets a wide range of peripherals products. The Company is organized into three business units: Qume Peripherals, Data Technology, and Compac Microelectronics. The Company currently has five product lines: storage controllers and chip sets, printer products, display products, computer supplies and accessories, and flexible disk drive products.

Total revenue increased 71.8 percent to \$183.2 million\* in fiscal year 1989 from \$106.6 million in fiscal year 1988. Qume attributed the growth to the acquisition of the Qume Companies and to sales of its new

CrystalPrint page printers and storage controller products. Net income reached \$5.0 million in fiscal year 1989, soaring 140.0 percent over fiscal year 1988. Qume employs 1,023 people worldwide.

In fiscal years 1989, 1988, and 1987, Qume respectively allocated \$7.3 million, \$5.1 million, and \$3.8 million to its R&D activities. These figures represented 4.0, 4.8, and 5.7 percent, respectively, of total revenue. Qume's R&D facilities are located at its Milpitas, California, headquarters.

Over the past three years, Qume has substantially increased its efforts to increase its international sales. During 1989, 1988, and 1987, international sales respectively represented 38.6, 15.0, and 5.8 percent of total revenue.

Qume Peripherals products are marketed through original equipment manufacturers (OEMs) and distributor channels in the United States, Europe, and Asia to dealers, value-added resellers (VARs), and systems integrators. Key distributors for peripherals products include Arrow, Computer Brokers of Canada (CBC), Microamerica, Robec, Schweber, United Stationers, and Wyle. Major OEM customers include Apple, AT&T, Digital Equipment Corporation (DEC), Honeywell, IBM, ISC, Nixdorf, Prime, and Siemens.

The Company's Data Technology controller and disk drive lines are marketed worldwide through a direct sales force to OEMs, VARs, systems integrators, dealers, and distributors. OEM customers include Ferranti, ITT, Lanier Business Systems, Jasmine Technology, Victor Technology, Wyse Technology, and Zenith Data Systems.

In May 1990, the Company's board of directors approved a merger agreement with New Qume Corporation. New Qume was formed by Mr. Lee and is capitalized by Wearne Brothers Ltd. of Singapore,

\*All dollar amounts are in US dollars.

Mr. Lee, and Qume management through the New Qume Acquisition subsidiary. A stockholders' meeting was scheduled for late September 1990 to vote on the proposed merger. If successful, the New Qume will pay \$7.25 per share to current stockholders and take the Company private.

More detailed information is available in Tables 1 and 2, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region. Information on revenue by distribution channel is not available. Table 3, a comprehensive financial statement, is at the end of this backgrounder.

---

## BUSINESS SEGMENT STRATEGIC DIRECTION

### Storage Controllers and Chip Sets

Throughout fiscal 1989, Qume sold 1.1 million storage controller boards, accounting for 45 percent of total revenue. Storage controllers are electronic devices that direct the flow of data between a microcomputer's central processing unit and peripheral storage devices. Qume's storage controllers combine custom-designed, application-specific integrated circuits (ASICs) and proprietary software to enhance input/output system performance.

Qume's products include modified frequency modulation (MFM) disk controllers, run length limited (RLL) disk controllers, enhanced small disk interface (ESDI) disk controllers, Shugart Associates Standard Interface (SASI) disk controllers, small computer system interface (SCSI) host adapters, and chip sets for storage management. The products operate with IBM PC XT, PC AT, and PS/2-compatible computers and a variety of disk drives and 1/4-inch cartridge tape drives.

The Company also offers proprietary integrated circuits (ICs) to large OEMs that manufacture their own storage controllers. These OEM products include a microprogrammable high-speed processor, a voltage-controlled oscillator with data encoder/decoder, and data checking and correcting ICs.

### Printer Products

Qume manufactures and markets a variety of page and daisywheel printers. Printer-related products accounted for 20 percent of Qume's total revenue in fiscal 1989.

The page printer products include the CrystalPrint family and ScripTEN. The CrystalPrint family consists of the CrystalPrint Express, CrystalPrint Publisher, CrystalPrint Publisher II, CrystalPrint Super Series II, CrystalPrint Series II, and CrystalPrint WP. The CrystalPrint family offers a variety of printer emulations, including HP LaserJet Plus/Series II and Adobe PostScript, depending on the model. The ScripTEN uses Adobe's PostScript page description language to provide advanced desktop publishing capabilities for personal computer users in the Apple and IBM environments.

Qume's daisywheel printers, which include the SPRINT 11 PLUS Series, are compatible with all major lines of business computers and software. The printers have 96-character printwheels and a wide range of paper-handling capabilities. Daisywheel printer products offer print speeds from 45 to 90 characters per second (cps) and a 5,500-hour mean time between failure (MTBF) rate.

### Computer Supplies and Accessories

Qume sells a variety of page and daisywheel printer supplies and accessories. For page printers, Qume supplies downloadable soft fonts, drum sets, and toner for more than 125 printers. For daisywheel printers, Qume offers sheet feeders, forms tractors, print ribbons, and more than 100 printwheels.

The soft font families for page printers available from Qume are the Office Series for word processing, the Professional Series for desktop publishing in Aldus Pagemaker and Ventura Publisher environments, and the PostScript Series for desktop publishing using Apple Macintosh or IBM PCs. The fonts are licensed from type designers such as Compugraphic and ITC.

Qume recently introduced a family of software solutions targeted at small businesses. The product line, called Qumatic Instant Business Software and Supplies, is designed to meet the needs of small businesses and home offices for creating presentations, forms, mailing lists, and labels using a personal computer.

### Display Product Lines

In 1988, Qume held 1.6 percent market share of the worldwide display terminal market, according to Dataquest. Sales from Qume's video display terminals represented 10 percent of total revenue for fiscal year 1989. Qume was the first to offer a low-cost alphanumeric terminal, the first to have a 25,000-hour MTBF rate, and the first to supply ergonomic designs including detached keyboards and full-tilt and swivel screens.

Qume markets a series of ASCII and ANSI terminals as its QVT product line. The newest QVT products are the QVT 323EV and QVT 190. The QVT PCT was developed for PC applications and for use in multiuser systems. The QVT 101 PLUS and QVT 119 PLUS are alphanumeric ASCII terminals. The QVT 203 PLUS is an ANSI-compatible alphanumeric terminal. The QVT 190 is a compact ASCII terminal targeted at countertop applications. It features a 9-inch screen.

Other terminal products include the QXT 10 X Window terminal and the QNT 80 diskless Ethernet processing terminal. Qume also markets a family of color and monochrome PC monitors. The QM800 Series consists of five models: QM835,

QM850, QM885, QM880, and QM890. Features include 14-, 15-, and 20-inch screens; super VGA and autosynchronizing; high resolution (up to 1,024x768); and a three-year limited warranty.

### Flexible Disk Drive Products

In fiscal 1989, Qume's disk drive products accounted for only 2 percent of total revenue. Qume's HyperFlex 5.25-inch flexible disk drive and subsystem are designed for market segments where substantial amounts of information must be secured or transported. Therefore, it is aimed primarily at government and military markets, desktop publishing, and distributed database applications. The HyperFlex is offered in single and dual configurations with storage capacities of 12 or 24 megabytes. It can be mounted internally or used as an external subsystem.

### Further Information

For more information on Qume's business segments, please contact the appropriate Dataquest industry service.



**Table 1**  
**Five-Year Corporate Highlights (Thousands of US Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$53,213.0	\$52,134.0	\$66,577.0	\$106,646.0	\$183,162.1
Percent Change	-	(2.03)	27.70	60.18	71.75
Capital Expenditure	NA	NA	NA	NA	NA
Percent of Revenue	NA	NA	NA	NA	NA
R&D Expenditure	NA	NA	\$3,794.0	\$5,075.0	\$7,323.0
Percent of Revenue	NA	NA	5.70	4.76	4.00
Number of Employees	NA	NA	NA	NA	1,023
Revenue (\$K)/Employee	NA	NA	NA	NA	\$179.04
Net Income	(\$875.0)	(\$4,427.0)	\$3,627.0	\$2,098.0	\$5,036.0
Percent Change	-	(405.94)	181.93	(42.16)	140.04
<b>1989 Calendar Year*</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	
Quarterly Revenue	\$27.95	\$47.11	\$52.01	\$56.09	
Quarterly Profit	\$4.01	\$11.21	\$14.85	\$20.29	

\*Based upon fiscal year  
 NA = Not available

Source: Qume Corporation  
 Annual Reports and Forms 10-K  
 Dataquest (1990)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1985	1986	1987	1988	1989
North America	NA	NA	94.16	85.02	61.43
International	NA	NA	5.84	14.98	38.57
Europe	NA	NA	0	0	9.81
Asia/Pacific	NA	NA	5.84	14.98	28.76

NA = Not available

Source: Qume Corporation  
 Annual Reports and Forms 10-K  
 Dataquest (1990)

---

## 1989 SALES OFFICE LOCATIONS

North America—13  
 Europe—4  
 Asia/Pacific—1

---

## MANUFACTURING LOCATIONS

### *Asia/Pacific*

#### Taiwan

All of Qume's products are manufactured in Taiwan by its two subsidiaries: DTC Technology Corporation manufactures controller boards and Qume Corporation Taiwan manufactures video display terminals and certain printers. Qume also utilizes subcontractors located primarily in the Far East.

---

## SUBSIDIARIES

### *North America*

Compac Microelectronics, Inc. (United States)  
 Data Technology Corporation (DTC) (United States)  
 Group S. Inc. (United States)  
 Qume Peripherals Inc. (United States)

### *Europe*

Compac Microelectronics, Ltd. (United Kingdom)  
 Qume France (France)  
 Qume Germany (Germany)  
 Qume Ltd. (United Kingdom)  
 Qume United Kingdom (United Kingdom)

### *Asia/Pacific*

DTC Technology Corporation (Taiwan)  
 Qume Corporation Taiwan (Taiwan)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

### 1990

#### Software Resource Inc.

Qume and Software Resource entered into an agreement under which Software Resource is to

distribute Qume's line of software solutions for the small business and home office markets.

### 1987

#### MicroAge Computer Stores Inc.

Qume's ScriptEN laser printer will be sold in MicroAge Computer Stores throughout the United States. The agreement marks the first time Qume's products will be sold direct to a computer store chain.

#### Cyber/Source

Cyber/Source and Qume entered into an agreement for Cyber/Source to distribute Qume's LaserTEN printing systems, Qume's Sprint line of daisywheel printers, and Qume printer supplies and accessories in the Midwest and on the East Coast.

---

## MERGERS AND ACQUISITIONS

### 1988

#### Alcatel, N.V.

DTC acquired Qume Corporation, Qume Ltd., and Qume Corporation Taiwan (collectively, the Qume Companies) from Alcatel. DTC and the Qume Companies merged to form Qume Corporation.

### 1987

#### Compac Microelectronics, Inc.

DTC acquired Compac Microelectronics, a distributor of computer peripherals.

---

## KEY OFFICERS

#### David S. Lee

Chairman, president, and chief executive officer

#### Stephen R. Bowling

Executive vice president, chief financial officer

#### Edward S. Bancroft

Vice president, Operations

#### Colin Lillywhite

Vice president, European Sales and Service

#### Jack L. Marks

Vice president, Supplies

#### Franklin B. Shah

Vice president, Display Products

#### Michael Sugihara

Vice president, New Business Development

**Ben Taniguchi**  
Vice president, Sales

**Randy Wan**  
Vice president, Asia

**Theresa Wang**  
Vice president and general manager, Mass Storage  
Products

**Robert T. Huang**  
President, Compac Microelectronics, Inc.

---

---

**FOUNDERS**

David S. Lee

---

**PRINCIPAL INVESTORS**

New Qume Acquisition Co.—30.6 percent  
David S. Lee—15.3 percent  
Hambrecht & Quist Group and Affiliates—  
10.2 percent  
Wearne Brothers Ltd.—7.6 percent  
M. L. Venture Partners I, L.P.—6.3 percent

**Table 3**  
**Comprehensive Financial Statement\***  
**Fiscal Year Ending February**  
**(Thousands of US Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1988</b>	<b>1989</b>
<b>Total Current Assets</b>	<b>\$48,457.0</b>	<b>\$94,082.0</b>
Cash	7,460.0	2,180.0
Receivables	19,626.0	37,269.0
Marketable Securities	NA	NA
Inventory	20,771.0	52,552.0
Other Current Assets	600.0	2,081.0
<b>Net Property, Plants</b>	<b>\$5,184.0</b>	<b>\$9,030.0</b>
<b>Other Assets</b>	<b>\$1,444.0</b>	<b>\$7,163.0</b>
<b>Total Assets</b>	<b>\$55,085.0</b>	<b>\$110,275.0</b>
<b>Total Current Liabilities</b>	<b>\$16,549.0</b>	<b>\$53,723.0</b>
<b>Long-Term Debt</b>	<b>\$862.0</b>	<b>\$8,285.0</b>
<b>Other Liabilities</b>	<b>NA</b>	<b>\$4,277.0</b>
<b>Total Liabilities</b>	<b>\$17,411.0</b>	<b>\$66,285.0</b>
<b>Total Shareholders' Equity</b>	<b>\$37,674.0</b>	<b>\$43,990.0</b>
Common Stock	11.0	11.0
Other Equity	37,663.0	37,592.0
Retained Earnings	NA	6,387.0
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$55,085.0</b>	<b>\$110,275.0</b>
<b>Income Statement</b>	<b>1988</b>	<b>1989</b>
<b>Revenue</b>	<b>\$106,646.0</b>	<b>\$183,162.1</b>
US Revenue	90,670.7	112,512.8
Non-US Revenue	15,975.3	70,649.3
<b>Cost of Sales</b>	<b>\$88,520.0</b>	<b>\$140,960.0</b>
<b>R&amp;D Expense</b>	<b>\$5,075.0</b>	<b>\$7,323.0</b>
<b>SG&amp;A Expense</b>	<b>\$10,669.0</b>	<b>\$25,781.0</b>
<b>Capital Expense</b>	<b>NA</b>	<b>NA</b>
<b>Pretax Income</b>	<b>\$2,722.0</b>	<b>\$6,995.0</b>
<b>Pretax Margin (%)</b>	<b>2.55</b>	<b>3.82</b>
<b>Effective Tax Rate (%)</b>	<b>38.00</b>	<b>34.00</b>
<b>Net Income</b>	<b>\$2,098.0</b>	<b>\$5,036.0</b>
<b>Shares Outstanding, Thousands</b>	<b>10,755.0</b>	<b>11,692.0</b>
<b>Per Share Data</b>		
Earnings	\$0.20	\$0.43
Dividend	NA	NA
Book Value	\$3.50	\$3.76

**Table 3 (Continued)**  
**Comprehensive Financial Statement\***  
**Fiscal Year Ending February**  
**(Thousands of US Dollars, except Per Share Data)**

<b>Key Financial Ratios</b>	<b>1988</b>	<b>1989</b>
<i>Liquidity</i>		
Current (Times)	2.93	1.75
Quick (Times)	1.67	0.77
Fixed Assets/Equity (%)	13.76	20.53
Current Liabilities/Equity (%)	43.93	122.13
Total Liabilities/Equity (%)	46.21	150.68
<i>Profitability (%)</i>		
Return on Assets	7.62	6.09
Return on Equity	11.14	12.33
Profit Margin	1.97	2.75
<i>Other Key Ratios</i>		
R&D Spending % of Revenue	4.76	4.00
Capital Spending % of Revenue	NA	NA
Employees	-	1,023
Revenue (\$K)/Employee	NA	\$179.04
Capital Spending % of Assets	NA	NA

\*Qume Corporation went public in 1988; therefore, financial figures for fiscal years 1985, 1986, and 1987 are unavailable.  
 NA = Not available

Source: Qume Corporation  
 Annual Reports and Forms 10-K  
 Dataquest (1990)

## Racal Electronics Plc

Western Road  
Bracknell, Berkshire RG12 1RG  
England

Telephone: (0344) 481222

Fax: (0344) 54119

Dun's Number: 10-193-9122

*Date Founded: 1950*

---

### CORPORATE STRATEGIC DIRECTION

Racal Electronics Plc is known for three principal businesses: telecommunications, data communications, and security. Its Racal-Vodafone subsidiary in the United Kingdom is one of the world's largest and most profitable cellular radio companies and is the main contributor to Racal Electronics' profitability.

Racal's security business is its most important area, accounting for 33 percent of the Company's sales in 1989. Data communications was the second most important, representing 18 percent of sales, followed very closely by telecommunications, which contributed 15 percent. The Company's other four businesses—specialized businesses, radio communications, marine and energy, and defense radar and avionics—in combination made up the remaining 33 percent.

Racal's total revenue increased 16 percent to £1,589 million (US\$2,605 million) in fiscal 1989 from £1,366 million (US\$2,398 million) in fiscal 1988. (Percentage changes refer to £ amounts only; US\$ percentage changes will differ because of fluctuations in Dataquest exchange rates.) Net income increased 28 percent to £177 million (US\$290.7 million) in fiscal 1989 from £138 million (US\$226.2 million) in fiscal 1988. Racal Electronics employs approximately 33,702 people worldwide.

Europe's sales contribution to Racal's total revenue grew to £1.0 billion (US\$1.7 billion) in 1989. Sales to the European countries accounted for 62 percent of the total, up slightly from 61 percent in 1988.

More detailed information is available in Tables 1 and 2, which appear after "Business Segment Strategic

Direction" and present corporate highlights and revenue by region. Information on revenue by distribution channel is not available. Table 3, a financial statement, is at the end of this backgrounder. Due to the Company's accounting methods, a financial ratio analysis and comprehensive financial statements are not available.

---

### BUSINESS SEGMENT STRATEGIC DIRECTION

#### Security

The Company's security group is the largest security business in the world with wide geographical and product coverage. Sales of Racal's security products totaled £527.8 million (US\$865.2 million) in 1989. Racal is the international leader in providing electronic and physical security systems as well as fire detection and protection systems. Products in this business segment include safes that use a lightweight nonmetallic barrier material, safe enclosures, car locks, portable extinguishers, firefighting products for the offshore oil and gas industry, intruder alarms, locks and electronic security systems, and foam systems.

#### Telecommunications

Racal Telecom, in which Racal Electronics has an almost 80 percent equity interest, is the provider of mobile telecommunications including cellular radio, wide area paging, trunked private mobile radio, packet radio, and value-added network services. Sales of Racal's Telecom products totaled £241.7 million (US\$424 million) in 1989.

During March 1990, Racal-Vodafone celebrated the connection of the 500,000th subscriber to the Vodafone network, which is now the largest contiguous mobile telephone service in the world.

### *Data Communications*

The Data Communications Group deals with business communications products in the areas of data, text, image, and voice. Racal produces equipment ranging from modems and multiplexers to local area networks (LANs) and packet-switching devices for digital services. Sales of Racal data communications products rose 12.7 percent in 1989 to £286 million (US\$468.8 million). The Racal-Milgo Limited's Private Local Area Network (PLANET) system was designed to enable linking a wide range of equipment such as mainframes, personal computers, video display units, word processors, telex and viewdata terminals, disk storage file servers, and printers. Dataquest estimates that the Racal-Milgo subsidiary ranked third in the US modem market with 11 percent of the market share. Racal-Vadic, another Racal supplier of modems, was merged with Racal-Milgo in 1989. In 1988, before the merger, Racal-Vadic ranked ninth with 3.8 percent of the US market share. In the statistical multiplexer industry segment, Racal-Milgo was one of the top ten companies and commanded 4.2 percent of the worldwide market share in 1988.

Racal's change in emphasis within the Data Communications Group toward systems, managed networks, and network services continued in 1989. The group's first network services success, Government Data Network, was accepted into service in 1989. In fiscal 1989, Racal also acquired Quanta, a fiber-optic multiplexer company, and Interlan, the US-based local area networking company.

Racal InterLan designs and manufactures hardware and software solutions for standards-based local area networking at the work group, departmental, and premises levels. Headquartered in Boxborough, Massachusetts, Racal InterLan employs 275 people in the United States and abroad. Racal InterLan is a subsidiary of The Racal Corporation of Fort Lauderdale, Florida, a company within the US\$550 million Data Communications Group of the US\$3.2 billion parent corporation, Racal Electronics Plc.

### *Radio Communications*

Racal is one of the world leaders in the radio communications field. Currently, it supplies military and

civilian customers in more than 140 countries. Sales for the radio communications group totaled £133.5 million (US\$218.8 million) in 1989. The Company specializes in the provision of a wide range of turnkey systems based on a number of radio technologies such as mobile, fixed, and air-transportable. These systems may be linked over local and wide area networks and used for medium- and long-haul communications links.

The Company also has an outstanding line of advanced technology products, from hand-held radios to high-power transmitters. These products have been designed to meet the needs of widely diverse users in tactical and strategic defense, security and paramilitary operations, and a variety of civil roles.

Racal entered the UK market as an operator and supplier of cellular mobile telephone systems. To secure itself in this market, Racal formed two companies: Racal-Vodac, to market the mobile telephone handset equipment; and Racal-Vodafone, to establish the cellular transmission and switching network.

Racal supplies three types of mobile equipment: a mobile telephone for automobiles, a portable telephone, which is a short-range handset unit, and a transportable telephone, which can be used for either purpose. During 1989, Vodafone continued to be the UK market leader, offering service to more than 90 percent of its territory.

### *Defense Radar and Avionics*

Racal defense radar and avionics companies supply radar, electronic warfare systems, and high-performance radar for surface-to-air missile systems. Sales for Defense Radar and Avionics products totaled £126 million (US\$206.5 million) in 1989. A key user of these products is the United Kingdom's Royal Navy. In the avionics sector, Racal established its flight management systems for civil and military fixed- and rotary-wing applications. These systems control and display all aspects of navigation, flight performance, communications, monitoring, and mission management.

During 1990, Britain's Racal Electronics is holding discussions with British, US, and European defense companies regarding a joint venture to remain competitive in the radar business. The decision comes on the heels of an earlier decision to cease the Company's efforts to divest itself of its defense business, but

Racal decided instead to consolidate and reorganize those efforts. The Company believes a joint venture with another company for future radar work is the best response to reductions in the defense budget.

### Marine and Energy

Racal's marine and energy electronics sector supplies advanced terrestrial and satellite systems for navigation and positioning. For merchant and naval ships, pleasure craft, and fishing boats, these products are designed to improve efficiency and safety. Products range from a simple radar system to fully customized, integrated electronic systems covering an entire ship. The new range of deep-sea radars made a major impact in fiscal year 1989, with sales volumes increased by more than 20 percent. Sales for Racal's Marine and Energy Group totaled £105.7 million (US\$173.2 million) in 1989.

Seismic exploration grew strongly worldwide while drilling activity continued at a high level. The group's established networks of high-accuracy, short- and medium-range positioning chains benefited accordingly and were aided by the incorporation of satellite techniques. Sales of the MICRO-FIX high-accuracy, short-range positioning system, used extensively for dredging and offshore work, increased 50 percent.

### Specialized Businesses

Sales for Specialized Businesses totaled £168.3 (US\$275.9 million) in 1989.

### Data and Communications Recording

The acoustics area deals with high-noise-level environments for both military and civilian communications markets. The products include transducers, microphones, handsets, headsets, protective communications helmets, field telephones, intercom systems, and on-board audio management systems for trains and aircraft.

The Company continued to make progress with its new airborne satellite communications antennas, which are being used for passenger trials in British Airways aircraft.

### Electronic Design Automation

Racal-Redac is addressing the increasing requirement of its customers for a fully integrated system for the design and verification of electronic circuits and their physical implementation as printed circuit boards (PCBs) or application-specific integrated circuits (ASICs). Dataquest estimates that Racal-Redac had 6.4 percent of the 1989 revenue share in the worldwide PCB layout sector of the computer-aided design/computer-aided manufacturing (CAD/CAM) industry. It ranked among the top ten CAD/CAM vendors participating in PCB layout applications.

During 1990, Racal Electronics acquired Silc Technologies for US\$3.2 million. Silc is a spinoff of GTE and will become a subsidiary of Racal with the completion of the deal. Silc, which has 30 employees, is expected to add its SilcSyn technology to the Racal-Redac Visula design system.

Silc and HHB, a Racal subsidiary, entered an agreement in 1989 to develop an interface between Racal-Redac's IC simulation system and the SilcSyn design system. The agreement also included Racal-Redac distributing the SilcSyn design system. The acquisition of Silc Technologies is expected to strengthen Racal-Redac's position in the design-automation market and provide a wider range of design tools from which to choose. Silc was founded in February 1987 and shipped its first product, the SilcSyn ASIC Design System, in mid-1988.

### Health and Safety

Racal's products for health and safety include a line of hearing protectors, the lightweight Jupiter antidust helmet, a dual-air protection system, and the Zephyr power respirator for dentists. Hearing and respiratory protection equipment achieved an increase of more than 20 percent in both sales and profit in fiscal 1989.

### Further Information

For more information about the Company's business segments, please contact the appropriate Dataquest industry service.



**Table 1**  
**Corporate Highlights\* (Millions of US Dollars)**

	1986	1987	1988	1989
Four-Year Revenue	\$1,862.2	\$2,116.1	\$2,397.9	\$2,788.4
Percent Change	29.54	13.63	13.32	16.29
Net Income	\$132.7	\$164.4	\$246.5	\$312.2
Percent Change	(22.8)	23.9	50.0	26.6
Number of Employees	32,545	32,418	31,910	33,702
Revenue (\$K)/Employee	\$57.22	\$65.28	\$75.15	\$82.74
Exchange Rate (US\$1=£)	£0.68	£0.61	£0.57	£0.61
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>
Quarterly Revenue	NA	NA	NA	NA
Quarterly Profit	NA	NA	NA	NA

NA = Not available  
 \*Highlights for 1985 were not available.

Source: Racal Electronics Plc  
 Annual Reports  
 Dataquest (1990)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1986	1987	1988	1989
Europe	53.00	57.00	61.00	62.00
All Others	47.00	43.00	39.00	38.00
North America	25.00	23.00	20.00	18.00
Asia/Pacific	17.00	15.00	14.00	16.00
ROW	5.00	5.00	5.00	4.00

Source: Racal Electronics Plc  
 Annual Reports  
 Dataquest (1990)

---

## 1989 SALES OFFICE LOCATIONS

Information is not available.

---

## MANUFACTURING LOCATIONS

### *North America*

Florida, United States  
Data communications equipment

### *Europe*

Warrington, United Kingdom  
Data communications equipment

---

## SUBSIDIARIES

Companies in this list are wholly owned by Racal Electronics Plc except where stated. Subsidiaries of these companies are inset beneath the parent company.

### *North America*

ACS Communication Systems Inc. (United States)  
Chubb National Foam Inc. (United States)  
Decca Electronics Inc. (United States)  
Racal Avionics Inc. (United States)  
Racal (Canada) Inc. (Canada)  
Racal-Chubb Canada Inc. (Canada)  
Racal-Chubb Electronic Security Systems Inc. (United States)  
Racal-Chubb Inc. (United States)  
Racal Communications Inc. (United States)  
Racal-Data Communications Inc. (United States)  
Racal-Data Instruments Inc. (United States)  
Racal Decca Canada Limited (Canada)  
Racal Electronics Inc. (United States)  
Racal Filter Technologies Limited (Canada)  
Racal Guardall Inc. (United States)  
Racal-Guardata Inc. (United States)  
Racal Health & Safety Inc. (United States)  
Racal-Milgo Limited (United States)  
Racal Recorders Inc. (United States)  
Racal-Redac Inc. (United States)  
Racal Survey (Canada) Inc. (Canada)  
The Racal Corporation Canada Inc. (Canada)  
The Racal Corporation (United States)

### *Europe*

Ablex Audio Video Limited (United Kingdom)  
A.R.E.—Applicazioni Radio Elettroniche SpA (67.5 percent) (Italy)  
C.E. Marshall (Wolverhampton) Limited (United Kingdom)  
Chubb Alarms Limited (United Kingdom)  
Chubb Wardens Limited  
Chubb & Son Scandinavia AB (Sweden)  
Chubb Electronics Limited (United Kingdom)  
Chubb Fire Limited (United Kingdom)  
Chubb National Foam Limited, Racal Panorama Limited  
Chubb Fire Security Limited (United Kingdom)  
Chubb International Limited (United Kingdom)  
Chubb Ireland Limited (Ireland)  
Chubb Lips Nederland BV (Netherlands)  
Chubb Lips Systemen BV (Netherlands)  
Chubb (N.I.) Limited (Northern Ireland) (United Kingdom)  
Chubb Parsi SA (Spain)  
Chubb Securite SA (France)  
Chubb-SIA SpA (Italy)  
Chubb Sicherheitstechnik Vertrieb GmbH (Germany)  
Decca Limited (United Kingdom)  
Decca Radio and Television Limited (United Kingdom)  
Decca Survey Overseas Limited (United Kingdom)  
De Culemborgse Beveiligingsdienst BV (Netherlands)  
Fibre Form Limited (United Kingdom)  
Gispén Buroeinrichtung GmbH (Germany)  
Gispén + Staalmeubel BV (Netherlands)  
Hormann Sicherheitstechnik GmbH (Germany)  
H.S. Control Systems Limited (United Kingdom)  
International Navigatie Apparaten BV (Netherlands)  
Josiah Parkes & Sons Limited (United Kingdom)  
L&F Willenhall Limited (United Kingdom)  
Lips & Gispén BV (Netherlands)  
Lips-Vago Elettronica SpA (Italy)  
Lips-Vago SpA (Italy)  
Lynx Alarm SA (France)  
Nederland Survey Projecten en Apparatuur BV (Netherlands)  
NV Security Industries SA (Belgium)  
Racal Acoustics Limited (United Kingdom)  
Racal Antennas Limited (United Kingdom)  
Racal Arbeitssicherheit GmbH (Germany)  
Racal Avionics Limited (United Kingdom)  
Racal-Chubb Data Security Limited (United Kingdom)  
Racal-Guardata Limited, Racal-Guardata Financial Systems Limited, Racal-Transcom Limited

Racal-Chubb Limited (United Kingdom)  
Albert Marston & Company Limited, Chubb &  
Sons Lock and Safe Company Limited, Chubb  
Security Installations Limited  
Racal-Chubb Security Systems Limited (United  
Kingdom)  
Racal Communications Limited (United Kingdom)  
Racal Communications Systems Limited  
Racal-Comsec Limited (United Kingdom)  
Racal-Dana Instruments SA (France)  
Racal-Decca Advanced Development Limited  
(United Kingdom)  
Racal-Decca Limited (United Kingdom)  
Racal-Decca Marine Navigation Limited (United  
Kingdom)  
Racal-Decca Navigator A/S (Denmark)  
Racal-Decca Service Limited (United Kingdom)  
Racal Defense Radar Limited (United Kingdom)  
Racal Defense Electronics (Radar) Limited, Racal  
Defense Radar and Displays Limited, Racal Radar  
Defense Systems Limited  
Racal-Dena Instruments Italia Srl (Italy)  
Racal Electronics Deutschland Holding GmbH  
(Germany)  
Racal Electronics Europe BV (Netherlands)  
Racal Electronics France SA (France)  
Racal Electronics Ireland Limited (Ireland)  
Racal Electronics SA (Switzerland)  
Racal Elektronik System GmbH (Germany)  
Racal Engineering Limited (United Kingdom)  
Racal Finance Limited (United Kingdom)  
Racal Group Services Limited (United Kingdom)  
Racal-Guardall (Scotland) Limited (United Kingdom)  
Racal-Guardall (Sales) Limited  
Racal-Guardall Espana Sa (Spain)  
Racal-Guardall SA (France)  
Racal-Guardall Srl (Italy)  
Racal Health & Safety AB (Sweden)  
Racal Imaging Systems Limited (United Kingdom)  
Racal Information Technology Services Limited  
(United Kingdom)  
Racal Instrumentation Limited (United Kingdom)  
Racal Automation Limited, Racal-Dana  
Instruments Limited, Racal Recorders Limited  
Racal International Limited (United Kingdom)  
Racal Marine Electronics Limited (United Kingdom)  
Racal Marine Group Limited (United Kingdom)  
Racal Marine Ireland Limited (Ireland)  
Racal Marine Systems Limited (United Kingdom)  
Racal-MESL (France) SARL (99.5 percent) (France)  
Racal-MESL Limited (Scotland) (United Kingdom)  
Racal Microelectronic Systems Limited (United  
Kingdom)  
Racal-Milgo (Belgium) SA-NV (Belgium)  
Racal-Milgo BV (Netherlands)  
Racal-Milgo GmbH (Germany)

Racal-Milgo Italia Srl (Italy)  
Racal-Milgo Limited (United Kingdom)  
Racal Network Services Limited (United Kingdom)  
Racal Data Networks Limited, Racal Voice  
Networks Limited  
Racal Norge A/S (Norway)  
Racal Oil and Gas Limited (United Kingdom)  
Racal Properties Limited (United Kingdom)  
Racal Protection SARL (France)  
Racal Radar A/S (Denmark)  
Racal-Redac AB (Sweden)  
Racal-Redac BV (Netherlands)  
Racal-Redac Group Limited (United Kingdom)  
Racal-Redac Systems Limited, Racal-Redac UK  
Limited  
Racal-Redac Italia Srl (Italy)  
Racal-Redac SA (France)  
Racal-Redac-Design-System GmbH (Germany)  
Racal Research Limited (United Kingdom)  
Racal Safety Limited (United Kingdom)  
Racal Survey China Limited (United Kingdom)  
Racal Survey Limited (United Kingdom)  
Racal Survey Norge A/S (Norway)  
Racal Survey (UK) Limited (United Kingdom)  
Racal Svenska Ab (Sweden)  
Racal-Tacticom Limited (United Kingdom)  
British Communications Corporation Limited,  
Racal Mobilcal Limited, Racal-Tacticom Systems  
Limited  
Racal Telecom Plc (79.92 percent) (United Kingdom)  
Racal Cellular Limited (79.92 percent),  
Racal-Vodac Limited (79.92 percent)  
Racal Training Services Limited (United Kingdom)  
Racal-Vodacom Limited (79.92 percent) (United  
Kingdom)  
Racal-Vodafone (Holdings) Limited (79.92 percent)  
(United Kingdom)  
Racal-Vodafone Limited (79.92 percent) (United  
Kingdom)  
Racal-Vodapage Limited (79.92 percent),  
Racal-Vodata Limited (79.92 percent)  
Safety Techniek BV (Netherlands)  
Sea Surveys Limited (Ireland)  
Societe Lyonnaise de Protection Electronique SA  
(France)  
Union Locks Limited (United Kingdom)  
Van Dam Beveiligingen BV (Netherlands)  
Walton SA (France)  
Weyrad Electronics Limited (United Kingdom)

*Asia-Pacific*

Chubb Australia Limited (Australia)  
Chubb Electronics (Hong Kong) Limited (50 percent)  
(Hong Kong)

Chubb Hong Kong Limited (50 percent) (Hong Kong)  
 Chubb National Foam Pty Limited (Australia)  
 Chubb New Zealand Limited (New Zealand)  
 Chubb Singapore Private Limited (70 percent) (Singapore)  
 Decca Electronics Limited (Australia)  
 Mills-Tui Trailers Limited (New Zealand)  
 PT Chubb-Lips Indonesia (76 percent) (Indonesia)  
 Racal Electronics (Singapore) Private Limited (Singapore)  
 Racal Electronics Pty Limited (Australia)  
 Racal-Chubb Holdings Australia Limited (Australia)  
 Racal-Decca Electronics (Hong Kong) Limited (Hong Kong)  
 Racal-Guardata (New Zealand) Limited (New Zealand)  
 Racal-Redac (Japan) Limited (Japan)  
 Racal-Redac Asia Limited (Hong Kong)  
 Racal-Survey (Malaysia) Sdn Bhd (70 percent) (Malaysia)  
 Swordsman Australia Pty Limited (Australia)  
 Tag Security Systems Australasia Pty Limited (Australia)  
 Wormald Security Australia Pty Limited (Australia)

#### ROW

Chubb Alarms (Pty) Limited (69.1 percent) (South Africa)  
 Chubb Fire Security (Pty) Limited (69.1 percent) (South Africa)  
 Chubb Holdings Limited (69.1 percent) (South Africa)  
 Chubb Holdings (Private) Limited (69.1 percent) (Zimbabwe)  
 Chubb Lock & Safe Company (Pty) Limited (69.1 percent) (South Africa)  
 Chubb-Union Security (Private) Limited (69.1 percent) (Zimbabwe)  
 Decca Contractors (SA) Pty Limited (South Africa)  
 Josiah Parkes & Sons (Nigeria) Limited (60 percent) (Nigeria)  
 Josiah Parkes & Sons (South Africa) Limited (69.1 percent) (South Africa)

#### ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

1989

##### Willemijn

Willemijn granted a token-ring license to Racal.

##### IBM

Racal is to become an industry remarketer of IBM PS/2 and RT computers.

1988

##### Ericsson

The companies agreed to cooperative development of the digital cellular infrastructure and subscriber equipment for the pan-European system.

##### Matra

The companies agreed to cooperative development of the digital cellular infrastructure and subscriber equipment for the pan-European system.

---

#### MERGERS AND ACQUISITIONS

1990

##### Network Communications Group of DCA

Racal Electronics acquired DCA's Network Communications Group in January to integrate with Racal-Milgo's networking systems group.

##### Sile Technologies

Racal Electronics acquired this software company to strengthen its position in the design-automation market.

1989

##### HHB Systems

Racal Electronics acquired this manufacturer of PCB layout systems.

##### DCA's Network Communications Group

Racal Electronics acquired this digital systems multiplexer and OSI network management equipment manufacturer.

##### Thom "6"

Racal Electronics acquired the CAE activities of Thom "6."

##### Quanta

Racal Electronics acquired Quanta, a fiber-optic multiplexer company.

1988

##### ACS Communication Systems, Inc.

Racal Electronics acquired this communications company.

**Pall Canada Limited**

Racal Electronics acquired this Canadian filter manufacturing company.

**Interlan**

Racal Electronics acquired this leading specialist in LANs.

**Wormald Security**

Racal Electronics acquired this security company.

**H. S. Control Systems Ltd.**

Racal Electronics acquired this security company.

**P. G. Crossland**

Director

**J. E. Diggins**

Director

**G. J. Lomer**

Director

**D. J. Peacock**

Director

**M. R. Richards**

Director

---

**KEY OFFICERS**

**Sir Ernest Harrison OBE**

Chairman and chief executive officer

**D. C. Elsbury OBE**

Deputy chief executive officer

**Sir Edward Ashmore**

Director

**B. J. Clarke**

Director

**J. E. Coates**

Director

---

**PRINCIPAL INVESTORS**

Information is not available.

---

**FOUNDERS**

Information is not available.

**Table 3**  
**Comprehensive Financial Statement\***  
**Fiscal Year Ending March 31**  
**(Millions of US Dollars)**

<b>Balance Sheet</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Fixed Assets	\$502.1	\$568.0	\$675.4	\$853.6
Tangible Assets	500.3	564.8	665.8	828.7
Investments	1.8	3.3	9.6	14.9
Current Assets	\$1,350.9	\$1,498.2	\$1,665.3	\$2,376.7
Stocks	427.6	484.8	536.7	526.6
Debtors	717.8	808.0	888.9	973.4
Investments	0.4	0.5	0.5	2.0
Cash	205.0	204.9	239.1	838.7
Provisions for Liabilities and Charges	\$479.4	\$469.0	\$443.5	\$259.8
Net Current Assets	\$621.2	\$639.7	\$577.5	\$741.5
Net Assets	\$1,600.9	\$1,676.7	\$1,696.5	\$1,854.9
Capital and Reserves	\$636.5	\$737.0	\$804.7	\$1,257.4
Share Capital	210.1	256.1	274.6	262.5
Share Premium Account	118.4	261.6	284.2	293.0
Profit and Loss	284.4	199.8	239.3	697.7
Other Reserves	23.5	19.5	6.7	4.3
Minority Interest	\$10.6	\$5.7	\$8.1	\$2.6
Shareholders' Equity	\$647.1	\$742.8	\$804.7	\$1,257.2
<b>Income Statement</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Revenue	\$1,862.2	\$2,116.1	\$2,397.9	\$2,605.6
Cost of Sales	\$1,253.2	\$1,370.8	\$1,545.3	\$1,685.6
SG&A Expenses	\$442.1	\$540.5	\$578.6	\$628.7
Operating Profit	\$167.1	\$205.9	\$276.1	\$289.8
Exchange Rate (US\$1=£)	£0.68	£0.61	£0.57	£0.61

\*Financial information for 1985 was not available.

Source: Racal Electronics Plc  
 Annual Reports  
 Dataquest (1990)

**Racal Electronics Plc**  
Western Road  
Bracknell, Berkshire RG12 1RG  
England  
Telephone: (0344) 481222  
Fax: (0344) 54119  
Dun's Number: 10-193-9122  
*Date Founded: 1950*

---

## **CORPORATE STRATEGIC DIRECTION**

Racal Electronics Plc is known for its three principal businesses: telecommunications, security, and data communications. Racal-Vodafone is one of the world's largest and most profitable cellular radio companies and is the main contributor to Racal Electronics' profitability.

Racal's security business is its most important area, accounting for 33 percent of the Company's turnover in 1989. Data communications is the second most important, accounting for 18 percent of sales, followed very closely by telecommunications, which contributed 15 percent. The Company's other five businesses—specialized businesses, radio communications, marine and energy, defense radar and avionics, and data networks—in combination make up the remaining 33 percent.

Racal's total revenue increased 16 percent to \$2.8 billion\* in fiscal 1989 from \$2.4 billion in fiscal 1988. Net income increased 41 percent to \$221.0 million in fiscal 1989 from \$157.1 million in fiscal 1988. Racal Electronics employs approximately 33,500 people worldwide.

Europe's sales contribution to Racal's total revenue grew to \$1.7 billion in 1989. Sales to the European countries accounted for 62 percent of the total, up slightly from 61 percent in 1988.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region and distribution channel. Table 4, a comprehensive financial statement, is at the end of this profile. Due to the Company's accounting

\* All dollar amounts are in U.S. dollars.

methods, a financial ratio analysis is not available with European companies.

---

## **BUSINESS SEGMENT STRATEGIC DIRECTION**

### **Security**

The Company's security group is the largest security business in the world with wide geographical and product coverage. Racal is the international leader in providing electronic and physical security systems as well as fire detection and protection systems. Products in this business segment include safes that use a lightweight nonmetallic barrier material, safe enclosures, car locks, portable extinguishers, fire-fighting products for the offshore oil and gas industry, intruder alarms, locks and electronic security companies, and foam systems.

### **Telecommunications**

Racal's telecommunications activities fall under the data communications and radio communications sectors.

### **Data Communications**

The data communications sector deals with business communications products in the areas of data, text, image, and voice. Racal produces equipment ranging from modems and multiplexers to local area networks (LANs) and packet-switching devices for digital services. The Racal-Milgo Private Local Area Network (PLANET) system has been designed to enable the linking of a wide range of equipment, such as mainframes, personal computers, video display units, word processors, telex and viewdata terminals, disk storage

file servers, and printers. Dataquest estimates that Racal-Milgo ranked third in the U.S. modem market with 11 percent of the market share. Racal-Vadic, another Racal supplier of modems, was merged with Racal-Milgo in 1989. In 1988, before the merger, Racal-Vadic ranked ninth with 3.8 percent of the U.S. market share. In the statistical multiplexer industry segment, Racal-Milgo was one of the top 10 companies and commanded 4.2 percent of the worldwide market share in 1988.

Racal's change in emphasis within the data communications group toward systems, managed networks, and network services continued in 1989. The group's first network services success, Government Data Network, was accepted into service in 1989. In fiscal 1989, Racal also acquired Quanta, a fiber-optic multiplexer company, and Interlan, a leading LAN specialist, to expand the group's technology base.

### *Radio Communications*

Racal is one of the world leaders in the radio communications field. Currently, it supplies military and civilian customers in more than 140 countries. The Company specializes in the provision of a wide range of turnkey systems based on a number of radio technologies, such as mobile, fixed, and air-transportable technologies. These systems may be linked over local and wide area networks and used for medium- and long-haul communications links.

The Company also has an outstanding line of advanced technology products, from hand-held radios to high-power transmitters. These products have been designed to meet the needs of widely diverse users in tactical and strategic defense, security and paramilitary operations, and a variety of civil roles.

Racal entered the U.K. market as an operator and supplier of cellular mobile telephone systems. To secure itself in this market, Racal formed two companies: Racal-Vodac, to market the mobile telephone handset equipment; and Racal-Vodafone, to establish the cellular transmission and switching network.

Racal supplies three types of mobile equipment: a mobile telephone for automobiles, a portable telephone, which is a short-range handset unit, and a transportable telephone, which can be used for either purpose. During 1989, Vodafone continued to be the U.K. market leader, offering service to more than 90 percent of its territory.

### **Defense Radar and Avionics**

Racal defense radar and avionics companies supply radar, electronic warfare systems, and high-performance radar for surface-to-air missile systems. A key user of these products is the United Kingdom's Royal Navy. In the avionics sector, Racal established its flight management systems for civil and military fixed- and rotary-wing applications. These systems control and display all aspects of navigation, flight performance, communications, monitoring, and mission management.

### **Marine and Energy**

Racal's marine and energy electronics sector supplies advanced terrestrial and satellite systems for navigation and positioning. For merchant and naval ships, pleasure craft, and fishing boats, these products are designed to improve efficiency and safety. Products range from a simple radar system to fully customized, integrated electronic systems covering an entire ship. The new range of deep-sea radars made a major impact in fiscal year 1989, with sales volumes increased by more than 20 percent.

Seismic exploration grew strongly worldwide while drilling activity continued at a high level. The group's established networks of high-accuracy, short- and medium-range positioning chains benefited accordingly and were aided by the incorporation of satellite techniques. Sales of the MICRO-FIX high-accuracy, short-range positioning system, used extensively for dredging and offshore work, increased 50 percent.

### **Specialized Businesses**

#### *Acoustics*

The acoustics area deals with high-noise-level environments for both military and civilian communications markets. The products include transducers, microphones, handsets, headsets, protective communications helmets, field telephones, intercom systems, and on-board audio management systems for trains and aircraft.

#### *Antennas*

The Company continued to make progress with its new airborne satellite communications antennas, which are being used for passenger trials in British Airways aircraft.



### ***Computer-Aided Engineering and Design***

Racal-Redac is addressing the increasing requirement of its customers for a fully integrated system for the design and verification of electronic circuits and their physical implementation as printed circuit boards (PCBs) or application-specific integrated circuits (ASICs). Dataquest estimates that Racal-Redac had 6.4 percent of the 1988 revenue share in the worldwide PCB layout sector of the computer-aided design/computer-aided manufacturing (CAD/CAM) industry. It ranked among the top 10 CAD/CAM vendors participating in PCB layout applications.

### ***Health and Safety***

Racal's products for health and safety include a line of hearing protectors, the lightweight Jupiter antidust helmet, a dual-air protection system, and the Zephyr

power respirator for dentists. Hearing and respiratory protection equipment achieved an increase of more than 20 percent in both sales and profit in fiscal 1989.

### ***Microelectronics***

Racal provides complete design and production capabilities to satisfy the growing customer demand for ASICs and other customized devices. Other growth areas are liquid crystal displays, thick-film hybrids, and surface-mounted components.

### ***Further Information***

For more information about the Company's business segments, please contact the appropriate industry service.

**Table 1**  
**Five-Year Corporate Highlights (Millions of U.S. Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$1,437.6	\$1,862.2	\$2,116.1	\$2,397.9	\$2,788.4
Percent Change	-	29.54	13.63	13.32	16.29
Number of Employees	25,220	32,545	32,418	31,910	33,702
Revenue (\$K)/Employee	\$57.00	\$57.22	\$65.28	\$75.15	\$82.74
Net Income	\$111.9	\$91.3	\$94.8	\$157.1	\$221.0
Percent Change	-	(18.41)	3.83	65.72	40.69
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	
Quarterly Revenue	N/A	N/A	N/A	N/A	
Quarterly Profit	N/A	N/A	N/A	N/A	

N/A = Not Available

Source: Racal Electronics Plc  
 Annual Reports  
 Dataquest  
 January 1990

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1984	1985	1986	1987	1988
Europe	45.00	53.00	57.00	61.00	62.00
International	55.00	47.00	43.00	39.00	38.00
North America	33.00	25.00	23.00	20.00	18.00
Asia/Pacific	15.00	17.00	15.00	14.00	16.00
ROW	7.00	5.00	5.00	5.00	4.00

Source: Racal Electronics Plc  
 Annual Reports  
 Dataquest  
 January 1990

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1988
Direct Sales	N/A
Indirect Sales	N/A

N/A = Not Available

Source: Dataquest  
 January 1990

---

## 1989 SALES OFFICE LOCATIONS

North America—Not available

Japan—Not available

Europe—Not available

Asia/Pacific—Not available

ROW—Not available

---

## MANUFACTURING LOCATIONS

### *North America*

Florida, United States

Data communications equipment

### *Europe*

Warrington, United Kingdom

Data communications equipment

---

## SUBSIDIARIES

Companies in this list are wholly owned by Racal Electronics Plc except where stated. Subsidiaries of these companies are inset beneath the parent company.

### *North America*

ACS Communication Systems Inc. (United States)

Chubb National Foam Inc. (United States)

Decca Electronics Inc. (United States)

Racal Avionics Inc. (United States)

Racal (Canada) Inc. (Canada)

Racal-Chubb Canada Inc. (Canada)

Racal-Chubb Electronic Security Systems Inc.  
(United States)

Racal-Chubb Inc. (United States)

Racal Communications Inc. (United States)

Racal-Data Communications Inc. (United States)

Racal-Data Instruments Inc. (United States)

Racal Decca Canada Limited (Canada)

Racal Electronics Inc. (United States)

Racal Filter Technologies Limited (Canada)

Racal-Guardall Inc. (United States)

Racal-Guardata Inc. (United States)

Racal Health & Safety Inc. (United States)

Racal Recorders Inc. (United States)

Racal-Redac Inc. (United States)

Racal Survey (Canada) Inc. (Canada)  
The Racal Corporation (United States)  
The Racal Corporation Canada Inc. (Canada)

### *Japan*

Racal-Redac (Japan) Limited

### *Europe*

Decca Limited (United Kingdom)

Ablex Audio Video Limited (United Kingdom)

Decca Radio and Television Limited (United Kingdom)

Decca Survey Overseas Limited (United Kingdom)

Fibre Form Limited (United Kingdom)

Racal-Decca Limited (United Kingdom)

Racal Avionics Limited (United Kingdom)

Racal-Decca Advanced Development Limited  
(United Kingdom)

Racal-Decca Marine Navigation Limited (United Kingdom)

Racal Defense Radar Limited (United Kingdom)

(Racal Defense Electronics (Radar) Limited,  
Racal Defense Radar and Displays Limited,  
Racal Radar Defense Systems Limited)

Racal Marine Electronics Limited (United Kingdom)

Racal Marine Group Limited (United Kingdom)

Racal Marine Systems Limited (United Kingdom)

Racal-MESL Limited (Scotland) (United Kingdom)

Racal Survey Limited (United Kingdom)

Racal Survey China Limited (United Kingdom)

Racal Survey (UK) Limited (United Kingdom)

Racal-Decca Service Limited (United Kingdom)

Weyrad Electronics Limited (United Kingdom)

H.S. Control Systems Limited (United Kingdom)

Racal Acoustics Limited (United Kingdom)

Racal Antennas Limited (United Kingdom)

Racal-Chubb Limited (United Kingdom) (Albert  
Marston & Company Limited, Chubb & Sons

Lock and Safe Company Limited, Chubb  
Security Installations Limited)

Chubb Alarms Limited (United Kingdom) (Chubb  
Wardens Limited)

Chubb Electronics Limited (United Kingdom)

Chubb Fire Limited (United Kingdom) (Chubb  
National Foam Limited, Racal Panorama  
Limited)

Chubb Fire Security Limited (United Kingdom)

Chubb International Limited (United Kingdom)

Chubb (N.I.) Limited (Northern Ireland) (United  
Kingdom)

C.E. Marshall (Wolverhampton) Limited (United  
Kingdom)

Josiah Parkes & Sons Limited (United Kingdom)  
 Racal-Chubb Data Security Limited (United Kingdom) (Racal-Guardata Limited, Racal-Guardata Financial Systems Limited, Racal-Transcom Limited)  
 Racal-Chubb Security Systems Limited (United Kingdom)  
 Union Locks Limited (United Kingdom)  
 L&F Willenhall Limited (United Kingdom)  
 Racal Communications Limited (United Kingdom) (Racal Communications Systems Limited)  
 Racal-Comsec Limited (United Kingdom)  
 Racal Engineering Limited (United Kingdom)  
 Racal Finance Limited (United Kingdom)  
 Racal Group Services Limited (United Kingdom)  
 Racal-Guardall (Scotland) Limited (Scotland) (United Kingdom) (Racal-Guardall (Sales) Limited)  
 Racal Imaging Systems Limited (United Kingdom)  
 Racal Information Technology Services Limited (United Kingdom)  
 Racal Instrumentation Limited (United Kingdom) (Racal Automation Limited, Racal-Dana Instruments Limited, Racal Recorders Limited)  
 Racal International Limited (United Kingdom)  
 Racal Microelectronic Systems Limited (United Kingdom)  
 Racal-Milgo Limited (United Kingdom)  
 Racal Network Services Limited (United Kingdom) (Racal Data Networks Limited, Racal Voice Networks Limited)  
 Racal Oil and Gas Limited (United Kingdom)  
 Racal Properties Limited (United Kingdom)  
 Racal-Redac Group Limited (United Kingdom) (Racal-Redac Systems Limited, Racal-Redac UK Limited)  
 Racal Research Limited (United Kingdom)  
 Racal Safety Limited (United Kingdom)  
 Racal-Tacticom Limited (United Kingdom) (British Communications Corporation Limited, Racal Mobilcal Limited, Racal-Tacticom Systems Limited)  
 Racal Telecom Plc (79.92%) (United Kingdom) (Racal Cellular Limited (79.92%), Racal-Vodac Limited (79.92%))  
 Racal-Vodacom Limited (79.92%) (United Kingdom)  
 Racal-Vodafone (Holdings) Limited (79.92%) (United Kingdom)  
 Racal-Vodafone Limited (79.92%) (United Kingdom) (Racal-Vodapage Limited (79.92%), Racal-Vodata Limited (79.92%))  
 Racal Training Services Limited (United Kingdom)

NV Security Industries SA (Belgium)  
 Racal-Milgo (Belgium) SA-NV (Belgium)  
 Racal-Decca Navigator A/S (Denmark)  
 Racal Radar A/S (Denmark)  
 Chubb Ireland Limited (Ireland)  
 Racal Electronics Ireland Limited (Ireland)  
 Racal Marine Ireland Limited (Ireland)  
 Sea Surveys Limited (Ireland)  
 Chubb Sicherheitstechnik Vertrieb GmbH (West Germany)  
 Gispfen Buroeinrichtung GmbH (West Germany)  
 Hormann Sicherheitstechnik GmbH (West Germany)  
 Racal Arbeitssicherheit GmbH (West Germany)  
 Racal Electronics Deutschland Holding GmbH (West Germany)  
 Racal Elektronik System GmbH (West Germany)  
 Racal-Milgo GmbH (West Germany)  
 Racal-Redac-Design-System GmbH (West Germany)  
 Chubb Securite SA (France)  
 Lynx Alarm SA (France)  
 Racal-Dana Instruments SA (France)  
 Racal Electronics France SA (France)  
 Racal-Guardall SA (France)  
 Racal-MESL (France) SARL (99.5%) (France)  
 Racal Protection SARL (France)  
 Racal-Redac SA (France)  
 Societe Lyonnaise de Protection Electronique SA (France)  
 Walton SA (France)  
 Chubb Lips Nederland BV (Holland)  
 Chubb Lips Systemen BV (Holland)  
 De Culemborgse Beveiligingsdienst BV (Holland)  
 Gispfen + Staalmeubel BV (Holland)  
 International Navigatie Apparaten BV (Holland)  
 Lips & Gispfen BV (Holland)  
 Nederland Survey Projecten en Apparatuur BV (Holland)  
 Racal Electronics Europe BV (Holland)  
 Racal-Milgo BV (Holland)  
 Racal-Redac BV (Holland)  
 Safety Techniek BV (Holland)  
 Van Dam Beveiligingen BV (Holland)  
 A.R.E. - Applicazioni Radio Elettroniche SpA (67.5%) (Italy)  
 Lips-Vago SpA (Italy)  
 Lips-Vago Elettronica SpA (Italy)  
 Chubb-SIA SpA (Italy)  
 Racal-Dena Instruments Italia Srl (Italy)  
 Racal-Guardall Srl (Italy)  
 Racal-Milgo Italia Srl (Italy)  
 Racal-Redac Italia Srl (Italy)

Racal Norge A/S (Norway)  
 Racal Survey Norge A/S (Norway)  
 Chubb Parsi SA (Spain)  
 Racal-Guardall Espana Sa (Spain)  
 Chubb & Son Scandinavia AB (Sweden)  
 Racal Health & Safety AB (Sweden)  
 Racal-Redac AB (Sweden)  
 Racal Svenska Ab (Sweden)  
 Racal Electronics SA (Switzerland)

#### *Asia-Pacific*

Chubb Australia Limited (Australia)  
 Chubb National Foam Pty Limited (Australia)  
 Decca Electronics Limited (Australia)  
 Racal-Chubb Holdings Australia Limited (Australia)  
 Racal Electronics Pty Limited (Australia)  
 Swordsman Australia Pty Limited (Australia)  
 Tag Security Systems Australasia Pty Limited (Australia)  
 Wormald Security Australia Pty Limited (Australia)  
 Chubb New Zealand Limited (New Zealand)  
 Mills-Tui Trailers Limited (New Zealand)  
 Racal-Guardata (New Zealand) Limited (New Zealand)  
 Chubb Electronics (Hong Kong) Limited (50%) (Hong Kong)  
 Chubb Hong Kong Limited (50%) (Hong Kong)  
 Racal-Decca Electronics (Hong Kong) Limited (Hong Kong)  
 Racal-Redac Asia Limited (Hong Kong)  
 PT Chubb-Lips Indonesia (76%) (Indonesia)  
 Racal-Survey (Malaysia) Sdn Bhd (70%) (Malaysia)  
 Chubb Singapore Private Limited (70%) (Singapore)  
 Racal Electronics (Singapore) Private Limited (Singapore)

#### *ROW*

Josiah Parkes & Sons (Nigeria) Limited (60%) (Nigeria)  
 Chubb Alarms (Pty) Limited (69.1%) (South Africa)  
 Chubb Fire Security (Pty) Limited (69.1%) (South Africa)  
 Chubb Holdings Limited (69.1%) (South Africa)  
 Chubb Lock & Safe Company (Pty) Limited (69.1%) (South Africa)  
 Decca Contractors (SA) Pty Limited (South Africa)  
 Josiah Parkes & Sons (South Africa) Limited (69.1%) (South Africa)  
 Chubb Holdings (Private) Limited (69.1%) (Zimbabwe)  
 Chubb-Union Security (Pvt) Limited (69.1%) (Zimbabwe)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

1989

### Willemijn

Token ring license granted to Racal

### IBM

Racal to become an industry remarketer of IBM PS/2 and RT computers

1988

### Ericsson

Cooperative development of the digital cellular infrastructure and subscriber equipment for the pan-European system

### Matra

Cooperative development of the digital cellular infrastructure and subscriber equipment for the pan-European system

---

## MERGERS AND ACQUISITIONS

1989

### HHB Systems

Acquired manufacturer of printed circuit board layout systems

### DCA's Network Communications Group

Acquired digital systems multiplexer and OSI network management equipment manufacturer

### Thom "6"

Acquired CAE activities

1988

### ACS Communication Systems, Inc.

Acquired communications company

### Pall Canada Limited

Acquired Canadian filter manufacturing company

### Quanta

Acquired this fiber-optic multiplexer company

### Interlan

Acquired this leading specialist in LANs

**Wormald Security**  
Acquired security company

**H.S. Control Systems Ltd.**  
Acquired security company

**B.J. Clarke**  
Director

**J.E. Coates**  
Director

**P.G. Crossland**  
Director

---

**KEY OFFICERS**

**J.E. Diggins**  
Director

**Sir Ernest Harrison OBE**  
Chairman and chief executive officer

**G.J. Lomer**  
Director

**D.C. Elsbury OBE**  
Deputy chief executive officer

**D.J. Peacock**  
Director

**Sir Edward Asbmore**  
Director

**M.R. Richards**  
Director

**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending March**  
**(Millions of U.S. Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Fixed Assets</b>	\$410.1	\$505.4	\$572.1	\$678.8	\$913.3
Intangible Assets	5.7	5.1	4.0	3.4	2.1
Tangible Assets	402.1	498.5	564.8	665.7	897.5
Investments	2.3	1.8	3.3	9.7	13.7
<b>Current Assets</b>	\$1,132.8	\$1,350.9	\$1,498.3	\$1,665.3	\$2,064.8
Stocks	407.7	427.7	484.8	536.6	617.2
Debtors	586.7	717.9	808.0	888.9	1,016.8
Investments	1.1	0.4	0.6	0.6	2.3
Deposits	38.5	91.6	138.3	122.7	332.3
Cash	98.8	113.3	66.6	116.5	96.3
<b>Current Liabilities</b>	(\$599.6)	(\$729.7)	(\$858.6)	(\$1,087.8)	(\$1,279.1)
<b>Long-Term Debt</b>	(\$311.3)	(\$437.1)	(\$419.4)	(\$402.4)	(\$236.1)
<b>Other Liabilities</b>	(\$58.7)	(\$42.3)	(\$49.6)	(\$41.0)	(\$41.9)
<b>Net Current Assets</b>	\$533.2	\$621.2	\$639.7	\$577.5	\$785.7
<b>Net Assets</b>	\$573.3	\$647.2	\$742.8	\$812.9	\$1,421.0
<b>Capital and Reserves</b>	\$566.1	\$636.5	\$737.0	\$804.8	\$1,345.6
Share Capital	185.3	210.1	256.0	274.6	280.8
Share Premium Account	103.4	118.4	261.7	284.3	313.4
Revaluation Reserve	7.9	8.9	10.6	6.7	4.6
Other Reserves	51.1	14.7	8.8	0	0
Profit and Loss	218.4	284.4	199.9	239.2	746.7
<b>Minority Interest</b>	\$7.2	\$10.7	\$5.8	\$8.1	\$75.5
Shareholders' Equity	\$573.3	\$647.2	\$742.8	\$812.9	\$1,421.0
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>Revenue</b>	\$1,437.6	\$1,862.2	\$2,116.1	\$2,397.9	\$2,788.4
Europe	646.9	987.0	1,206.2	1,462.7	1,728.8
International	790.7	875.2	909.9	935.2	1,059.6
<b>Operating Profit</b>	\$186.6	\$167.0	\$205.9	\$276.1	\$310.2
<b>Pretax Income</b>	\$171.8	\$132.7	\$164.4	\$242.2	\$312.2
<b>Pretax Margin (%)</b>	11.95	7.13	7.77	10.10	11.20
<b>Effective Tax Rate (%)</b>	45.00	40.00	35.00	35.00	35.00
<b>Net Income</b>	\$111.9	\$91.3	\$94.8	\$157.1	\$221.0
<b>Shares Outstanding, Millions</b>	N/A	N/A	N/A	N/A	N/A
<b>Per Share Data</b>					
Earnings	N/A	N/A	N/A	N/A	N/A
Dividends	N/A	N/A	N/A	N/A	N/A
Book Value	N/A	N/A	N/A	N/A	N/A
<b>Exchange Rate: US\$1/£</b>	£0.77	£0.68	£0.61	£0.57	£0.57*

\*The exchange rate for 1989 is the exchange rate for Q1 1989.  
 N/A = Not Available

Source: Racal Electronics Plc  
 Annual Reports  
 Dataquest  
 January 1990

# Racal Electronics Plc

Racal Electronics Plc  
Landata House  
Station Road, Hook,  
Basingstoke  
Hants RG27 9PE  
England

Telephone: + 44 (25672) 3911 Telex: 858294

## THE COMPANY

### Background

Racal Electronics, formed in 1950 as a radio communications consultancy with £100 capital, has expanded into a powerful international group of companies, leading the world in many areas of professional electronics and security.

The most dramatic growth has been since 1961, when Racal became a public company. At that time, sales stood at £1.9 million with pretax profits of £182,000. In 1985, turnover broke the billion-pound barrier with pretax profits of £132,305.

The Racal work force in 1961 stood at 720. Now, with the acquisition of Chubb last year, there are more than 33,000 employed by the Company throughout the world.

The main areas of the Company's activity are security, data communications, radio communications, marine and energy electronics, and defense radar and avionics. Other wide-ranging activities providing a strong contribution to the remaining percentage of sales include communications security, acoustics, health care, and microelectronics.

Since its formation, Racal has maintained a continuing commitment to a high level of research and development, with some 70 percent of total costs provided by the Company's own resources. Individual operating companies are responsible for their own product designs, and specialist teams at central research establishments in the United Kingdom and the United States spearhead the application of advanced technologies and the development of new business areas.



# Racal Electronics Plc

## Operations

Racal activities are divided into the following sectors:

- Data Communications
- Radio Communications
- Security
- Marine and Energy Electronics
- Defense Radar and Avionics
- Other Business Activities

Sales during fiscal year 1985 were £1,106,971,000, representing an increase of 35.7 percent. Table 1 lists fiscal 1985 sales by business sectors.

Table 1

### Racal Electronics Plc SALES BY BUSINESS SECTOR--1985

<u>Sector</u>	<u>1985 Sales</u>
Data Communications	£ 343,571,000
Radio Communications	185,523,000
Security	171,636,000
Marine and Energy Electronics	136,263,000
Defense Radar and Avionics	114,911,000
Other Business Activities	<u>155,067,000</u>
Total Sales	£1,106,971,000

Source: Racal Electronics Plc  
Annual Report

## International Operations

Racal has 84 subsidiaries outside the United Kingdom in 21 different countries and 11 associated companies in 8 countries. Sales outside the United Kingdom amounted to £769 million in 1985, representing almost 70 percent of total sales. These sales increased by 36.7 percent over 1984 sales, as shown in Table 2.

# Racal Electronics Plc

Table 2  
Racal Electronics Plc  
SALES BY GEOGRAPHIC REGION

<u>Region</u>	<u>1984 Percentage</u>	<u>1985 Percentage</u>
Africa	6%	7%
The Americas	31	33
Asia and Australia	16	15
United Kingdom	31	31
Europe (excluding U.K.)	<u>16</u>	<u>14</u>
Total	100%	100%

Source: Racal Electronics Plc  
Annual Report

## Research and Development

The Company's growth has always been based on a succession of new high-performance products designed by Racal engineers and scientists and financed from Racal's own resources.

Racal research and development is currently in the areas of advanced projects in silicon technology, microcircuit design methods, and experimental satellite communications work in association with the European Space Agency and on a very advanced signal processing system for the Racal EW equipment supported by the U.K. Ministry of Defense.

## Employees

The average number of persons employed by the Company increased by 39.2 percent to 25,220 persons. Table 3 shows the number of employees in the United Kingdom and overseas for 1984 and 1985.

# Racal Electronics Plc

Table 3

Racal Electronics Plc  
NUMBER OF EMPLOYEES BY LOCATION

<u>Location</u>	<u>1984</u>	<u>1985</u>
United Kingdom	11,742	15,835
Overseas	<u>6,370</u>	<u>9,385</u>
Total Employees	18,112	25,220

Source: Racal Electronics Plc  
Annual Report

## Prior-Year Highlights

The Company's 1985 net profit before taxation amounted to £132.3 million, an increase of 11 percent over the previous year's £119.2 million. Sales during fiscal year 1985 were £1,107.00 million, an increase of 35.7 percent over the previous year's £185.6 million.

## TELECOMMUNICATIONS ACTIVITIES

The telecommunications activities of the Company fall under the Data Communications and Radio Communications sectors:

The Data Communications sector deals with business communications products in the areas of data, text, image, and voice. Racal produces equipment ranging from modems and multiplexers to local area networks and packet switching devices for digital services.

Racal is one of the world's leading companies in the radio communications field. Today, it supplies military and civilian customers in more than 140 countries. The Company specializes in the provision of a wide range of turnkey systems based on a number of radio technologies such as portable, mobile, fixed, and air-transportable technologies. These may be linked over local and wide area networks and for medium and long-haul communications links.

# Racal Electronics Plc

The Company also has an outstanding range of advanced technology radio products, from hand-held radios to high-power transmitters. These have been designed to meet the needs of a wide diversity of users in tactical and strategic defense, security and paramilitary operations, and a variety of civil roles.

## Private Local Area Network

The Racal-Milgo Private Local Area Network (PLANET) system has been designed to enable the linking of a wide range of equipment such as mainframes, personal computers, video display units, word processors, telex and viewdata terminals, disk storage file servers, and printers.

## Vodafone

Racal has entered the U.K. market as an operator and supplier of a cellular mobile telephone system. (British Telecom Securicor is the other U.K. licensed cellular system operator.) Racal has established two companies--Racal-Vodac to market the mobile telephone handset equipment and Racal-Vodafone to establish the cellular transmission and switching network.

Racal supplies three types of mobile equipment:

- The mobile--A telephone for the car
- The portable--A short-range handset unit
- The transportable--A telephone that can be used either as a mobile phone installed in the car or alternatively as a hand-carried portable unit, having a large battery pack and consequently a larger range and longer recharge life than the Vodafone unit

In an effort to gain greater flexibility in overseas markets, in December 1986, Racal bought out the minority partners of its Vodafone cellular telephone network in a deal worth \$161 million.

# Racal Electronics Plc

## MILITARY AND MARINE ACTIVITIES

Racal's marine and energy electronics sector supplies advanced terrestrial and satellite systems for navigation and positioning. For merchant and naval ships, pleasure craft, and fishing boats, Racal provides products that are designed to improve efficiency and safety. Products range from a simple radar system to fully customized integrated electronic systems covering the entire ship.

Racal defense radar and avionics companies supply radar electronic warfare systems, and high-performance radar for surface-to-air missile systems. A key user of these products is the U.K. Navy.

## Radius Inc.

1710 Fortune Drive  
San Jose, California 95131  
Telephone: (408) 434-1010  
Fax: (408) 434-0770  
Dun's Number: 15-553-4597

*Date Founded: 1986*

---

### CORPORATE STRATEGIC DIRECTION

Radius Inc. was formed in 1986 to develop high-performance visual computing solutions for personal computers. The Company's current products include a family of high-resolution monochrome, gray-scale, and color displays that enable personal computers to perform graphics-intensive applications that formerly required workstations or specialized computer systems. Elements of visual computing include high-resolution graphics, photographic-quality color images, animation, and full-motion video.

Radius pioneered the development of visual computing solutions for the Apple Macintosh personal computer and is a leading independent supplier of high-resolution display systems for the Macintosh, with an installed base of over 100,000 units. Almost all of the Company's net sales have been derived from products designed for use with Macintosh personal computers. Radius shipped its first products for IBM and compatible personal computers in early 1990 and intends to expand its product offerings for this market.

Radius believes its distribution plan is a key element of its strategy. The Company's products are available through a worldwide network of Radius Authorized Resellers and Radius Authorized Value-Added Resellers (VARs). Domestically, Radius has corporate distribution agreements with several chains including Businessland, ComputerLand, Computer Factory, Connecting Point, Heath Zenith, Inacomp, MicroAge, and NYNEX. Additionally, Radius products are available directly through independent dealers, resellers, and VARs. The Company's international sales are made through 19 distributors that market, sell, and service the Company's products in 22 countries. For fiscal year 1989, international sales represented 33 percent of revenue.

Total revenue increased 149 percent from \$32.9 million\* in fiscal 1988 to \$82.0 million in fiscal 1989. This increase reflected increases in unit shipments of Radius Two Page Display systems and Radius Color Display systems, which were introduced in late fiscal 1988. Net income increased to \$6.1 million in fiscal 1989 from \$2.8 million in fiscal 1988. R&D expenses increased from \$1.3 million in fiscal 1988 to \$3.8 million in fiscal 1989. The Company completed its initial stock offering in August 1990.

More detailed information is available in Tables 1 and 2, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region. Table 3, a comprehensive financial statement, is at the end of this backgrounder. Information on revenue by distribution channel is not available.

---

### BUSINESS SEGMENT STRATEGIC DIRECTION

Radius is a leading supplier of monochrome and gray-scale graphics products for the monochrome publishing and graphics productivity markets offering products for both Macintosh and industry-standard architecture (ISA)-compatible platforms. All Radius display system products consist of either a full-page or a two-page display, a video interface, and RadiusWare software.

According to Dataquest, Radius ranked first among the third-party vendors for Apple monochrome monitors, with a worldwide market share of 19 percent. The Company's product offerings in monochrome and gray-scale display systems include the Radius Pivot Display, the Radius Two Page Display/19, the

\*All dollar amounts are in US dollars.

Radius Two Page Display/21, and the Radius Precision Color Calibrator.

Dataquest estimates that Radius ranked fourth in the Apple color monitor market with a 4.6 percent market share in 1989. The Company's products in this area include the Radius Color Display system, the Radius PrecisionColor Calibrator, the Radius QuickCAD Graphics Engine, the QuickColor Graphics Engine, and the RadiusTV. The RadiusTV provides the capability to display full-motion video images from a VCR, videodisc, red/green/blue (RGB) camera, or a television broadcast signal on a Macintosh II computer. Using this product, a user can combine text, graphics, video images, and sound in an integrated manner for interactive applications.

Radius' general-purpose CPU acceleration products for the Macintosh Plus and Macintosh SE provide 32-bit CPU performance to the low end of the Macintosh product line. The Radius Accelerator 16 significantly increases the processing speed of the Macintosh Plus and the Macintosh SE. The Radius Accelerator 25 significantly increases the processing speed of the Macintosh SE.

#### Further Information

For further information about Radius' business segments, please contact the appropriate Dataquest industry service.

**Table 1**  
**Corporate Highlights (Thousands of US Dollars)**

	1987	1988	1989	
Three-Year Revenue	\$7,278.0	\$32,863.0	\$81,953.0	
Percent Change	-	351.54	149.38	
Capital Expenditure	\$776.0	\$891.0	\$6,413.0	
Percent of Revenue	10.66	2.71	7.83	
R&D Expenditure	\$419.0	\$1,333.0	\$3,822.0	
Percent of Revenue	5.76	4.06	4.66	
Number of Employees	NA	NA	300	
Revenue (\$K)/Employee	NA	NA	\$273.20	
Net Income	\$426.0	\$2,770.0	\$6,119.0	
Percent Change	-	550.23	120.90	
<b>1989 Calendar Year</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>
Quarterly Revenue	\$18,085.00	\$20,795.00	\$20,019.00	\$23,054.00
Quarterly Profit	\$2,169.00	\$1,510.00	\$688.00	\$1,752.00

NA = Not available

Source: Radius Inc.  
Prospectus  
Dataquest (1990)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1987	1988	1989
United States	70.00	68.00	67.00
International	30.00	32.00	33.00

Source: Radius Inc.  
Prospectus  
Dataquest (1990)



---

## 1989 SALES OFFICE LOCATIONS

North America—8  
Europe—2

---

## MANUFACTURING LOCATIONS

*North America*  
San Jose, California  
Assembly/packaging

---

## SUBSIDIARIES

Information is not available.

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

Information is not available.

---

## MERGERS AND ACQUISITIONS

1990

IMV Ltd.

Radius acquired IMV Ltd., a developer of video compression technology.

---

## KEY OFFICERS

Michael D. Boich  
President and chief executive officer

Stephen L. Bartlett  
Vice president, Manufacturing

Ralph J. Burgess  
Vice president, Customer Service

Dirk H. Eastman  
Vice president, Sales

Richard A. Heddleson  
Vice president, Finance, and chief financial officer

Steven R. Holtzman  
Vice president, Marketing

Andrew J. Slinger  
Vice president, Engineering

---

## PRINCIPAL INVESTORS

Information is not available.

---

## FOUNDERS

Alain Rossmann  
Matt Carter  
Burrell Smith  
Michael D. Boich

**Table 3**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending September**  
**(Thousands of US Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Total Current Assets	NA	\$19,643.0	\$27,588.0
Cash	NA	9,181.0	8,933.0
Receivables	NA	5,911.0	9,088.0
Marketable Securities	NA	0	0
Inventory	NA	3,988.0	8,460.0
Other Current Assets	NA	563.0	1,107.0
Net Property, Plants	NA	\$1,232.0	\$6,986.0
Other Assets	NA	\$396.0	\$232.0
<b>Total Assets</b>	<b>NA</b>	<b>\$21,271.0</b>	<b>\$34,806.0</b>
Total Current Liabilities	NA	\$6,066.0	\$10,762.0
Long-Term Debt	NA	0	\$2,558.0
Other Liabilities	NA	0	0
<b>Total Liabilities</b>	<b>NA</b>	<b>\$6,066.0</b>	<b>\$13,320.0</b>
Total Shareholders' Equity	NA	\$15,205.0	\$21,486.0
Converted Preferred Stock	NA	12,388.0	12,381.0
Common Stock	NA	0	170.0
Other Equity	NA	(75.0)	(76.0)
Retained Earnings	NA	2,892.0	9,011.0
<b>Total Liabilities and Shareholders' Equity</b>	<b>NA</b>	<b>\$21,271.0</b>	<b>\$34,806.0</b>
<b>Income Statement</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Revenue	\$7,278.0	\$32,863.0	\$81,953.0
US Revenue	5,095.0	22,347.0	54,908.0
Non-US Revenue	2,183.0	10,516.0	27,045.0
Cost of Sales	\$4,823.0	\$19,285.0	\$54,007.0
R&D Expense	\$419.0	\$1,333.0	\$3,822.0
SG&A Expense	\$1,624.0	\$8,027.0	\$14,744.0
Capital Expense	\$776.0	\$891.0	\$6,413.0
Pretax Income	\$545.0	\$4,702.0	\$9,945.0
Pretax Margin (%)	7.49	14.31	12.14
Effective Tax Rate (%)	22.00	41.00	38.00
Net Income	\$426.0	\$2,770.0	\$6,119.0
Shares Outstanding, Thousands	5,684.0	9,032.0	10,867.0
<b>Per Share Data</b>			
Earnings	\$0.07	\$0.31	\$0.56
Dividend	0	0	0
Book Value	NA	\$1.68	\$1.98

**Table 3 (Continued)**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending September**  
**(Thousands of US Dollars, except Per Share Data)**

<b>Key Financial Ratios</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<i>Liquidity</i>			
Current (Times)	NA	3.24	2.56
Quick (Times)	NA	2.58	1.78
Fixed Assets/Equity (%)	NA	8.10	32.51
Current Liabilities/Equity (%)	NA	39.89	50.09
Total Liabilities/Equity (%)	NA	39.89	61.99
<i>Profitability (%)</i>			
Return on Assets	-	26.04	21.82
Return on Equity	-	36.44	33.35
Profit Margin	5.85	8.43	7.47
<i>Other Key Ratios</i>			
R&D Spending % of Revenue	5.76	4.06	4.66
Capital Spending % of Revenue	10.66	2.71	7.83
Employees	NA	NA	300
Revenue (\$K)/Employee	NA	NA	\$273,177
Capital Spending % of Assets	NA	4.19	18.42

NA = Not available

Source: Radius Inc.  
Prospectus  
Dataquest (1990)

## Ramtek Corporation

1525 Atteberry Lane  
San Jose, California 95131  
Telephone: (408) 954-2700  
Fax: (408) 954-0118  
Dun's Number: Not Available

*Date Founded: 1971*

### CORPORATE STRATEGIC DIRECTION

Ramtek Corporation designs, manufactures, and services specialized computer display and processing systems used in a variety of imaging and graphics applications. Imaging applications include image generation and display for petrochemical, meteorological, medical, and remote sensing analysis. Graphics applications include process control; military command, control, communications, and intelligence; and computer-aided design and manufacturing (CAD/CAM). Founded in 1971, Ramtek was a pioneer in the development of computer display systems for color images.

In March 1988, after financial and management difficulties left the Company in serious trouble, James A. Swanson, formerly Ramtek's corporate counsel, was appointed president and CEO, and a new management team was organized. The new management filed a voluntary petition for reorganization under Chapter 11 of the United States Bankruptcy Code in September 1988. The Company has not generated operating profits on an annual basis since fiscal 1983. In November 1989, the Court confirmed the Company's Plan of Reorganization.

Revenue decreased 9 percent to \$17.6 million\* in fiscal 1990 from \$19.3 million in the previous year. Approximately \$2.7 million of the Company's revenue from product sales during fiscal 1990 is attributable to revenue recognized from a contract with a new UK customer, the Civil Aviation Authority. R&D expenses were \$4.3 million in fiscal 1990 compared with \$3.0 million in the previous year because of the development of the Millennium product, which was introduced in the third quarter of fiscal 1990. No sales of the Millennium product were recorded in fiscal 1990, but shipments are expected to begin in fiscal 1991.

\*All dollar amounts are in US dollars.

The Company met its cash requirements during fiscal 1990 primarily through revenue generated by product sales, including sales to its three principal customers: Unisys Corporation, Control Data Corporation, and the Civil Aviation Authority. During fiscal 1990, Unisys, Control Data, and the Civil Aviation Authority respectively accounted for approximately 8, 14, and 15 percent of revenue. Ramtek's net income was \$12.0 million, which included an extraordinary item of \$12.5 million related to a gain from the Company's emergence from Chapter 11. Ramtek had a net income of \$217,000 in fiscal 1989, which included an extraordinary item related to the utilization of a net operating loss carry forward of \$397,000.

The Company markets its products in the United States through six regional sales offices. International sales are made through the Company's direct sales force and through 13 foreign distributors. European sales are supported by the Company's foreign sales and service office in the United Kingdom. Ramtek supports its customers domestically and internationally with product service centers in the United States and Europe. The Company sells a substantial portion of its products to end users such as utility companies, aerospace and defense companies, government agencies, and universities. The Company also sells its systems to original equipment manufacturers (OEMs), value-added resellers (VARs), and systems integrators. Ramtek employs 123 people worldwide.

More detailed information is available in Tables 1 and 2, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region. Information regarding revenue by distribution channel is not available. Table 3, a comprehensive financial statement, is at the end of this backgrounder.

---

## **BUSINESS SEGMENT STRATEGIC DIRECTION**

Ramtek offers a wide range of computer display systems, which are divided into two major product categories: one specialized for imaging applications and one specialized for graphics applications. Within each category, the Company's products maintain upward compatibility.

Imaging products include the 9000 Series, the 4660 Product, and the Millennium. Ramtek's most mature product line, the 9000 Series Display, is used to generate high-resolution images. Available in a broad range of configurations, the 9000 Series offers a variety of video generators providing features for specific applications. Designed to serve the 9000 Series customer base with improved price/performance characteristics, the 4660 Product offers a number of additional features. These include the ability to view images stored in refresh memory on a CRT and to simultaneously display several independent viewports of varying size. The Millennium is a high-performance, high-resolution subsystem designed to accelerate the processing and visual

display of technical and scientific data. Millennium connects to a UNIX workstation off-loading the critical image processing and visualization functions from the workstation.

Ramtek's graphics products include the 4200/4300 Series. This series is composed of 1,280 x 1,024-resolution, host-dependent graphics display systems intended primarily for technical professionals. By performing certain graphics functions locally, this product provides faster system response to user input and implements display changes more rapidly than when these functions are performed by a host computer. All 4200/4300 Series products are available with several software options, communications features, and interactive devices. Applications are supported by Company-supplied interface software, GKS/CGI interface software, or Tektronix 4115 firmware compatibility.

### **Further Information**

For further information about Ramtek's business segments, please contact the appropriate Dataquest industry service.

**Table 1**  
**Corporate Highlights\* (Thousands of US Dollars)**

	1989	1990
Two-Year Revenue	\$19,271.0	\$17,600.0
Percent Change	-	(8.67)
Capital Expenditure	\$597.0	\$423.0
Percent of Revenue	3.10	2.40
R&D Expenditure	\$2,974.0	\$4,296.0
Percent of Revenue	15.43	24.41
Number of Employees	120	123
Revenue (\$K)/Employee	\$160.59	\$143.09
Net Income	\$217.0	\$12,041.0
Percent Change	-	5,448.85

1989 Calendar Year	Q1	Q2	Q3	Q4
Quarterly Revenue	NA	NA	NA	NA
Quarterly Profit	NA	NA	NA	NA

\*Statements of Operations for fiscal years 1987 and 1988 are not available on an audited basis.  
 NA = Not available

Source: Ramtek Corporation  
 Forms 10-K  
 Dataquest (1990)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1989	1990
United States	88.00	70.00
International	12.00	30.00
Europe	12.00	30.00

Source: Ramtek Corporation  
 Forms 10-K  
 Dataquest (1990)

---

## 1989 SALES OFFICE LOCATIONS

North America—6  
Europe—1

---

## MANUFACTURING LOCATIONS

*North America*  
San Jose, California

---

## SUBSIDIARIES

Information is not available.

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

Information is not available.

---

## MERGERS AND ACQUISITIONS

Ramtek has not participated in any mergers or acquisitions.

---

## KEY OFFICERS

**James A. Swanson**  
President and chief executive officer

**Bill R. Finley**  
Chief financial officer

**W. Michael Tyler**  
Vice president, Marketing

---

## PRINCIPAL INVESTORS

Information is not available.

---

## FOUNDERS

Information is not available.

**Table 3**  
**Comprehensive Financial Statement\***  
**Fiscal Year Ending June**  
**(Thousands of US Dollars, except Per Share Data)**

<b>Balance Sheet</b>	<b>1989</b>	<b>1990</b>
<b>Total Current Assets</b>	<b>\$7,254.0</b>	<b>\$7,120.0</b>
Cash	1,371.0	823.0
Receivables	2,459.0	3,286.0
Marketable Securities	0	0
Inventory	3,184.0	2,808.0
Other Current Assets	240.0	203.0
Net Property, Plants	\$1,296.0	\$1,197.0
Other Assets	\$209.0	\$14.0
<b>Total Assets</b>	<b>\$8,759.0</b>	<b>\$8,331.0</b>
<b>Total Current Liabilities</b>	<b>\$19,742.0</b>	<b>\$4,293.0</b>
Long-Term Debt	0	0
Other Liabilities	0	0
<b>Total Liabilities</b>	<b>\$19,742.0</b>	<b>\$4,293.0</b>
<b>Total Shareholders' Equity</b>	<b>(\$10,983.0)</b>	<b>\$4,038.0</b>
Converted Preferred Stock	0	0
Common Stock	41.0	46.0
Other Equity	29,480.0	4,104.0
Retained Earnings	(40,504.0)	(112.0)
<b>Total Liabilities and Shareholders' Equity</b>	<b>\$8,759.0</b>	<b>\$8,331.0</b>
<b>Income Statement</b>	<b>1989</b>	<b>1990</b>
<b>Revenue</b>	<b>\$19,271.0</b>	<b>\$17,600.0</b>
US Revenue	16,986.0	12,368.0
Non-US Revenue	2,285.0	5,232.0
Cost of Sales	\$10,118.0	\$9,233.0
R&D Expense	\$2,974.0	\$4,296.0
SG&A Expense	\$5,274.0	\$4,908.0
Capital Expense	\$597.0	\$423.0
Pretax Income	\$280.0	(\$444.0)
Pretax Margin (%)	1.45	(2.52)
Effective Tax Rate (%)	NA	NA
Net Income	\$217.0	\$12,041.0
Shares Outstanding, Thousands	4,099.0	4,346.0
<b>Per Share Data</b>		
Earnings	\$0.05	\$2.77
Dividend	0	0
Book Value	(\$2.68)	\$0.93



**Table 3 (Continued)**  
**Comprehensive Financial Statement\***  
**Fiscal Year Ending June**  
**(Thousands of US Dollars, except Per Share Data)**

<b>Key Financial Ratios</b>	<b>1989</b>	<b>1990</b>
<i>Liquidity</i>		
Current (Times)	0.37	1.66
Quick (Times)	0.21	1.00
Fixed Assets/Equity (%)	(11.80)	29.64
Current Liabilities/Equity (%)	(179.75)	106.32
Total Liabilities/Equity (%)	(179.75)	106.32
<i>Profitability (%)</i>		
Return on Assets	4.95	140.91
Return on Equity	(3.95)	(346.75)
Profit Margin	1.13	68.41
<i>Other Key Ratios</i>		
R&D Spending % of Revenue	15.43	24.41
Capital Spending % of Revenue	3.10	2.40
Employees	120	123
Revenue (\$K)/Employee	\$160.59	\$143.09
Capital Spending % of Assets	6.82	5.08

\*Statements of Operations for fiscal years 1987 and 1988 are not available on an audited basis.  
 NA = Not available

Source: Ramtek Corporation  
 Forms 10-K  
 Dataquest (1990)

## Rank Xerox

2654 Parkway, Marlow  
Bucks SL7 1YL  
United Kingdom  
Telephone: (44) 628-890-000  
Fax: (44) 628-892-001  
Telex: 846666  
Dun's Number: 31-502-2046

*Date Founded: 1956*

### Corporate Strategic Direction

Rank Xerox provides a range of copiers and office systems to meet customers' needs in the creation, printing, copying, distribution, filing, and publishing of paper and electronic documents. The Company, a joint venture between Xerox Corporation and The Rank Organisation, has extensive R&D and manufacturing facilities in the European Community (EC) and a distribution network in over 80 countries in the EC and throughout the world.

During fiscal 1989, Rank Xerox showed an 11.5 percent rise in revenue to £2.6 billion (US\$4.1 billion). (Percentage changes refer to £ amounts only; US\$ percentage changes will differ because of fluctuations in Dataquest exchange rates.) Net income decreased 98.8 percent to £69.3 million (US\$113.6 million) in fiscal 1989 from £137.8 million (US\$225.9 million) in fiscal 1988. The difference was the £58.1 million (US\$95.2 million) dividend declared by the Company in 1989. Rank Xerox employed approximately 28,000 people in 1989.

Rank Xerox's high-volume revenue increased 25 percent in 1989, while revenue in the mid-volume sector rose 2 percent. Revenue in the low-volume sector increased 5 percent. Decentralized electronic printing (DEP) sector revenue increased 22 percent with the introduction of the Company's first low-volume laser printer, the Xerox 4030.

The 1989 electronic typewriter market showed a 7 percent decline in revenue, but profit remained stable. The launch of three new facsimile machines into the existing line of Telecopiers made Rank Xerox the only supplier of cut-sheet and plain paper machines. Nineteen eighty-nine revenue from fax machines increased 42 percent over fiscal 1988 figures.

During 1989, the Office Systems Business was reorganized into Integrated Systems Operations. This business group custom designs complex document management systems for European governments. Rank Xerox will be using its strength and heritage in document management to deliver integrated systems to vertical markets such as pharmaceuticals, aerospace, and defense, which require specific solutions to processing huge numbers of documents.

The Company's goals for the upcoming years are centered around customer satisfaction. Substantial programs have been implemented to decrease downtime and to increase overall customer satisfaction. The Company surveys all its 14,000 customers yearly for a benchmark comparison of its present performance.

In efforts to reduce costs in areas that have no direct interface with the customer, Rank Xerox has consolidated its central logistical functions over recent years. Now one organization is responsible for all day-to-day operations and for driving developments and improvements. This group is called Rank Xerox Logistics Operations. The group has introduced a just-in-time (JIT) delivery system to control inventory levels and production processes and costs. The organization plans to decrease logistical costs as a percentage of revenue by 4 percent by 1992. Another goal is to be able to deliver commodity products to customers within 24 hours of receipt of order and to deliver the Company's other products on the dates that customers specify.

Because of the Company's accounting practices and policies, a financial analysis is not included in this backgrounder.

---

## BUSINESS SEGMENT STRATEGIC DIRECTION

### Copiers

Rank Xerox does most of its manufacturing in Europe, pursuing the following principles: closer involvement with its supplier base, which results in higher-quality components; JIT deliveries from those suppliers, which results in lower inventory costs; and use of a high degree of automation both for parts delivery and machine assembly. Because of these principles, Rank Xerox believes itself to be in a better position than that of its Japanese competitors.

According to Dataquest, Rank Xerox captured 11.8 percent of the plain paper copier market in 1989, ranking the Company second behind Canon. Rank Xerox was most active in Segment 1 with 55,000 units placed last year. However, in the newly developed Segment 6, the Company has nearly 77 percent of the market with approximately 3,600 units placed. Some of the new machines introduced are the 50 Series—5012/514, 5042, 5090—all in 1989. Introduced in 1990 were the 5065 and 5220. Nearly half of all machine installations in 1989 were 50 Series products, and the proportion is expected to be 80 percent by 1990 year-end.

The new Integrated Systems Operations has been very successful in designing complex systems for European governments and has decided to enter the commercial sector. This new unit combines custom systems with the rest of the Company's document systems business.

In February 1989, Xerox Engineering Systems Division (XES) was formed, bringing all Xerox engineering product lines into one group and including Versatec. XES is now the world's largest supplier of printers, plotters, and copiers to the specialized engineering and large document market. This division introduced the Xerox 5080 engineering drawing printer with variable reduction and enlargement in 1989. The Xerox Docutech was introduced in late 1990. The Docutech is a large-capacity copier/printer machine that can be linked with a network system, allowing electronic transfer of documents.

### Printers

Rank Xerox and Xerox manufacture page, non-impact, plain, paper printers (PNPPs). New printers include the 8700 MODEL V, 8790 MODEL V, 9700 MODEL V, and 9790 MODEL V, all introduced in 1990. Dataquest ranked the Company seventh in the 11- to 15-pages-per-minute (ppm) segment, with 3 percent market share for 1989. In the 21- to 30-ppm segment, the Company ranked first with 31.3 percent share. In the 51- to 80-ppm segment, it ranked third with 22.6 of the market. In the 81- to 150-ppm segment, the Company ranked second to IBM with 26.1 percent market share for 1989.

### Facsimiles

Rank Xerox's strength lies in its mid- to high-range product line. It has focused its R&D on printing technology and the integration of fax with its other office products. The Company introduced its thermal transfer fax machine that uses cut-sheet, plain bond paper in 1986. It introduced three plain paper facsimile machines May 1990: the 3010/3010E, 7032, and 7033. All three machines are in Segment 6.

Dataquest ranks Xerox seventh in 1989 facsimile market with 52,100 shipments worldwide and a 3.6 percent market share.

### Further Information

For further information about the Company's business segments, please contact the appropriate Dataquest industry services.

---

## 1989 SALES OFFICES LOCATIONS

Europe—16  
Asia/Pacific—8  
ROW—9

---

## MANUFACTURING LOCATIONS

### Europe

Coslada, Spain  
Toner and developer production, low-volume printer assembly, and product refurbishing

**Lille, France**

High-volume processor assembly (1065, 1090), input/output device assembly, mid- and high-volume product refurbishing, memory writer assembly, and software duplication

**Mitcheldean, United Kingdom**

Low-volume processor assembly, low- and high-volume product refurbishing, fuser roller manufacturing, and wire and harness manufacturing

**Venray, Netherlands**

Low-volume processor assembly

**Welwyn Garden City, United Kingdom**

PWBA assembly, cartridge assembly for the 5046, and photoreceptor production

**Asia/Pacific****Bombay, India**

Assembly of full product range for export to Eastern bloc countries

**Rampur, India**

Full assembly of low- and midrange products, including electronics, photoreceptors, and toners and developers

**ROW****Sixth October City, Egypt**

Assembly of full product range

---

**SUBSIDIARIES****Europe**

Burofinance SA (France)  
 Finansaktiebolaget Rank Xerox Credit (Sweden)  
 NV Rank Xerox Credit SA (Belgium)  
 NV Rank Xerox SA (Belgium)  
 Office de Transformation Papetiere SA (France)  
 Rank Xerox A/S (Denmark)  
 Rank Xerox Austria (Austria)  
 Rank Xerox Belgium (Belgium)  
 Rank Xerox (Copy Bureaux) Limited (United Kingdom)  
 Rank Xerox DDR (Germany)  
 Rank Xerox de Financiacion SA (Spain)  
 Rank Xerox Denmark (Denmark)  
 Rank Xerox Equipment Services Limited (United Kingdom)  
 Rank Xerox Exports Limited (United Kingdom)  
 Rank Xerox Finance Limited (United Kingdom)  
 Rank Xerox Finans A/S (Denmark)

Rank Xerox Finland (Finland)  
 Rank Xerox France (France)  
 Rank Xerox Germany (Germany)  
 Rank Xerox Greece (Greece)  
 Rank Xerox Holland (Netherlands)  
 Rank Xerox (Ireland) Limited (Ireland)  
 Rank Xerox Italy (Italy)  
 Rank Xerox Leasing GmbH (Germany)  
 Rank Xerox Leasing International Finance BV (Netherlands)  
 Rank Xerox Leasing International Limited (United Kingdom)  
 Rank Xerox (Management) Limited (United Kingdom)  
 Rank Xerox (Nederland) BV (Netherlands)  
 Rank Xerox (Overseas) Limited (United Kingdom)  
 Rank Xerox Oy (Finland)  
 Rank Xerox Portugal (Portugal)  
 Rank Xerox (R & S) Limited (United Kingdom)  
 Rank Xerox Rentalease BV (Netherlands)  
 Rank Xerox SA (France)  
 Rank Xerox Spain (Spain)  
 Rank Xerox Sweden (Sweden)  
 Rank Xerox Switzerland (Switzerland)  
 Rank Xerox Vertriebs GmbH (Germany)  
 Societe Industriell Rank Xerox SA (France)  
 Xerobail SA (France)

**Asia/Pacific**

Bombay Facility (40 percent owned) (India)  
 Fuji Xerox (Japan)  
 Rampur Facility (40 percent owned) (India)  
 Rank Xerox (Hong Kong) Limited (Hong Kong)  
 Rank Xerox (Singapore) Pte Ltd (Singapore)

**ROW**

Rank Xerox Kenya Limited (Kenya)  
 Rank Xerox Mozambique (Mozambique)  
 Rank Xerox (Nigeria) Limited (Nigeria)  
 Rank Xerox Uganda Limited (Uganda)  
 Sixth of October City (75 percent owned) (Egypt)

---

**ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS**

Information is not available.

---

**MERGERS AND ACQUISITIONS**

1990

**Fuji Xerox**

Rank Xerox sold its businesses in Australia, Malaysia, New Zealand, and Singapore to Fuji Xerox for £135 million (US\$221.3 million). Fuji Xerox is a joint venture between Fuji and Rank Xerox, each owning 50 percent.

**P. A. Allaire**  
Director

**H. C. Debuissier**  
Director

**M. B. Gifford**  
Director

**L. Gonzalez-Camino**  
Director

---

**PRINCIPAL INVESTORS**

Information is not available.

---

---

**KEY OFFICERS**

**D. T. Kerns**  
Chairman

**Bernard Fourmer**  
Managing director

---

**FOUNDERS**

Information is not available.

## Raytheon Company

141 Spring Street  
Lexington, Massachusetts 02173  
Telephone: (617) 862-6600  
Fax: (617) 860-2172  
Dun's Number: 10-116-6999

*Date Founded: 1922*

---

### CORPORATE STRATEGIC DIRECTION

Raytheon Company conceives, develops, manufactures, and sells electronic systems and subsystems, equipment, and components for government and commercial use. The Company also is involved in other businesses such as aircraft products, energy services, major appliances, heavy construction equipment, and publication of textbooks. In 1989, Raytheon was ranked as the 53rd largest industrial company by *Fortune Magazine*.

Raytheon is organized into five major business areas: electronics, aircraft products, energy services, major appliances, and other lines. The Company's principal business is to design, engineer, manufacture, and service advanced electronic devices, equipment, and systems for both government and commercial customers. The electronics business segment accounted for 61 percent of the Company's revenue in fiscal 1989.

Total revenue increased by 7.4 percent to about \$8.8 billion\* in fiscal 1989 from \$8.2 billion in fiscal 1988. Net income increased 8.0 percent to \$528.8 million in fiscal 1989 from about \$489.6 million in fiscal 1988. Raytheon employs 77,600 people worldwide.

R&D expenditure totaled \$274.7 million in fiscal 1989, representing 3.1 percent of revenue. Capital spending totaled \$413.9 million in fiscal 1989, representing 4.7 percent of revenue.

More detailed information is available in Tables 1 through 3, which appear after "Business Segment Strategic Direction" and present corporate highlights and revenue by region and distribution channel. Table 4, a comprehensive financial statement, is at the end of this profile.

---

\*All dollar amounts are in US dollars.

---

### BUSINESS SEGMENT STRATEGIC DIRECTION

#### Electronics Businesses

In government electronics, Raytheon is a leading supplier of tactical missile systems from ground-based air defense missile systems such as the Patriot, Raytheon's largest program, to advanced air-to-air missiles such as AMRAAM. It also leads in air-to-ground missiles such as Maverick and in ship-launched missiles such as Standard-2.

Raytheon builds a variety of shipboard radar systems; almost every ship in the US Navy carries at least one Raytheon radar system. Raytheon also holds a dominant position in the development of large, ground-based, phased-array radars for early warning and strategic surveillance.

Raytheon also builds satellite communications systems and terminals for the US Air Force and Navy and is developing an electronic aircraft identification system for use by US and NATO forces. The Company produces advanced electronic countermeasure systems for shipboard and airborne use.

Raytheon is developing advanced automation displays for the FAA's multibillion-dollar modernization program. The Company also will produce up to 102 Doppler weather radar systems for the FAA to provide warning of wind shear conditions around the nation's airports.

Also, Raytheon develops submarine and ship-surface-ship sonar systems, combat control systems, displays, and minehunting equipment.

In its commercial electronics business, Raytheon produces a full range of solid-state components as well as broadcast, industrial, and microwave tubes. Industrial electronics products include Sorensen power supplies, Switchcraft jacks and plugs, and custom electronic components from Raytheon Semiconductor Division.

#### Aircraft Products

Beech Aircraft Corporation, a Raytheon subsidiary, supplies aircraft to the general aviation market. It produces jet, turboprop, and piston engine planes used by individuals, businesses, commuter airlines, and governments. In addition to providing sales and service support to commercial customers, Beech also sells aircraft, target drones, and services to the US government.

#### Energy Services

Through Raytheon's subsidiaries, The Badger Company Inc., United Engineers and Constructors International Inc., and Seismograph Service Corp., Raytheon designs, constructs, and maintains petroleum, petrochemical, chemical processing, electrical generating, and industrial plants and conducts worldwide exploration and related services for the oil and gas industries.

#### Major Appliances

Raytheon's major appliances business group consists of the Amana Refrigeration Inc., Caloric Corp., and Speed Queen Co. subsidiaries.

#### Other Lines

Raytheon also is involved in publishing textbooks and instructional materials for elementary and secondary school and college use through its D.C. Heath subsidiary. Also, Raytheon provides construction and road-building equipment to the resurfacing and pavement recycling market through its Cedarapids Inc. subsidiary.

#### Further Information

For more information about the Company's business segments, please contact the appropriate industry service. Dataquest tracks Raytheon through its MilAero Technology Service.

**Table 1**  
**Five-Year Corporate Highlights (Thousands of US Dollars)**

	1985	1986	1987	1988	1989
Five-Year Revenue	\$6,408,537.0	\$7,307,952.0	\$7,659,421.0	\$8,192,083.0	\$8,796,076.0
Percent Change	-	14.03	4.81	6.95	7.37
Capital Expenditure	\$346,427.0	\$341,471.0	\$354,182.0	\$421,300.0	\$413,900.0
Percent of Revenue	5.41	4.67	4.62	5.14	4.71
R&D Expenditure	\$260,251.0	\$253,990.0	\$266,123.0	\$271,032.0	\$274,652.0
Percent of Revenue	4.06	3.48	3.47	3.31	3.12
Number of Employees	73,000	75,000	76,500	76,200	77,600
Revenue (\$K)/Employee	\$87.79	\$97.44	\$100.12	\$107.51	\$113.35
Net Income	\$375,905.0	\$393,205.0	\$445,056.0	\$489,554.0	\$528,814.0
Percent Change	-	4.60	13.19	10.00	8.02
1989 Calendar Year		Q1	Q2	Q3	Q4
Quarterly Revenue		\$2,072.80	\$2,289.91	\$2,189.00	\$2,246.00
Quarterly Profit		\$120.80	\$133.69	\$137.40	\$136.91

Source: Raytheon Company  
Annual Reports and Forms 10-K  
Dataquest (1990)

**Table 2**  
**Revenue by Geographic Region (Percent)**

Region	1985	1986	1987	1988	1989
North America	93.00	93.00	92.00	92.81	93.39
International	7.00	7.00	8.00	7.19	6.61
Europe	7.00	7.00	8.00	7.19	6.61

Source: Raytheon Company  
Annual Reports and Forms 10-K  
Dataquest (1990)

**Table 3**  
**Revenue by Distribution Channel (Percent)**

Channel	1988	1989
Direct Sales	100.00	100.00
Indirect Sales	0	0

Source: Dataquest (1990)



---

## 1990 SALES OFFICE LOCATIONS

Information is not available.

---

## MANUFACTURING LOCATIONS

### *North America*

Andover, Bedford, Lowell, and Tewksbury, Massachusetts; Bristol, Tennessee

Missile Systems Division manufacturing activities include the Patriot surface-to-air missiles; Patriot/Hawk interoperability development; Hawk surface-to-air missiles; a new version of the Sparrow and Sea Sparrow missiles; Sidewinder air-to-air missiles; Maverick, AMRAAM, and Phoenix long-range missiles; Stinger air defense missiles; the Standard Missile-2; the Block 4 (Aegis Extended Range Version); and Agile Continuous Wave Acquisition Radar.

Marlborough, Sudbury, Waltham, and Wayland, Massachusetts

Equipment Division manufacturing activities include Air traffic control; military ground and satellite communication; naval radar and fire control; intelligence, warning, and space track radar; missile guidance components; displays; military computers; Pave Paws phased-array radar; Ballistic Missile Early Warning System radar; relocatable over-the-horizon backscatter radar systems for the navy; Milstar terminals; equipment for the navy's Aegis system; equipment for the NATO Sea Sparrow System; SPS-49 long-range air-search radar; Tartar fire-control radar; guidance electronics for Trident II missiles; an advanced family of military computers; the Ground-Based Surveillance Radar experiment for SDI; UYQ-21 standard shipboard displays; and TRC-170.

Goleta, California; Melville, New York

Electromagnetic Systems Division manufacturing activities include the ALQ-99, ALQ-184, SLQ-32, ALQ-142, ballistic reentry vehicle active decoys, and operational electronically steerable and simultaneous multibeam phased-array systems and subsystems.

East Providence and Portsmouth, Rhode Island

Submarine Signal Division manufacturing activities include antisubmarine warfare and advanced minehunting sonar.

Salina and Wichita, Kansas; Jackson, Missouri  
Beech Aircraft Corporation manufactures the C-12F, C-12, C-12D, C-12J, T-34C, T-1, and missile targets for government customers.

---

## SUBSIDIARIES

### *North America*

Amana Refrigeration Inc. (United States)  
Beech Aircraft Corporation (United States)  
Caloric Corp./Modern Maid (United States)  
Cedarapids Inc. (United States)  
D.C. Heath and Co. (United States)  
GeoQuest Systems (United States)  
Microwave and Power Tube Division (United States)  
Raytheon Canada Ltd.(Canada)  
Raytheon Marine Co. (United States)  
Raytheon Service Co. (United States)  
Research Division (United States)  
Seismograph Service Corp. (United States)  
Semiconductor Division (United States)  
Sorensen Co. (United States)  
Speed Queen Co. (United States)  
Switchcraft Inc. (United States)  
The Badger Company Inc. (United States)  
United Engineers and Constructors International Inc. (United States)

### *Europe*

BSG (Germany)  
Cossor Electronics Ltd. (England)  
Data Logic Ltd. (England)  
Electrical Installations Ltd. (England)  
Lacroix and Kress (Germany)  
REMCO SA (Spain)  
TAG Semiconductors Ltd. (Switzerland)

---

## ALLIANCES, JOINT VENTURES, AND LICENSING AGREEMENTS

1989

Hughes Aircraft and Messerschmitt-Boelkow Blohm

Raytheon, Hughes Aircraft, and Messerschmitt-Boelkow-Blohm (Germany) agreed to start licensed joint production of the Advanced Medium-Range Air-to-Air Missile (AMRAAM) in Europe.

1988

**Digital Equipment Corporation (DEC)**

Raytheon introduced three new militarized VAX computers under license from DEC. The three models use the same architecture and software as the DEC machines, with six custom CMOS chips acting as the core processor.

**Mitsubishi Heavy Industries Ltd.**

Raytheon and Mitsubishi Heavy Industries entered into a licensing agreement calling for Mitsubishi to assemble surface-to-air (SAM) Patriot missile systems under license from Raytheon.

**Showa Denko**

Raytheon and Showa Denko entered into a marketing agreement calling for Showa Denko to market Raytheon's infrared optical materials and parts of zinc selenide in Japan.

1987

**Cossor Electronics Ltd.**

Raytheon with Cossor Electronics signed a memorandum of understanding to enter into a joint development effort on the US Mark XV IFF (Identification Friend or Foe) and the UK NIS (NATO Identification System).

**Interatom**

Raytheon and Interatom entered into a licensing agreement calling for Interatom to sell and service certain Raytheon industrial lasers and production systems in Europe.

---

**MERGERS AND ACQUISITIONS**

1989

**GeoQuest Systems**

Raytheon acquired GeoQuest Systems, a privately held computer technology developer. GeoQuest will continue to operate autonomously.

**Balinger Schalttechnik**

Raytheon acquired Balinger Schalttechnik, an electronic and electromechanical control subsystem supplier.

**Standard Havens Inc.**

Raytheon acquired 96 percent of Standard Havens, an asphalt equipment firm.

---

**KEY OFFICERS**
**Thomas L. Phillips**

Chairman and chief executive officer

**Dennis J. Picard**

President

**E. Leonard Kane**

Senior vice president, Human Resources

**Philip A. Phallon**

Senior vice president, Corporate Marketing

**Philip W. Cheney**

Vice president, Engineering

**John F. Harding**

Vice president, Contracts

**Aldo Massara**

Vice president, International Affairs

**Gerald A. Smith**

Vice president, Washington Operations

**John R. Pasquariello**

Vice president, Manufacturing

---

**PRINCIPAL INVESTORS**

Information is not available.

---

**FOUNDERS**

Information is not available.

**Table 4**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December**  
**(Thousands of US Dollars, except Per Share Data)**

Balance Sheet	1985	1986	1987	1988	1989
Total Current Assets	\$1,875,611.0	\$2,009,656.0	\$2,436,579.0	\$2,844,292.0	\$3,104,481.0
Cash	33,113.0	42,333.0	89,518.0	108,056.0	99,250.0
Receivables	622,783.0	652,362.0	681,575.0	709,024.0	671,481.0
Marketable Securities	250,890.0	183,547.0	-	-	-
Inventory	635,708.0	573,224.0	667,715.0	726,264.0	851,961.0
Other Current Assets	333,117.0	558,190.0	997,771.0	1,300,948.0	1,481,789.0
Net Property, Plants	\$1,080,971.0	\$1,103,683.0	\$1,217,408.0	\$1,355,198.0	\$1,456,296.0
Other Assets	\$484,433.0	\$442,560.0	\$408,243.0	\$540,015.0	\$777,516.0
Total Assets	\$3,441,015.0	\$3,555,899.0	\$4,062,230.0	\$4,739,505.0	\$5,338,293.0
Total Current Liabilities	\$1,437,258.0	\$1,552,623.0	\$2,168,428.0	\$2,577,166.0	\$2,822,047.0
Long-Term Debt	\$74,775.0	\$48,698.0	\$44,743.0	\$41,340.0	\$45,982.0
Other Liabilities	-	-	-	-	\$44,118.0
Total Liabilities	\$1,512,033.0	\$1,601,321.0	\$2,213,171.0	\$2,618,506.0	\$2,912,147.0
Total Shareholders' Equity	\$1,928,982.0	\$1,954,578.0	\$1,849,059.0	\$2,120,999.0	\$2,426,146.0
Converted Preferred Stock	-	-	-	-	-
Common Stock	77,668.0	74,078.0	67,699.0	66,373.0	65,620.0
Other Equity	115,748.0	137,709.0	171,140.0	185,359.0	184,709.0
Retained Earnings	1,735,566.0	1,742,791.0	1,610,220.0	1,869,267.0	2,175,817.0
Total Liabilities and Shareholders' Equity	\$3,441,015.0	\$3,555,899.0	\$4,062,230.0	\$4,739,505.0	\$5,338,293.0
<b>Income Statement</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Revenue	\$6,408,537.0	\$7,307,952.0	\$7,659,421.0	\$8,192,083.0	\$8,796,076.0
US Revenue	5,959,939.0	6,796,395.0	7,046,667.0	7,603,083.0	8,215,076.0
Non-US Revenue	448,598.0	511,557.0	612,754.0	589,000.0	581,000.0
Cost of Sales	\$5,066,163.0	\$5,843,007.0	\$6,123,418.0	\$6,536,521.0	\$6,996,512.0
R&D Expense	\$260,251.0	\$253,990.0	\$266,123.0	\$271,032.0	\$274,652.0
SG&A Expense	\$591,478.0	\$661,948.0	\$668,705.0	\$743,512.0	\$779,277.0
Capital Expense	\$346,427.0	\$341,471.0	\$354,182.0	\$421,300.0	\$413,900.0
Pretax Income	\$599,846.0	\$652,185.0	\$685,424.0	\$705,539.0	\$757,663.0
Pretax Margin (%)	9.36	8.92	8.95	8.61	8.61
Effective Tax Rate (%)	37.30	39.70	35.10	30.60	30.20
Net Income	\$375,905.0	\$393,205.0	\$445,056.0	\$489,554.0	\$528,814.0
Shares Outstanding, Thousands	81,670.0	77,041.0	72,764.0	66,373.0	65,620.0
<b>Per Share Data</b>					
Earnings	\$4.60	\$5.10	\$6.12	\$7.31	\$7.96
Dividend	\$1.60	\$1.75	\$1.85	\$2.00	\$2.20
Book Value	\$23.62	\$25.37	\$25.41	\$31.96	\$36.97

**Table 4 (Continued)**  
**Comprehensive Financial Statement**  
**Fiscal Year Ending December**  
**(Thousands of US Dollars, except Per Share Data)**

<b>Key Financial Ratios</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<i>Liquidity</i>					
Current (Times)	1.30	1.29	1.12	1.10	1.10
Quick (Times)	0.86	0.93	0.82	0.82	0.80
Fixed Assets/Equity (%)	56.04	56.47	65.84	63.89	60.03
Current Liabilities/Equity (%)	74.51	79.44	117.27	121.51	116.32
Total Liabilities/Equity (%)	78.39	81.93	119.69	123.46	120.03
<i>Profitability (%)</i>					
Return on Assets	-	11.24	11.68	11.12	10.49
Return on Equity	-	20.25	23.40	24.66	23.26
Profit Margin	5.87	5.38	5.81	5.98	6.01
<i>Other Key Ratios</i>					
R&D Spending % of Revenue	4.06	3.48	3.47	3.31	3.12
Capital Spending % of Revenue	5.41	4.67	4.62	5.14	4.71
Employees	73,000	75,000	76,500	76,200	77,600
Revenue (\$K)/Employee	\$87.79	\$97.44	\$100.12	\$107.51	\$113.35
Capital Spending % of Assets	10.07	9.60	8.72	8.89	7.75

Source: Raytheon Company  
Annual Reports and Forms 10-K  
Dataquest (1990)

# Raytheon Company

Table 1

**Estimated Worldwide Semiconductor Revenue by Calendar Year  
(Millions of Dollars)**

	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
Total Semiconductor	\$65	\$95	\$79	\$84	\$89	\$99
Total Integrated Circuit	\$45	\$73	\$51	\$69	\$77	\$84
Bipolar Digital (Function)	\$15	\$37	\$23	\$42	\$51	\$55
Bipolar Digital Memory	7	7	20	10	14	14
Bipolar Digital Logic	8	30	3	32	37	41
MOS (Function)					\$ 1	\$ 2
MOS Memory						
MOS Microdevices						
MOS Logic					1	2
Analog	\$30	\$36	\$28	\$27	\$25	\$27
Total Discrete	\$20	\$22	\$28	\$15	\$12	\$15
Total Optoelectronic						

Table 2

**Raytheon Company  
1988 Worldwide Ranking by Semiconductor Markets  
(Revenue in Millions of Dollars)**

	<u>1988</u>	<u>1987</u>	<u>1988</u>	<u>Sales</u>	<u>Industry</u>
	<u>Rank</u>	<u>Rank</u>	<u>Revenue</u>	<u>% Change</u>	<u>% Change</u>
				<u>1987-1988</u>	<u>1987-1988</u>
Total Semiconductor	60	54	\$99	11.2%	33.0%
Total Integrated Circuit	56	49	\$84	9.1%	37.4%
Bipolar Digital (Function)	14	14	\$55	7.8%	9.2%
Bipolar Digital Memory	8	8	14	0	11.0%
Bipolar Digital Logic	14	15	41	10.8%	9.0%
MOS (Function)	84	87	\$ 2	100.0%	54.5%
MOS Logic	71	74	2	100.0%	29.2%
Analog	46	42	\$27	8.0%	16.0%
Total Discrete	40	40	\$15	25.0%	14.4%

Source: Dataquest  
December 1989

# Raytheon Company

Table 3

Raytheon Company  
Estimated 1988 Semiconductor Revenue by Geographic Region  
(Millions of Dollars)

	<u>U.S.</u>	<u>Japan</u>	<u>Europe</u>	<u>ROW</u>
Total Semiconductor	\$82		\$17	
Total Integrated Circuit	\$68		\$16	
Bipolar Digital (Function)	\$46		\$ 9	
Bipolar Digital Memory	12		2	
Bipolar Digital Logic	34		7	
MOS (Function)	\$ 2			
MOS Memory				
MOS Microdevices				
MOS Logic	2			
Analog	\$20		\$ 7	
Total Discrete	\$14		\$ 1	
Total Optoelectronic				

Source: Dataquest  
December 1989

# Raytheon Company

Raytheon Company  
141 Spring Street  
Lexington, Massachusetts 02173  
Telephone: (617) 862-6600  
(Millions of Dollars except per Share Data)

## Balance Sheet (December 31)

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Working Capital	\$ 671	\$ 685	\$ 695	\$ 438	\$ 457
Long-Term Debt	\$ 68	\$ 99	\$ 86	\$ 75	\$ 49
Shareholder's Equity	\$1,712	\$1,887	\$1,979	\$1,929	\$1,955
After-Tax Return on Average Equity (%)	18.6	17.1	17.6	19.0	19.5

## Operating Performance (Fiscal Year Ending December 31)

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Revenue	\$5,217	\$5,631	\$5,996	\$6,409	\$7,308
U.S. Revenue	\$3,701	\$4,276	\$4,854	\$5,381	\$6,057
Non-U.S. Revenue	\$1,516	\$1,355	\$1,142	\$1,028	\$1,251
Cost of Revenue	\$4,211	\$4,516	\$4,815	\$5,066	\$5,843
R&D Expense	\$ 170	\$ 218	\$ 236	\$ 260	\$ 254
SG&A Expense	\$ 465	\$ 512	\$ 526	\$ 592	\$ 662
Pretax Income	\$ 490	\$ 497	\$ 545	\$ 600	\$ 652
Pretax Margin (%)	9.4	8.8	9.1	9.4	8.9
Effective Tax Rate (%)	40.0	38.0	37.6	37.3	39.7
Net Income	\$ 319	\$ 300	\$ 243	\$ 376	\$ 393
Average Shares Outstanding (Thousands)	84,654	84,933	84,825	82,167	77,696
Per Share Data					
Earnings	\$ 3.77	\$ 3.53	\$ 2.87	\$ 4.57	\$ 5.60
Dividends	\$ 1.40	\$ 1.40	\$ 1.45	\$ 1.60	\$ 1.75
Book Value	\$20.28	\$22.30	\$23.46	\$24.14	\$26.39
Price Range	\$28.25- 49.88	\$41.38- 57.50	\$34.75- 48.88	\$39.38- 55.63	\$52.38- 71.75
Total Employees	72,000	76,100	73,300	73,000	75,000
Capital Expenditures	\$ 224	\$ 254	\$ 414	\$ 342	\$ 346

Source: Raytheon Company  
Annual Report  
Dataquest  
March 1988

**Raytheon Company**

**(Page intentionally left blank)**



# Raytheon Company

## THE COMPANY

### Executive Summary

Raytheon Company is a \$7.3 billion company active in a wide range of business lines including commercial and government electronics, aviation, appliances, energy services, construction equipment, and publishing. Over the past 20 years, the Company has diversified its business base by adding more commercial areas to balance its growing sales to the U.S. government.

Its principal business is the design, engineering, manufacture, and servicing of advanced electronic devices, equipment, and systems for both commercial and government customers.

### Overview

The Company was incorporated in Cambridge, Massachusetts, in 1922 as American Appliance Company and adopted its present name in 1925. The Company reincorporated in Delaware, in 1928. Currently, it employs 75,000 people worldwide.

Raytheon is one of the largest defense contractors and is known as a reliable supplier of systems to the military, particularly for aerospace applications. The Department of Defense (DOD) listed Raytheon as the seventh largest DOD prime contractor in 1986. The U.S. government accounted for 53 percent of Raytheon's total revenue and approximately 50 percent of Raytheon's Semiconductor Division sales in 1986.

### Company Organization

Raytheon is engaged in 5 lines of business composed of 9 operating groups and 12 major operating subsidiaries with more than 80 plants and laboratories in 26 states. The Company's nine operating groups are:

- Research and Development
- Engineering
- Various Staff Departments
- Missile Systems Division
- Government Group
- Commercial Group (includes Semiconductor Division)

# Raytheon Company

- Appliances Group
- Energy Services Group
- Aircraft Group

## Lines of Business

Raytheon reported consolidated revenue for fiscal year ending December 31, 1986, of \$7,308 million, an increase of 14 percent compared with \$6,409 million in 1985. Net income was \$393 million, an increase of 5 percent compared with \$376 million in 1985.

Raytheon showed an increase in each of its five lines of business: electronics, aircraft products, energy services, major appliances, and other lines. Defense electronics systems paced the growth in Electronics, which accounted for 59 percent of 1986 revenue. Table 1 shows Raytheon's revenue by lines of business.

Table 1

Raytheon Company  
Revenue by Business Lines  
(Millions of Dollars)

	<u>Fiscal Year Ending December 31</u>				
	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Electronics	\$2,952	\$3,301	\$3,399	\$3,794	\$4,343
Aircraft Products	568	642	723	743	868
Energy Services	1,124	926	680	651	744
Major Appliances	565	710	797	785	876
Other Lines	<u>304</u>	<u>358</u>	<u>397</u>	<u>436</u>	<u>477</u>
Total	\$5,513	\$5,937	\$5,996	\$6,409	\$7,308

Source: Raytheon Company  
Annual Report  
Dataquest  
March 1988

# Raytheon Company

Sales to the government, which have been primarily to the DOD, were \$3.9 billion in 1986 and \$3.4 billion in 1985, representing 53 percent of total sales in 1986 and 52 percent in 1985. Of these sales, \$324 million in 1986 and \$282 million in 1985 represent purchases made by the government on behalf of non-U.S. governments.

Raytheon's backlog of orders at December 31, 1986, was almost \$7.8 billion compared with approximately \$6.5 billion at the end of 1985, as shown in Table 2. The 1986 amount includes funded backlog of \$5.4 billion from the U.S. government, compared with \$4.5 billion at the end of 1985.

Table 2

**Raytheon Company  
Backlog by Lines of Business  
(Millions of Dollars)**

	<u>1985</u>	<u>1986</u>
Electronics	\$5,345	\$6,431
Aircraft Products	758	799
Energy Services	263	374
Major Appliances	24	35
Other Lines	<u>109</u>	<u>127</u>
<b>Total Backlog</b>	<b>\$6,499</b>	<b>\$7,766</b>
<b>U.S. Government-Funded Backlog Included in Total Backlog</b>	<b>\$4,542</b>	<b>\$5,448</b>

Source: Raytheon Company  
Annual Report

## International Activities

In 1986, \$1,251 million or 17 percent of the total revenue was sold to customers outside the United States, compared with \$1,028 million, or 16 percent, in 1985. Raytheon sometimes uses sales representatives and distributors in connection with non-U.S. sales.

# Raytheon Company

## Facilities

Raytheon's principal facilities occupy approximately 27.6 million square feet. Table 3 shows the locations of Raytheon's semiconductor facilities.

Table 3  
Raytheon Company  
Semiconductor Manufacturing Facilities\*

<u>Location</u>	<u>Size/ Square Feet</u>	<u>Technology/Products</u>
Massachusetts		
Andover	80,000	CMOS-VHSIC, ASIC, radiation hardening capability
Andover	110,000	GaAs MMICs
Lexington	7,500	GaAs-ASIC, MMIC
Lexington	1,500	Research facility
Northborough	3,500	GaAs MESFETs, linear
California		
Mountain View	N/A	Gate arrays
Mountain View	6,000	Discretes and small signal transistors
Mountain View	7,000	Bipolar-linear and ASICs

\*Nonsemiconductor facilities are located in Alabama, Arkansas, California, Colorado, Connecticut, Florida, Illinois, Iowa, Kansas, Kentucky, Massachusetts, New Hampshire, New Mexico, New York, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, Tennessee, Wisconsin, Canada, and Europe.

N/A = Not Available

Source: Dataquest  
March 1988

In June 1986, Raytheon began construction on a new 110,000-square-foot monolithic microwave IC (MMIC) facility in Andover, Massachusetts. It will cost \$45 million and be located adjacent to Raytheon's VHSIC-level plant.

# Raytheon Company

## Capital Spending and R&D Spending

Raytheon's combined capital and research and development (R&D) spending was \$600 million in 1986, which accounted for 8.2 percent of revenue. Capital spending for 1986 was \$346 million, which was used to add and expand engineering facilities, including those in Rhode Island and Massachusetts. Raytheon also began construction of a \$45 million center for the development and production of gallium arsenide monolithic microwave integrated circuits.

Table 4 shows Raytheon's capital and R&D spending.

**Table 4**  
**Raytheon Company**  
**Capital and R&D Spending as a Percent of Revenue**  
**(Millions of Dollars)**

	<u>Fiscal Year Ending December 31</u>				
	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Revenue	\$5,217	\$5,631	\$5,996	\$6,409	\$7,308
Capital Spending	224	254	414	342	346
% of Revenue	4.3	4.5	6.9	5.3	4.7
R&D Spending	170	218	236	260	254
% of Revenue	3.3	3.9	3.9	4.1	3.5
Combined Capital and R&D Spending	394	472	650	602	600
% of Revenue	7.6	8.4	10.8	9.4	8.2
% Increase	(12.4)	19.8	37.7	(7.4)	(0.3)

Source: Raytheon Company  
Annual Reports  
Dataquest  
March 1988

# Raytheon Company

During 1986, Raytheon's company-sponsored R&D was \$254 million, compared with \$260 million in 1985. These expenditures were principally for product development for the government and for aircraft products.

In addition to company-sponsored R&D, Raytheon derived net sales of \$689.3 million from U.S. government contracts for R&D in 1986. The principal customers of Raytheon's research, development, and engineering capabilities are the U.S. government and other contractors to the government.

Approximately 12,900 employees were actively engaged in research and development at the end of 1986.

## **PRODUCTS AND MARKETS**

### **Semiconductor Product Markets**

The Raytheon Semiconductor Division (SCD) revenue in 1986 was \$89 million, a 13 percent increase compared with \$79 million in 1985. The division remained profitable throughout the semiconductor market decline partly because it has strong sales to military contractors. Semiconductor sales to the DOD accounted for approximately 50 percent of the SCD's sales in 1986.

The growth of Raytheon's semiconductor business was due to a 34 percent increase in sales of bipolar digital products from \$32 million in 1985 to \$43 million in 1986, as shown in Table 5. Within the bipolar segment sales of its bipolar logic products increased 83 percent, from \$12 million in 1985 to \$22 million in 1986. (The industry average growth for bipolar logic products was 14 percent). Memory product sales rose 5 percent from \$20 million to \$21 million.

SCD offers full military processing of products designed expressly for military/aerospace performance. Government certification allows Raytheon to supply Class B and QPL devices in accordance with the requirements of MIL-STD-38510. Both the older 883B Rev B and updated 883B Rev C standards are available. Raytheon supports MIL-S-19500 with discrete products, and JAN, JANTX, and JANTXV with transistor products. SCD provides devices and also integrates the devices into systems that it supplies to the DOD.

# Raytheon Company

Table 5

**Raytheon Company  
Worldwide Semiconductor Revenue  
(Millions of Dollars)**

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
<b>Total Semiconductor</b>	<b>\$52</b>	<b>\$65</b>	<b>\$95</b>	<b>\$79</b>	<b>\$89</b>
<b>Total Integrated Circuit</b>	<b>34</b>	<b>44</b>	<b>76</b>	<b>60</b>	<b>72</b>
<b>Bipolar Digital (Technology)</b>	<b>14</b>	<b>14</b>	<b>40</b>	<b>32</b>	<b>43</b>
<b>TTL</b>	<b>14</b>	<b>14</b>	<b>40</b>	<b>32</b>	<b>43</b>
<b>Bipolar Digital (Function)</b>	<b>14</b>	<b>14</b>	<b>40</b>	<b>32</b>	<b>43</b>
<b>Bipolar Digital Memory</b>	<b>6</b>	<b>6</b>	<b>10</b>	<b>20</b>	<b>21</b>
<b>Bipolar Digital Logic</b>	<b>8</b>	<b>8</b>	<b>30</b>	<b>12</b>	<b>22</b>
<b>Linear</b>	<b>20</b>	<b>30</b>	<b>36</b>	<b>28</b>	<b>29</b>
<b>Total Discrete</b>	<b>\$18</b>	<b>\$21</b>	<b>\$19</b>	<b>\$19</b>	<b>\$17</b>
<b>Transistor</b>	<b>18</b>	<b>19</b>	<b>13</b>	<b>14</b>	<b>16</b>
<b>Small Signal Transistor</b>	<b>17</b>	<b>19</b>	<b>13</b>	<b>14</b>	<b>16</b>
<b>Power Transistor</b>	<b>1</b>	<b>2</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Other Discrete</b>	<b>-</b>	<b>-</b>	<b>6</b>	<b>5</b>	<b>1</b>

Source: Dataquest  
March 1988

## **Semiconductor Products and Technologies**

Raytheon offered its first gate arrays in 1974 and began offering ECL and CMOS devices in 1987.

Products include linear, ECL and CMOS arrays, standard linear ICs, bipolar programmable read-only memories (PROMs), digital ICs, and small signal transistors. New product developments focus on field and factory programmable products that optimize solutions to customer systems applications.

SCD's key strategies are stated as:

- Semicustom focus for all new technologies
- Radiation hardness development

# Raytheon Company

- Classified manufacturing development
- Continued support of military-specified parts and QPLs
- Development of field-programmable logic devices

To provide cutting-edge technology for its programs, SCD built a Microelectronics Center (MEC) in Andover, Massachusetts, in 1983. The center is used for designing and fabricating CMOS ICs at the VHSIC Phase-I level. It is an 80,000-square-foot semiconductor facility and features 8,500-square-foot class 10 and 8,600-square-foot class 100 clean rooms. The adjacent MMIC facility will produce devices capable of operating as amplifiers at microwave frequencies, and will be used as transmitters and receivers in radar, electronic warfare, and communication equipment and systems that Raytheon produces for defense applications.

## Product Lines

### Linear ICs

SCD provides a broad range of linear ICs, including data conversion, operational amplifiers, voltage references, voltage regulators, comparators, timers, decoders, and oscillators. In the tradition of linear suppliers, SCD has forged a niche-oriented marketing strategy that targets military as well as high-performance segments of the commercial marketplace. For example, SCD supplies a precision dual op amp for low-end signal conditioning and instrumentation applications. The device offers good DC input specifications and low-noise characteristics for applications that need low offset voltage and low-temperature coefficients. These devices meet both military and commercial specifications, and are available in both plastic and ceramic 8-pin "Mini-DIPs."

A quad-programmable voltage comparator IC is another recent product introduction that reflects SCD's strategy for the military and commercial linear IC marketplace. This product integrates four "139"-type micropower voltage comparators on a single chip. The programmability gives users the ability to control power dissipation through adjustment in the supply current drain. Significant applications include battery-powered circuits, threshold/ zero crossing detectors, and digital interface circuits. Power consumption is 10 microwatts per comparator at a power supply voltage of 5 volts and programming current of 0.5 microamp. This product represents SCD's long-term linear IC strategy, which focuses on field and factory programmable applications primarily for the military but also for commercial applications.

A third new product for high-performance military and commercial usage is a high-speed digital-to-analog converter that offers a plus/minus 1.0 percent voltage reference. This device can upgrade designs for the industry standard AD565. Specific applications range from high-speed display drives and high-speed control systems to analog-to-digital converters for both military and commercial users.



# Raytheon Company

SCD has also been developing controller and switching regulator ICs for power supplies.

## **Application-Specific ICs**

Raytheon introduced its first TTL array in 1974, followed by a 300-gate device in 1978 used in Patriot and Sparrow missiles. In 1982, Raytheon offered bipolar integrated Schottky TTL configurable gate arrays having from 836 to 2,400 gates with 2.3 propagation gate delays.

Today, SCD is penetrating the ASIC market with a five-fold product offering—linear arrays, TTL arrays, ISL arrays, ECL arrays, and CMOS arrays.

At present, its strongest product offering is a new family of ECL arrays that are the result of an agreement with Bipolar Integrated Technology. The new arrays are the CGA40E12 with 8,001 equivalent gates and the CGA70E18 with 12,540 equivalent gates. They are manufactured using BIT1 technology, which features a 2-micron design rule. Power consumption for the arrays is 300 microwatts per gate, which contributes to a speed-power product of less than 0.1 picojoules per gate.

In March 1987, SCD introduced a family of high-performance CMOS gate arrays ranging from 880 to 10,013 equivalent gates and having 1.4ns typical gate delays. Manufactured with an advanced 2-micron dual-layer metal technology and designated as the RL7000, the product family is a second source of LSI Logic's LL7000 series of HCMOS logic arrays, which has eight masterslice options. Raytheon uses LSI Logic's LDS software system to design the arrays, which ensures compatibility of products developed.

The Company also expanded its family of semicustom analog ICs with a new linear array that contains 15 independent gain cells. The RLA160 is a flexible VLSI linear macrocell array that provides the user with the versatility of predesigned programmable analog cells. These cells can be converted into a variety of analog functions such as current sources, voltage references, detector/amplifier circuits, voltage-to-current sources, data conversion circuits, active filter, and timers. The device can replace a printed circuit board with as many as 15 analog devices of 10 transistors each, 240 binarily-weighted thin-film transistors, and a bandgap voltage reference. The RLA160 is manufactured with an advanced, proprietary dual-layer metal bipolar process.

Raytheon's ISL configurable gate array (CGA) family consists of an uncommitted configurable logic array of integrated Schottky logic (ISL) elements and LS TTL-compatible input/output (I/O) buffers.

## **Bipolar LSI Memory Products**

SCD supports a line of from 2K to 64K bipolar PROMs. All devices are available in military and commercial versions and have a power-saving SPROM option. The SPROM features automatic power-down that turns off most of the internal circuitry when the device is not in use, offering a power savings of 70 percent. A new 64K device fabricated with an oxide isolated vertical fuse bipolar process will be offered in the near future.

# Raytheon Company

## **Mature Product Line**

SCD's mature product line includes a logic line and small signal transistors. The market offers the opportunity for suppliers to garner higher ASPs on the mature products as other suppliers abandon the marketplace. Raytheon will continue to make these lines available as long as a sizable demand for them exists.

## **Semiconductor Agreements**

The following is a list of Raytheon's semiconductor agreements.

- AMD** In 1975, Raytheon received a license to second-source AMD's 2900 bipolar PROM.
- ECD** In 1984, Energy Conversion Devices Inc. (ECD) agreed to an exclusive two-year agreement to license certain proprietary technologies to Raytheon. Raytheon developed prototype semiconductor devices that are based on ECD's amorphous materials techniques.
- LSI Logic** In January 1986, LSI Logic and Raytheon Semiconductor announced a five-year agreement that allows Raytheon to act as a second source for the LL7000 Series Logic Array. The arrays use 2-micron HCMOS technology and range up to 10,000 gates. LSI Logic will also provide its proprietary LDS software system.
- The agreement provides Raytheon Semiconductor with an immediate market presence in CMOS technology and expands Raytheon's strong position in bipolar arrays.
- BIT** In July 1986, SCD and Bipolar Integrated Technology, Inc. (BIT), announced an agreement that gives SCD access to BIT's advanced bipolar BIT1 process. BIT1 is based on emitter-coupled logic (ECL), which is used in a wide range of high-speed computing systems. Raytheon and BIT will also develop a family of ECL gate arrays and standard cell devices for production with the BIT1 process. Raytheon will use its computer-aided design and engineering (CAD/CAE) facilities and BIT will perform wafer fabrication.
- TI** In January 1987, Raytheon and Texas Instruments (TI) formed a joint venture to aid in developing and producing large quantities of microwave/millimeter wave monolithic integrated circuit (MIMIC) components for the DOD.

# Raytheon Company

Total funding for this four-phase program, which will run from 1987 to 1992, is planned to be in excess of \$135 million. The U.S. Naval Air Systems Command has awarded approximately \$1 million to the Raytheon-TI partnership for the Concept Definition Phase, or Zero Phase.

The components will have applications in radar, communications, smart weapons, and electronic warfare systems.

The joint venture allows the companies to share information and tap each others' specialized capabilities. Together, Raytheon and TI's 3-inch wafer fab lines have processed more than 100 MIMIC designs. TI's Defense Systems and Electronics Group will use its new 40,000-square-foot GaAs MIMIC pilot line facility to execute the program.

## **NJR**

In April 1987, Raytheon and New Japan Radio (NJR) revised their technical assistance contract into one based on equal rights and reciprocity. Each must pay license and other fees when it manufactures and markets a product developed by the other, and both will have the right to market the new products worldwide. NJR requested the revision to the agreement, which was established as a joint venture in 1961. Since then, NJR has become technologically independent.

## **Mosaic Systems**

In May 1987, Raytheon made a \$1 million investment in Mosaic Systems of Troy, Michigan, through Raytheon Ventures. The investment gave Raytheon an ownership position of approximately 12 percent. Mosaic has developed a patented technique for packaging and programmably interconnecting IC elements. The universally programmable silicon circuit board (UNIPRO SCB) could compete with and, in some applications, replace ceramic substrates.

## **NONSEMICONDUCTOR PRODUCTS SUMMARY**

### **Electronics**

Raytheon's electronics business area accounts for 59 percent of the Company's total revenue. Products, excluding semiconductors, include missile systems, surveillance radars, air traffic control systems, military communications equipment, shipboard systems, sonar, electronic countermeasures, and commercial products, including medical and marine equipment.

# Raytheon Company

## **Aircraft Products**

Beech Aircraft Corporation, a wholly owned subsidiary of Raytheon, designs, manufactures, and sells a broad range of single- and twin-engine piston and turboprop aircraft and jet planes for the general aviation market.

Beech is also an aerospace contractor producing a variety of military aircraft and missile targets.

## **Major Appliances**

Raytheon manufactures and sells refrigerators, freezers, central heaters and air conditioners, combination microwave and electric or gas ranges, washing machines and dryers, and other home appliances, through its subsidiaries Amana Refrigeration, Inc., Caloric Corporation, and Speed Queen Company.

## **Energy Services**

Through its subsidiaries, The Badger Company, Inc., United Engineers & Constructors International, Inc., and Seismograph Service Corporation, Raytheon designs, constructs, and maintains petroleum, petrochemical, chemical processing, electrical generating, speciality process, pharmaceutical, biotechnology and industrial plants, and conducts worldwide exploration and related services for the oil and gas industries.

In November 1986, Raytheon's subsidiary, United Engineers and Constructors, acquired the domestic operations of Stearns Catalytic World Corporation. Stearns Catalytic is a leader in the field of power and industrial plant maintenance.

## **Other Lines**

A Raytheon subsidiary, Cedarapids, Inc., designs and manufactures a wide range of equipment for the road building and construction industries.

Raytheon Service Company (RayServe) offers worldwide engineering, installation, operation, maintenance, resource recovery, and training services, and supports and maintains other complex military and industrial systems. RayServe also provides maintenance and engineering services for many Raytheon air defense, commercial air traffic control, and marine radar systems.

The D.C. Heath Division of Raytheon publishes school and college text and reference books, educational software, and Caedmon voice recordings.

# RCA Corporation

## BACKGROUND AND OVERVIEW

RCA Corporation was formed by General Electric in 1919 to buy control of the U.S. Marconi Company and to manufacture radio devices and systems developed by AT&T, General Electric, Westinghouse, and others.

By 1930, RCA had 2,000 employees worldwide. It had acquired the Victor Talking Machine Company (manufacturer of phonographs) and owned half of the National Broadcasting Company as well as a radio station in New York and one in Washington, D.C.

Characterized from its earliest days by innovation, RCA was a pioneer in the development of television. The Company installed on the Empire State Building an experimental TV antenna that started operating on October 30, 1931.

In the 1940s, RCA, in a bid to prove the technical viability of transistors in consumer goods, built prototypes of an all-transistor radio, a television set with a 5-inch screen, and an amplifier for an electric ukelele. Transistors at that time each cost \$15 or more and were therefore unsuitable for volume consumer production.

During the early 1960s, RCA developed an impressive range of low-frequency power transistors for linear applications, and the Hometaxial Base 2N3055 became the industry standard for 10-amp power transistors. More recently, this range has been supplemented by a line of high-voltage power switching transistors (for use in direct off-line power supplies and main-derived power conversion applications), thyristors, and TRIACs.

In 1963, RCA began its development of MOS. It disclosed the development of an insulated-gate field-effect transistor that used silicon as a substrate. It was called a MOSFET and was produced in arrays to form logic networks. This was in the time period when germanium-based bipolar technology was dominant.

In 1969, RCA introduced a low-power design technique, which it called CMOS (complementary symmetry MOS). This technology was subsequently adopted as a standard semiconductor structure by the industry and opened the way for many new semiconductor markets.

In 1974, RCA produced the world's first 164,000-element chip, implemented silicon-on-sapphire (SOS) technology, and announced the first CMOS microprocessor. The Company pioneered the first BIMOS operational amplifier in 1976, setting new standards in the technology available.

# RCA Corporation

Since 1980, RCA has redirected its effort in CMOS toward improving its silicon gate technologies. The Company continues development of SOS technology, which, by virtue of its immunity to harsh external electrical environments, has proved popular in military applications.

RCA is also continuing development of BIMOS technology for digital and analog circuits. The Company offers a wide range of products in this area (analog/digital signal processing).

In 1982, RCA began to commercialize its semicustom capability. The facility for this had been available since 1968, but only for use in-house and by certain customers. Now RCA offers both gate array and standard cell solutions. The Company has one of the most advanced, fully automated design facilities on the market. Designs can be implemented either at the RCA design center or using an on-line facility at the customer's premises. Design capability is installed in North America, Europe, and the Far East, to cover the worldwide market.

## PRODUCTS AND MARKETS SERVED

RCA Solid State Division (SSD) produces an extensive range of devices for a wide variety of applications in telecommunications, data processing, industrial, and military equipment. Included in this line are bipolar and MOS power transistors, power hybrid circuits, TRIACs, silicon-controlled rectifiers, ultrafast-recovery rectifiers, linear ICs, CMOS logic ICs, CMOS LSI microprocessors, CMOS microsystems, and CMOS semicustom ICs.

In Europe, RCA SSD has a sales/marketing organization, as well as technology support groups, relating to three product lines:

- Memory, Microprocessor, Semicustom
- Standard ICs (linear, CMOS logic, standard high-speed, high-reliability ICs)
- Power devices (bipolar transistor, thyristor, rectifier, DMOS transistor)

European operations are headquartered in Brussels, Belgium, where strategic and support functions are carried out. The Company's European Semicustom Design Center is also housed there.

The sales/marketing organization is divided into three European regions--North, Central, and South Europe.

# RCA Corporation

The Company has several licensing agreements with semiconductor users and manufacturers in Europe. Most recently, RCA signed an agreement with Philips of the Netherlands for joint development of a high-speed CMOS logic family, known as QMOS. This family is the latest generation of standard CMOS logic and is aimed specifically at the LSTTL marketplace.

RCA plans to continue development of its 2-micron double-poly CMOS (jointly with Sharp) and SOS processes in the United States during 1985. The Company plans to have 1.25-micron capability in both technologies for both standard and semicustom integrated circuits in 1985 or 1986.

The Company is currently considering possible plant location sites in Europe (for integrated circuit manufacture only). The Company did have a discrete manufacturing facility in Liege, Belgium, but this was closed in 1978 for cost reasons.

As shown in Table 1, DATAQUEST estimates that RCA's European revenues in 1984 were \$89 million, a growth of 48 percent over 1983.

Table 1

RCA Corporation  
ESTIMATED EUROPEAN SEMICONDUCTOR REVENUES BY PRODUCT LINE  
(Millions of U.S. Dollars)

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>
Total Semiconductor	\$81	\$56	\$58	\$60	\$89
Total Integrated Circuit	\$54	\$38	\$43	\$46	\$73
Bipolar Digital	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
MOS	\$44	\$29	\$33	\$35	\$58
Linear	\$10	\$ 9	\$10	\$11	\$15
Total Discrete	\$26	\$17	\$14	\$13	\$15
Transistor	\$16	\$12	\$10	\$10	\$11
Diode	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
Thyristor	\$10	\$ 5	\$ 4	\$ 3	\$ 4
Other	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
Total Optoelectronic	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1

Source: DATAQUEST  
July 1985

# RCA Corporation

## RESEARCH AND DEVELOPMENT

RCA has the following semiconductor research and development (R&D) laboratories:

- Sarnoff Research Center, Princeton, New Jersey, U.S.A. (These are the main R&D laboratories for fundamental and applied research for the whole of RCA Corporation, including the Solid State Division.)
- Somerville, New Jersey, U.S.A. (The RCA SSD headquarters are also located here.)
- Mountaintop, Pennsylvania, U.S.A.
- Zürich, Switzerland (This is considered part of the Sarnoff Research Center.)
- Brussels, Belgium (R&D is carried out only in semicustom ICs.)

The R&D effort is concentrated on CMOS (Bulk and SOS) Technology for Digital and Linear ICs, BIMOS for Linear ICs, Power MOS for discrete and IC devices, and Semicustom ICs.

## OUTLOOK

RCA SSD has now substantially developed CMOS and Power MOS technologies. DATAQUEST believes that RCA will achieve submicron capability in its CMOS technology in the near future. The Company's joint venture with Sharp will enable fast implementation of this, with a U.S. plant in Washington State scheduled to be operational in 1986.