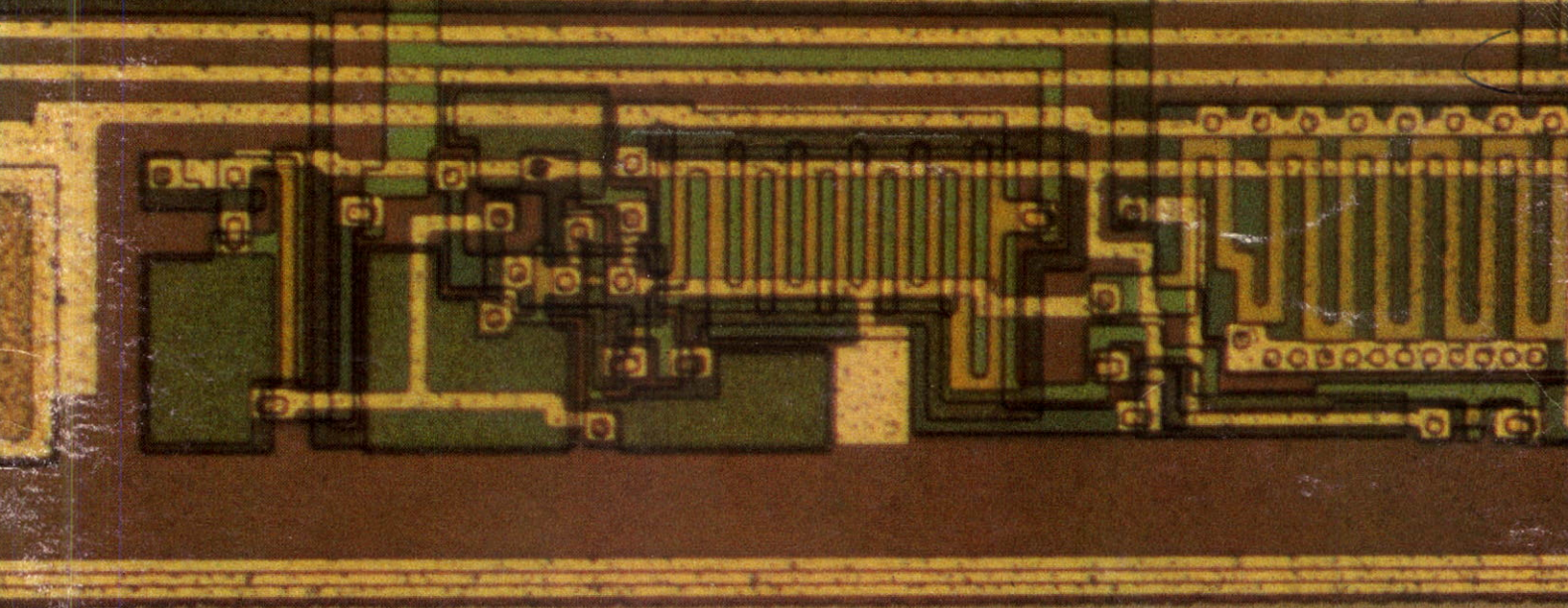
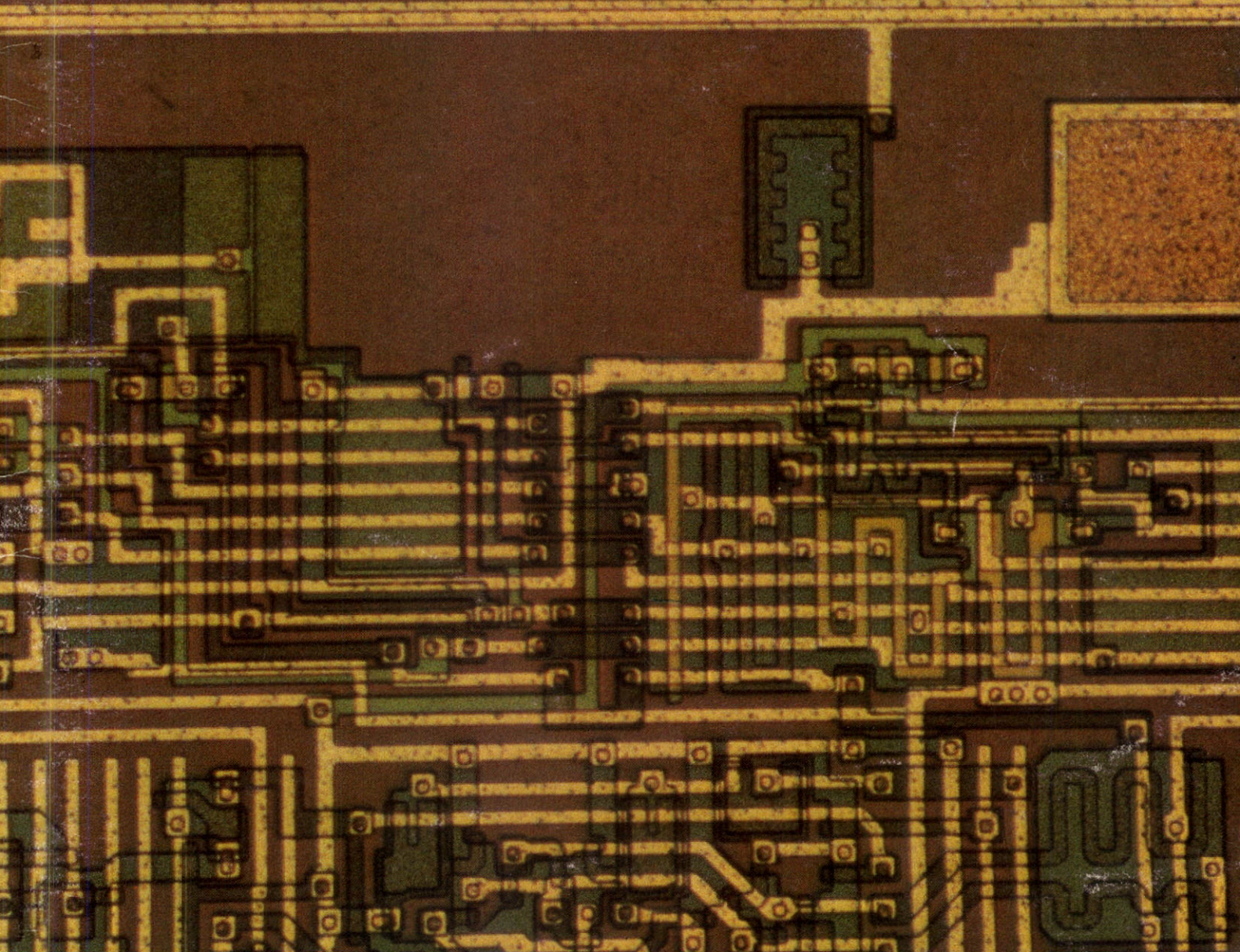


northern telecom

Northern Telecom Limited
Annual Report 1981

Semiconductors: Critical elements of the Intelligent Universe



Northern Telecom Limited

Northern Telecom Limited is the principal supplier of telecommunications equipment in Canada and the second largest in North America. It is also a significant manufacturer of information processing equipment. It operates 31 manufacturing plants in Canada, 16 in the United States, and one each in the Republic of Ireland, Brazil, England, and Malaysia. Research and development is conducted by 22 R&D centers located at these facilities and by Bell-Northern Research Ltd., a subsidiary, which operates six research facilities in Canada and two in the U.S., and is the largest industrial research and development organization in Canada.

Cover

Photography through a microscope makes visible portions of the surface detail of Northern Telecom's new E99 line card chip developed in 1981. Northern Telecom's expertise in designing and producing semiconductors has been a major factor in the corporation's leadership in pioneering digital telecommunications technology. Development of the E99 maintains Northern Telecom's two-to-three year industry lead in developing such complex custom integrated circuits for telecommunications.

Contents

Form 10-K

The Form 10-K annual report for 1981, as filed by the corporation with the Securities and Exchange Commission in Washington, D.C., is available to shareholders without charge upon request to Roy T. Cottier, vice-president, corporate relations.

Annual Meeting

The annual and special meeting of shareholders will take place at 10:30 a.m., Thursday, April 29, 1982 in the Toronto Hilton Harbour Castle Hotel, Toronto, Ontario.

Version française

On peut obtenir la version française de ce rapport en écrivant à l'adresse suivante:
Service des relations de l'entreprise
Northern Telecom Limitée
C.P. 458, succursale A
Mississauga (Ontario)
Canada L5A 3A2

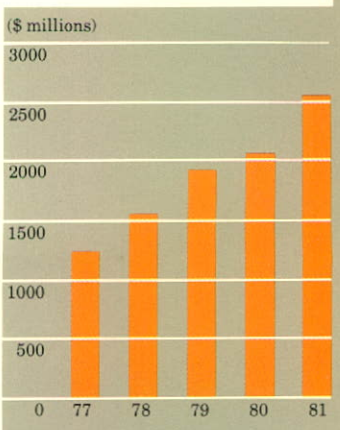
Versión española

Puede obtenerse la versión española de este informe solicitándola al
Corporate Relations Department
Northern Telecom Limited
P.O. Box 458, Station A
Mississauga, Ontario
Canada L5A 3A2

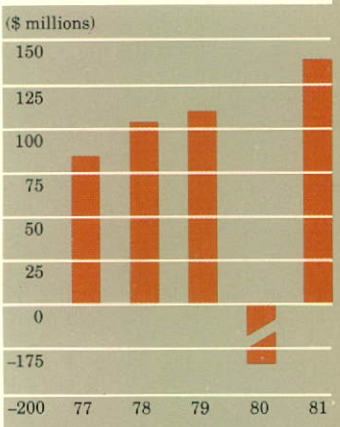
Financial highlights

	1981	1980
Revenues	$2,570,875,000	$2,054,561,000
Net earnings (loss)	136,657,000	(185,155,000)
Net earnings per share (loss per share)	3.95	(5.48)
Dividends per share	1.00	1.00
Shareholders' equity	853,456,000	728,314,000
Working capital	501,408,000	452,739,000
Capital expenditures	209,605,000	225,582,000
Research and development expenditures (net)	181,566,000	140,946,000
Shares outstanding (at Dec. 31)	34,947,544	34,432,788
Shares outstanding (average during year)	34,628,544	33,795,140
Shareholders	11,364	13,737
Employees	35,444	31,915

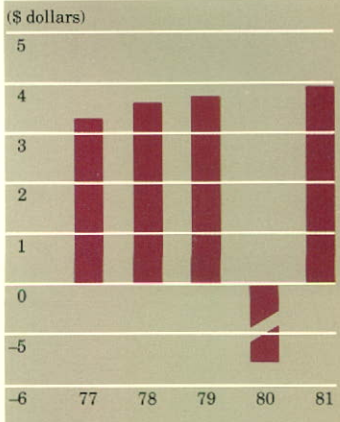
Consolidated revenues



Net earnings



Net earnings per share

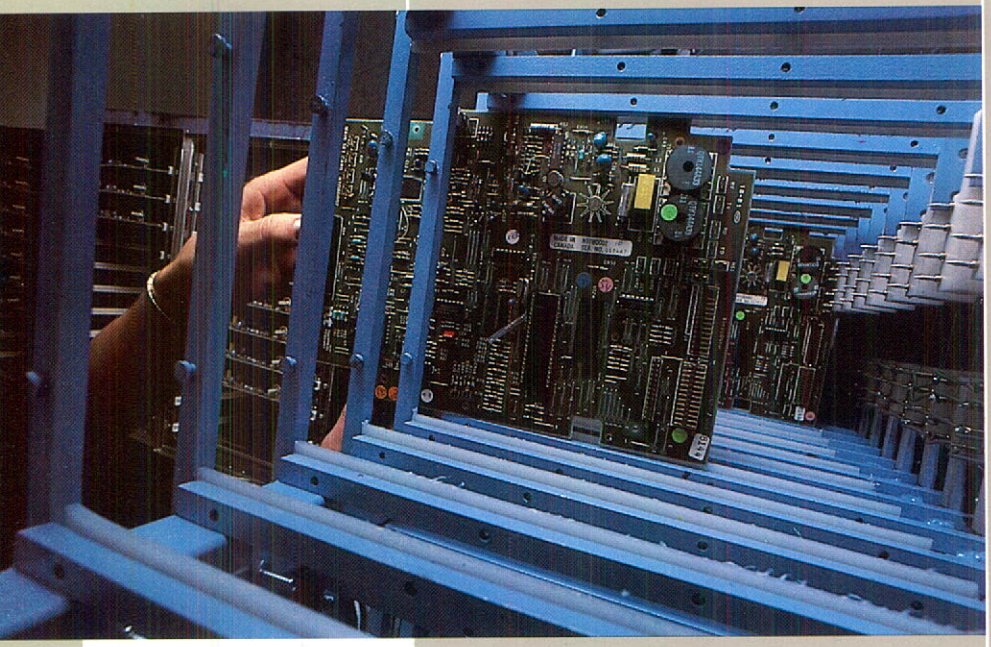


Report to shareholders

Northern Telecom's performance and accomplishments in 1981 should be well regarded for any company in any year. They seem particularly impressive, however, following the operating and financial difficulties experienced in 1980.

The growth achieved in 1981 marks a turning point for the corporation with records set for such key financial indicators as consolidated revenues, net earnings and earnings per share, order input and yearend order backlog.

Consolidated revenues in 1981 rose 25.1 percent to $2.571 billion compared with $2.055 billion in 1980. Most of our product lines reported good growth in 1981 despite increasing competition in many of our businesses and weakening international economies. Led by a 93.7 percent increase in digital switching sales, the largest gain was recorded by central office switching, up 53.6 percent in 1981.



Circuit packs are inserted into a Vantage 12 key telephone system being produced in London, Ont. Construction of a new 175,000-square-foot plant in Calgary, Alta. to produce Vantage 12 and other business products will begin in early 1982.

Transmission revenues, up 47.3 percent, and subscriber apparatus and business communications systems, with a 19.6 percent increase from 1980 revenues, were two other particularly strong areas.

In 1981, net earnings including an extraordinary gain of $16 million, or $0.46 per share, were a record $136.7 million, or $3.95 per share. The gain resulted from the sale of Northern Telecom's investment in the common shares of Intersil, Inc., which was acquired by another company.

This performance contrasts with a net loss in 1980, including extraordinary items, of $185.2 million, or $5.48 per share.

Net earnings, before an extraordinary gain, were $120.7 million, or $3.49 per share (based on an average of 34.6 million shares outstanding). In 1980, the corporation recorded a loss, before extraordinary items, of $21.4 million, or $0.63 per share (based on an average 33.8 million shares outstanding).

The loss in 1980 was principally attributable to a writeoff of goodwill and the establishing of various expense provisions mainly related to the electronic office systems business. These writeoffs and provisions amounted to about $220 million, of which $163.8 million qualified as extraordinary items under Canadian accounting principles. The remaining approximately $56 million was recorded as operating expenses. In 1980 we also incurred heavy manufacturing start-up expenses for our DMS (Digital Multiplex System) switching.

The Financial Review, beginning on page 22, presents a more detailed discussion of 1981 results compared with those of 1980 and 1979.

DMS switching turns profitable

In 1981, we began to see more tangible evidence of the potential created by our sizable investment in, and commanding leadership of, digital telecommunications technology. Northern Telecom's commitment to the DMS switching program has represented a nearly $300 million investment in research and development, and in plant and equipment through 1981.

Demand for the DMS digital switching systems continued in 1981 to exceed our expectations. DMS switching revenues climbed to $521 million in 1981 from $269 million in 1980. The backlog of orders for digital switching at $495.5 million at yearend indicates that we will again record good growth in 1982.

In the first quarter 1981, DMS switching operations turned the corner on profitability. Initially this was made possible mainly by the excellent performance of manufacturing operations in Canada and the progress made in producing the DMS-100 Family of large local and toll (long-distance) switches. By mid-year, we achieved profitability in DMS-10 and DMS-100 Family switching in Canada and the United States.

Our profitability steadily improved throughout the year as the volume of shipments rose and we achieved higher levels of productivity and cost reduction. However, the gross profit margins on digital switching at yearend were still below the gross margins of our other principal tele-

communications product lines. Historically, profit margins on sophisticated switching systems are higher than for other product lines. In 1982, we expect to achieve profit margins in digital switching comparable to the levels achieved in the mid-1970s by the SP-1 stored-program – controlled analog switching system; SP-1 was an important factor in our growth in revenues and profits during that period.

With about $52 million of sales in 1981 of equipment for the installed base of SP-1 switches, cumulative SP-1 sales since its 1971 debut surpassed the $1 billion mark late in the year.

In a little more than three years, DMS has nearly matched this record. Since the introduction of DMS-10 in mid-1977, DMS switching sales amounted to $954 million through the end of 1981.

Reflecting our productivity and cost-reduction efforts, and the positive impact of advanced technology, the current price of DMS switching is comparable to or lower than the price of SP-1 switches in 1976 – the year Northern Telecom became the first company in the world to announce plans and firm introduction dates for a complete family of digital switching and transmission systems. Since then Northern Telecom has maintained or extended its position as the leading supplier of digital switching systems in North America.

These are some of the DMS 1981 highlights:

- In March, Northern Telecom announced a new member of its DMS product line, the DMS-250, a 30,000-trunk capacity tandem switch (a tandem switch connects trunk lines of two telephone switching centers) for the specialized common carrier industry.

A few weeks later, Northern Telecom's U.S. subsidiary, Northern Telecom Inc. (NTI), announced it had been awarded a US$30 million contract by Satellite Business Systems (SBS) for 20 DMS-250 switches. One switch will be installed at each of the SBS Exchange Services earth stations in 20 of the largest U.S. cities to provide efficient interconnection for SBS message services between its earth stations and telephone company lines. The first two DMS-250s were shipped to SBS in late 1981.

- In March, NTI was awarded a five-year contract by the U.S. Air Force to provide 29 DMS-100 switches for the Air Force's Scope Dial project to modernize its telecommunications. The contract, valued at about US$70 million, including about US$20 million in the first year, is a part of the Air Force's plans to replace government-owned electro-mechanical telephone exchanges with digital systems at its bases around the world. These DMS-100 switches will be equipped with special features to provide PBX (private branch exchange) service, and will be similar to the new SL-100 business communications system, announced in 1981 by Northern Telecom.
- In 1981, NTI began supplying the DMS-200 system for AUTOVON (Automatic Voice Network), the global military grid for telephone service required by the U.S. Department of Defense, military departments, and other users. The first of these specially configured DMS-200s were placed in service in May to serve the Offutt Air Force Base, Fort Riley and Fort Leavenworth, Kansas and in October at Benton Ridge, Ohio. Three other DMS-200s have been ordered for sites in Alaska and Washington.
- In May, NTI officially opened its new DMS manufacturing facility in the Research Triangle Park, near Raleigh, North Carolina. Construction of the US$20 million, 250,000-square-foot facility began in mid-1979. In addition to manufacturing, it serves as the headquarters for Northern Telecom's Digital Switching Systems. In August, NTI announced that the growing demand for DMS requires a US$5.4 million, 76,000-square-foot addition to this facility. Construction is well advanced and should be completed by about mid-1982.
- In July, following an extensive evaluation study of several manufacturers' switches, American Telephone & Telegraph Company (AT&T) selected the DMS-200 for use.

Following negotiations, a four-year agreement to supply DMS-200s was signed in January 1982. The agreement is similar to the contract signed in early 1980 by Northern Telecom and AT&T under which Northern Telecom has been supplying AT&T operating companies with the DMS-10. We believe the agreement could result in more than US$200 million in sales of DMS-200s during the four-year period.

Three DMS-200s will be evaluated in 1982 by AT&T operating companies, two by Pacific Telephone and Telegraph Company in California, and one by Southern Bell in Florida. Assuming the successful completion of these tests, the next systems will be placed in service in early 1983.

Under the DMS-10 supply agreement with AT&T, 30 DMS-10s had been placed in service by yearend by 12 AT&T operating companies. An additional 95 DMS-10s were on order.

- In August, the Austrian government announced it had chosen Northern Telecom's DMS-100 local and DMS-200 toll switching technology, and digital switching systems of a European-based manufacturer, to serve as the basis for the equipment to be used to meet the

Northern Telecom Inc. officially opened in May 1981 its 250,000-square foot DMS manufacturing plant in Research Triangle Park near Raleigh, N.C. However, the continuing strong demand for DMS switches requires a 76,000-square-foot expansion of the plant which is now underway.

Edmund B. Fitzgerald, president, Northern Telecom Inc. (right), and W.G. Sharwell, vice-president, AT&T, sign four-year agreement under which Northern Telecom will supply DMS-200 switches to AT&T.

future expansion needs of the Austrian telecommunications network. The DMS switching technology will be used for digital switches to be developed and produced by Kapsch AG and Schrack Electronik AG, leading Austrian electronics and telecommunications systems manufacturers, under licensing agreements with Northern Telecom.

- In September, Lincoln Telephone and Telegraph Company, Hebron, Nebraska placed the 100th DMS-100 Family switch in service, a DMS-100/200 local/toll system serving 1,500 lines and 260 trunks. By yearend, 153 DMS-100 Family switches were serving 1.6 million equivalent (including long-distance trunks multiplied by five) lines in 9 Canadian provinces, 26 states in the U.S., in Barbados, Puerto Rico, and the Grand Bahamas.
- In October, The West Virginia Telephone Company, Bryceton Mills, West Virginia placed in service the 400th DMS-10. By the end of 1981, 442 DMS-10s were installed serving more than 600,000 telephone lines in 6 Canadian provinces, 44 states in the U.S., Korea, the Bahamas, Antigua, Barbados, and Puerto Rico.
- In December, Northern Telecom International Limited signed a $9 million contract with the Bermuda Telephone Company to modernize within two years that country's telecommunications network from analog to digital technology. The installation of the equivalent of more than 22,000 digital lines will leave just one analog switch in Bermuda's network. Significant DMS agreements were also reached with the telephone companies serving Barbados and the Bahamas.
- At the end of 1981, Northern Telecom had sold or on order 2,416 DMS switching and transmission systems (including the DMS-1 subscriber carrier) to serve 5.3 million equivalent lines, compared with 1,797 systems and 3.4 million equivalent lines at the end of 1980. This level of demand far exceeds that for any of our North American competitors.
- In 1979, Northern Telecom began production of the world's first single-chip filter-codec. This is a large-scale integrated (LSI) circuit combining the function of coding and decoding analog signals to digital format and vice versa, with the filtering of the signal. While our Semiconductor Components Group had produced more than two million of these custom LSIs through 1981, no other manufacturer in the world had begun commercial fabrication of them. The filter-codec chip has been a major factor in our leadership in pioneering digital technology.

In 1981, Northern Telecom and Bell-Northern Research Ltd. (BNR) announced a new LSI chip which technologically obsoletes the single-chip filter-codec and will enable us to extend our leadership.

The new LSI, called the E99 line card chip, integrates the filter-codec, a second chip called a controlled access circuit, and about 30 other components from the telephone line card used in a DMS switch, into a single chip about two-tenths-of-an-inch square.

Northern Telecom's expertise in applying commercially available semiconductors, and designing and manufacturing custom chips is one of our most important strategic competitive advantages. This is the subject of this report's theme: *Semiconductors: Critical elements of the Intelligent Universe*, which begins on page 12.

Introducing the SL Family

The introduction in September of the SL-100 business communications system, the largest digital PBX available or announced in the world, also marked the introduction of the SL Family concept.

SL-100 can economically handle voice and data communications requirements from a few thousand to 30,000 telephone lines. Based on Northern Telecom's proven DMS-100 switching system, the SL-100 offers such DMS features as Remote Line Modules to extend the SL-100's features and services to users' remote locations, and the unique diagnostic Maintenance and Administrative Position. SL-100's features will include a new featured electronic telephone.

Among the first SL-100 customers is the University of California, Los Angeles (UCLA) which awarded a US$15 million contract to NTI for an SL-100 to serve the 33,000 students and 17,000 faculty and staff on its 411-acre campus. UCLA expects the SL-100 and its communications management center feature to result in a savings in its telephone expenditures of about US$1 million a year.

SL-100 is the newest member of Northern Telecom's SL Family which includes the SL-1 digital business communications system, SL-10 data packet switching system, the Electronic Switched Network, and an expanding array of specially designed terminals.

The SL-1 continues to be one of the most advanced and successful digital PBX systems available. Northern Telecom invested $11 million to develop the SL-1. Since its introduction in December 1975, Northern Telecom has invested $61 million, including $21 million in 1981, in research and development to evolve every aspect of the system to take advantage of technological advances and to add to its capabilities. The wealth of software written during this period to support the SL-1 offers special features for industry, government, health care facilities, hotels and motels, financial, and educational institutions.

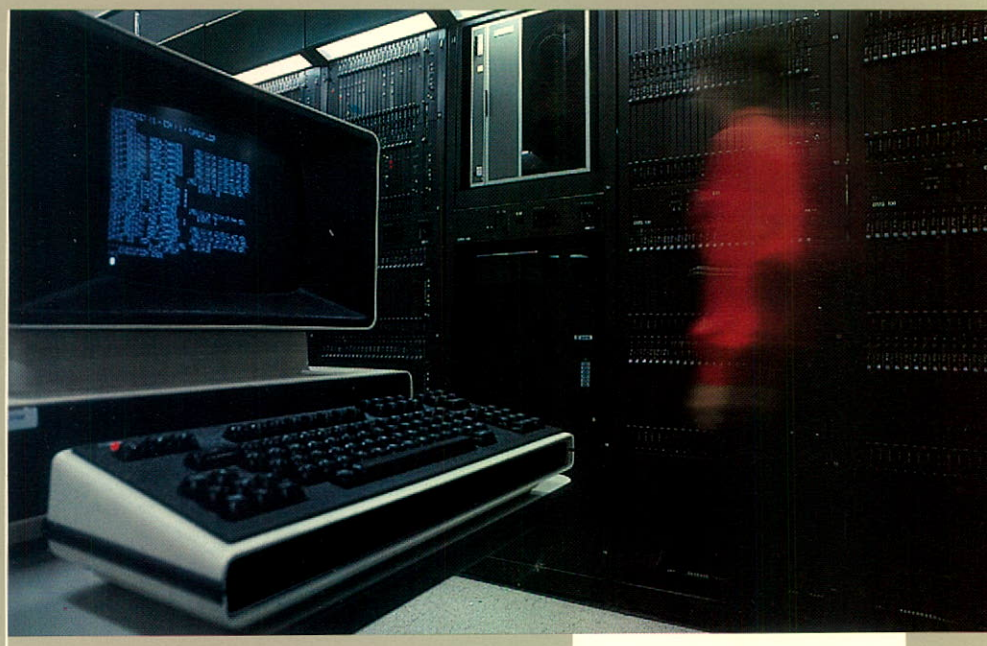
New capabilities will be added to the SL-1 in 1982 and beyond to maintain its leadership. These capabilities include interface capability with digital networks; compatibility with the X.25 data protocol to enable it to operate with the SL-10 system in data packet networks; synchronous data capability, and connectivity with selected local area networks.

Despite the historically high interest rates and the slack economies which affected the sales of many other PBX suppliers in 1981, SL-1 sales grew 40.7 percent to $318 million, bringing cumulative sales since 1975 to about $837 million. And, we expect to achieve 30 percent or better growth again in 1982 to reach an annual SL-1 sales level of more than $400 million, putting us well over the $1 billion mark since its introduction.

At yearend, SL-1s served more than 1.4 million lines in Canada, the U.S., and 33 other countries. In November, Ing. C. Olivetti and C., of Ivrea, Italy became our third European licensee for the SL-1. Previously, SL-1 manufacturing and marketing licenses were signed with Televerket, the Swedish telecommunications authority, and with The General Electric Company (GEC) of England, for the United Kingdom market. One particularly notable installation made in 1981 by GEC was of an SL-1 to serve the headquarters of British Telecom, the government's telecommunications agency.

The agreement with Olivetti followed negotiations between Northern Telecom International and Olteco – Olivetti Telecomunicazioni S.p.A., Olivetti's subsidiary which will be responsible for manufacturing and marketing the SL-1 in Italy. Olivetti had been serving as an SL-1 distributor, marketing it under the name of ICS 6000. It has enabled Olivetti to become one of the leading installers of private telephone exchanges in Italy.

Northern Telecom also signed in 1981 a license for manufacturing and marketing of the SL-10 in Austria by Kapsch AG. Austria will thus join the list of countries, including West Germany, Switzerland, Belgium, Canada, and the U.S., in which our SL-10 system is serving as the control nodes for public and private data networks. New capabilities are being added to the SL-10 in 1982 which should further enhance its attractiveness for new network applications leading to further sales growth from the $26.6 million attained in 1981, up from $22 million in 1980.



The Maintenance and Administrative Position (foreground), a feature unique to Northern Telecom's DMS-100 Family switches, enables telephone company technicians to monitor and diagnose a system's performance from an entire frame to portions of a single line card.

The fourth principal member of the SL Family is the Electronic Switched Network (ESN). Using the SL-1 or SL-100 as control nodes, ESN can integrate these PBXs, the SL-10, and other manufacturers' systems into a multilocation city-wide or nation-wide private communications voice and data network. The network management and control features of ESN's Communications Management Center, and custom design and engineering expertise of Northern Telecom, can reduce an organization's annual communications costs by as much as 20 to 40 percent. Many of Northern Telecom's North American facilities are now operating on an ESN network which is being extended throughout Canada and the U.S.

The SL Family also includes intelligent integrated voice and data terminals such as the special telephone sets designed for SL-1 and SL-100, and the new Displayphone.

Displayphone was announced in February 1981 and underwent market trials in Canada and the U.S. The enthusiastic response indicates that this will be one of the most exciting

Circuit packs are tested at the Raleigh, N.C. plant prior to shipment in a DMS switch. In 1981, more than 360,000 circuit packs, an increase of 72 percent over 1980, were produced in Northern Telecom's U.S. and Canadian plants for DMS-100 Family switches.

products we have introduced. The first member of the Displayphone product line, for which volume production began in our Belleville, Ontario and Minnetonka, Minnesota plants in early 1982, combines a telephone, a seven-inch display screen, and a full keyboard in a desktop (11.5 inches wide, 14.5 inches long and 8 inches high) terminal to provide integrated voice and data services.

Displayphone may be used simultaneously as a telephone, a data terminal to access remote data bases, as a part of an electronic mail network, for graphics display, and offers such special features as a reminder service, electronic notepad, and telephone directory.

Northern Telecom's expertise in integrating voice and data systems was further indicated by our November announcement of Omnifacts. Omnifacts is a series of software packages which will enable the corporation's Model 500 series of distributed data processing (DDP) systems to provide complete on-site cost control and analysis for SL-1 networks. Five different Omnifacts packages will be introduced during 1982. In April, Omnifacts CDR (call detail recording) will be the first to be introduced. It will serve such industries as health, hospitality, and education. In one possible configuration, the Model 585 DDP system with 256,000 characters of memory, 11 million characters of disk storage, and video display stations, will receive and store data from the SL-1 serving the institution, identify and maintain records for calls, and then prepare billing information. Omnifacts and Displayphone are two of the first tangible examples of our plans to offer integrated voice and data office systems.

Electronic office systems

The writeoffs and expense provisions established for our electronic office systems (EOS) operations in December 1980 contributed to a 1980 operating loss for this business of $86.7 million on revenues of $259 million.

EOS made progress in 1981 in further reducing its costs, recruiting additional key senior and middle management executives, improving service to its customers, and improving its position in a highly competitive industry.

Revenues increased 5.9 percent in 1981 to $274.2 million, and operating losses were sharply reduced to $15.7 million.

EOS announced or introduced a dozen new products in 1981 and several other significant announcements will be made in the first half of 1982. We must now bear the costs for developing, marketing, and starting up manufacturing of these new products and systems.

In addition to the Displayphone, among the most significant of the products announced or introduced were:

- the Model 296C and Model 294C on-line data entry and display systems. These IBM-compatible systems can handle up to 8 and 32 display stations and printers, respectively.
- the Model 585, a large-scale DDP system, twice as powerful as our previously largest system, the Model 445. With the Model 585, we can serve about 80 percent of the requirements of the DDP market. The Model 585 also enables us to offer users of our on-line data entry systems the opportunity to add DDP and word processing capabilities to upgrade their networks.
- the Model 503, a powerful, desk-top, low-cost DDP system that may operate on a stand-alone basis, with a small computer, or as a part of a larger network of Northern Telecom's Model 500 and Model 400 series DDP systems. The Model 503 will add in 1982 the popular CP/M operating system which will give users access to thousands of available software programs developed for other computer systems.
- Omniword, word processing capability for the Models 585 and 503, and the Model 400 series DDP systems. About 75 percent of the requests we get for bids now request word processing capability.
- IRIS (Intelligent Remote Input Stand) to further serve the needs of the communicating text processing market. Introduced in June, this microprocessor-based, desk-top unit attaches to IBM electronic typewriters to convert them into low-cost word processors and communicating electronic mail terminals.

The new products to be announced in the first half of 1982 will include an electronic mail system based on the Model 585 and an integrated voice and data communications system.

U.S. revenues top $1 billion

The revenue growth for DMS, the SL Family, and rising sales of transmission systems, telephone apparatus and key telephone systems, outside plant and test products, resulted in a 32.6 percent increase in our revenues in the U.S. in 1981 to $1.1 billion, compared with $793.7 million in 1980.

Revenues from customers in the U.S. now account for 40.9 percent of consolidated revenues. While revenues from Canadian customers

rose by 22.5 percent in 1981, the faster growth achieved in the U.S. and overseas markets, resulted in a decline in Canadian revenues as a percentage of the total to 48.5 percent. International revenues accounted for the remaining 10.6 percent.

International operations

In addition to the licensing agreements in Austria and Italy signed in 1981, and DMS agreements in Bermuda, the Bahamas, and Barbados, our international operations had a number of other achievements in 1981. These included:

- RCMC (Europe) B.V. signed a four-year contract to market our DDP products in markets including Europe and Africa. The contract is estimated to be worth at least US$15 million over the first two years.
- A similar multi-year agreement was signed with Olivetti which resulted in 1981 revenues for our on-line data entry systems of US$20.8 million.
- The first DMS-1A, the new international version of the DMS-1 subscriber carrier system, was shipped to Peru.
- In Asia, we signed a license agreement with Uniphone Sdn. Bhd. of Kuala Lumpur, Malaysia, under which it will manufacture our miniature protector/connector, blocks and main distributor frame systems for Asian markets. We also began deliveries of digital transmission equipment to South Korea under a $60 million contract signed in February 1981. Northern Telecom Canada Limited (NTC) is establishing a new transmission products plant in Winnipeg, Manitoba, which will employ about 270 people mainly in the production of systems for export to Korea and other markets.
- Two DMS-10s were installed in Korea for evaluation and competition against switches supplied by other manufacturers.
- In Turkey, NETAS – Northern Electric Telekomünikasyon A.S. and the Turkish government held a gala event to mark the placing into service of the one millionth telephone line in the country. When we first entered into a joint venture with the Turkish government in 1967, there were only about 100,000 telephone lines operating in the country. During the past decade we accomplished a significant transfer of technology and manufacturing expertise to Turkey to the point that only six Canadians now work alongside more than 1,800 Turkish employees at NETAS' 215,000-square-foot plant near Istanbul, and NETAS has established its own R&D laboratory.

While we expect to continue to work closely with NETAS, and to supply it with parts and components for advanced telecommunications systems, in 1981 we reduced our ownership of NETAS from 51 percent to 31 percent, consistent with our agreement with the Turkish government.

- The plant in Galway, Republic of Ireland, began a 50 percent expansion to 60,000 square feet to meet the demand in Europe and other markets for SL-1s, SL-10s, telephone apparatus and other products that are produced there.

The growth in our telecommunications business in the U.S. and overseas has resulted in an increasing level of exports from Canada. Export sales from our Canadian plants were $337.9 million.

Outlook for 1982

The outlook for 1982 appears good at this time, notwithstanding some concerns.

We are concerned about the poor performance of the economies in most of our markets. However, we entered 1982 with a record yearend order backlog of $1.26 billion, 25.1 percent higher than at the end of 1980. The broad acceptance of our product lines, particularly digital systems, is evidenced by this. We believe that no company in the world can match the breadth and excellence of our digital systems.

We are concerned about the losses in our EOS business and will continue to monitor closely its progress and performance in 1982.

We recognize that competition in many of our businesses is steadily increasing from traditional and new competitors. We believe, however, that in many cases these companies are using our systems as the benchmarks against which they must compete.

In 1982, Northern Telecom Canada must negotiate labor agreements with 11 different unions covering about 12,500 employees in its operations across the country. Some of these three-year agreements have already expired. Previous negotiations in 1976 and 1979 resulted in signing new three-year agreements without significant disruptions in our operations. We are hopeful that the current negotiations will again result in concluding new, mutually satisfactory pacts.

The corporation's accomplishments in 1981 are the result of considerable and sometimes extraordinary effort by employees throughout the organization. We expect they will meet the challenges of 1982 with the same dedication.

We will maintain our substantial commitment to research and development in order to extend our leadership in all of our businesses. Our net investment in research and development was

Northern Telecom Canada's Belleville, Ont. plant began commercial production of the new Displayphone integrated voice and data terminal in January 1982. The terminal is also being produced in Minnetonka, Minn.

Key pads for business telephone sets are produced in the London, Ontario plant.

$181.6 million in 1981, up 28.9 percent from $140.9 million in 1980. In 1982, we plan to increase this by 26.7 percent to about $230 million.

Capital spending in 1982 will also be increased from $209.6 million in 1981 to about $255 million. This reflects, in part: the costs for expanding our DMS switching plant near Raleigh, N.C.; the addition of a new 110,000-square-foot plant for our Network Systems group, near Dallas, Texas; the bringing on stream of our Optical Systems Division's 91,000-square-foot plant in Saskatoon, Saskatchewan; the new Winnipeg, Manitoba transmission products plant; expansion of our Aylmer, Quebec transmission plant, and the Galway, Eire plant addition.

We must also start-up, or increase production of such products as the Displayphone, the new EOS products, the DMS-250, SL-100, our Vantage 12 key telephone system (tripling of production capacity from the current level), and the PLC-1 private line concentrator.

Our financial position is excellent and these increased investments can be financed primarily from internally generated funds. We will, however, remain alert to possible financing opportunities that may be done at favorable terms. Such flexibility is desirable given the turmoil that has beset financial markets in recent years.

New directors

In November, Ian A. Barclay, 60, Chairman of the Board of British Columbia Forest Products Limited, Vancouver, British Columbia, and Walter M. Robinson, Jr., 58, Chairman and Chief Executive Officer, NLT Corporation, Nashville, Tennessee, were appointed to the Board of Directors. We regret that W. Maurice Young, who served the corporation as a director since 1973, retired from the Board.

Donald S. Harvie and A. Jean de Grandpré in 1981 became the second and third members of the corporation's Board to be honored by the Canadian Government by being appointed to the Order of Canada (O.C.). Gérard Plourde had previously received this recognition, bestowed on Canadian citizens for outstanding achievement and service to Canada, to humanity, and for distinguished service in areas of endeavor.

Our growth strategy

In 1981, we stated on several occasions, and published in our quarterly reports to shareholders, that we believe Northern Telecom can grow at about 20 percent a year in consolidated revenues to reach a rate of about $5 billion in 1985. We also established a target for return on revenues of seven to eight percent. These targets were set with these key corporate strategies to guide us:

- Achieve increasing recognition of Northern Telecom throughout North America and internationally as a leader in the development, manufacture, supply and service of integrated telecommunications and other information handling products and systems.
- Maintain a consistent investment commitment for research and development at about seven percent of consolidated revenues.
- Continue to build on our strength in telecommunications. Telecommunications equipment sales to remain about 80 to 85 percent of consolidated revenues; integrated electronic office systems to account for most of the rest, with emphasis on distributed information processing systems featuring integrated voice and data communications capabilities.
- Emphasize service, reliability and quality as a key competitive strength.
- Maintain a reputation for Northern Telecom with customers, employees, governments, and investors for doing what we say we will do.
- Achieve returns for our investors commensurate with a medium-risk, high-technology investment. Increase average return on shareholders' equity to over 20 percent; total debt as a percent of total capitalization to be under 30 percent.
- Pay out an average of from 20 to 25 percent of annual net earnings as dividends.
- Place increasing emphasis on finding, attracting, developing and retaining the best people.
- Maintain an awareness, sensitivity, and responsiveness to employee, customer, investor, government, community, national, and international issues and concerns to which the corporation may be a contributor or that may affect Northern Telecom's operations.

Our performance in 1982 and in future years will be consistent with these strategies.

W. F. Light

Walter F. Light
President and
Chief Executive Officer

A. Jean de Grandpré
Chairman of the Board

February 11, 1982

Directors and officers

A. Jean de Grandpré

Walter F. Light

Directors

Ian A. Barclay
Chairman of the Board
British Columbia Forest Products Ltd.
Vancouver, British Columbia

David W. Barr [3]
Chairman of the Board
Moore Corporation Limited
Toronto, Ontario

William O. Beers [2]
Former Chairman of the Board and CEO
Kraft, Inc.
Chicago, Illinois

A. Jean de Grandpré, O.C., Q.C. [1,3]
Chairman of the Board
Northern Telecom Limited
Chairman of the Board and Chief Executive Officer
Bell Canada
Montreal, Quebec

Georges L. Demers, Q.C. [4]
Senior partner
Demers, Gosselin and Robitaille
Quebec City, Quebec

Edmund B. Fitzgerald
President
Northern Telecom Inc.
Nashville, Tennessee

J. Douglas Gibson, O.B.E. [2,3]
Chairman of the Board
The Consumers' Gas Company
Toronto, Ontario

Donald S. Harvie, O.C. [4]
Chairman
Devonian Group
Calgary, Alberta

Robert S. Hurlbut [1,2]
Chairman of the Board and President
General Foods, Limited
Toronto, Ontario

Walter F. Light [1,4]
President and Chief Executive Officer
Northern Telecom Limited

Clifford S. Malone [1,2]
President and Chief Executive Officer
Canron Inc.
Toronto, Ontario

John H. Moore [1]
Chairman of the Board
John Labatt Limited
London, Ontario

William L. Naumann [3]
Former Chairman of the Board
Caterpillar Tractor Co.
Peoria, Illinois

Charles Perrault [2]
President
Perconsult Limited
Montreal, Quebec

Gérard Plourde, O.C. [3]
Chairman of the Board and Chief Executive Officer
U.A.P. Inc.
Montreal, Quebec

Walter M. Robinson, Jr.
Chairman and Chief Executive Officer
NLT Corporation
Nashville, Tennessee

Robert C. Scrivener [2,4]
Former Chairman of the Board and Chief Executive Officer
Northern Telecom Limited

James C. Thackray [1,3]
President
Bell Canada
Montreal, Quebec

[1] Member of the executive committee
[2] Member of the audit committee
[3] Member of the management resources and compensation committee
[4] Member of the pension fund policy committee

Officers

Chairman of the Board
A. Jean de Grandpré, O.C., Q.C.

President and Chief Executive Officer
Walter F. Light

Executive vice-presidents
Walter C. Benger
Marketing and technology

Robert A. Ferchat
Finance and administration

Charles G. Millar
Operations

President, Innovation and Development
Donald A. Chisholm

Vice-presidents
Clive V. Allen
General counsel

Roy T. Cottier
Corporate relations

J. Derek M. Davies
Business development

F. Robert Dyer
Market development

Ronald A. Hunter
Operations, planning

John D. MacDonald
Manufacturing and technology

Edward B. Matthews
Business systems

R. Brian O'Regan
Public affairs

John J. Rankin
Human resources

Lloyd A. Taylor
Semiconductor components

Treasurer
David W. Kendall, Jr.

Secretary
Anthony J. Lafleur

Controller
Donald K. Peterson

Northern Telecom Limited and principal subsidiaries

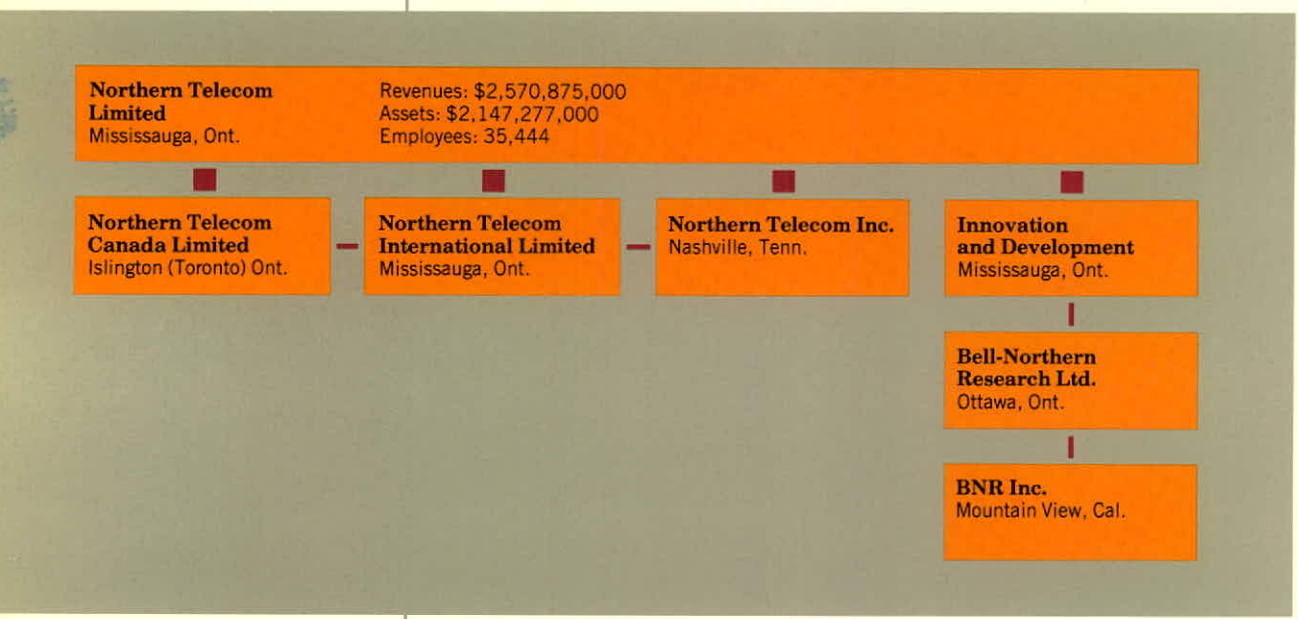
Northern Telecom Limited, based in Mississauga, (near Toronto), Ontario, comprises four principal organizations responsible for the manufacturing, marketing, service, and research and development of the corporation's products.

The corporation's largest operating subsidiary, Northern Telecom Canada Limited, serves Canadian customers' requirements for telecommunications products and systems. The corporation employed 20,776 people in Canada in 1981, up 11.5 percent from 18,634 in 1980.

Northern Telecom Inc. directs Northern Telecom's activities in the U.S. telecommunications market, and in the U.S. and international electronic office systems markets. In 1981, the corporation employed 12,737 people in the U.S., up 11 percent from 11,479 people in 1980.

Both of these companies support the sales efforts of Northern Telecom International Limited which is responsible for telecommunications equipment marketing outside of North America. The international operations employed 1,931 people in 1981, a 7.2 percent increase from the 1,802 people employed in 1980.

Innovation and Development is responsible for semiconductor components and the research and development activities of Northern Telecom's subsidiary, Bell-Northern Research Ltd. (BNR). BNR, which is the largest private industrial R&D organization in Canada, is 70 percent owned by Northern Telecom and 30 percent by Bell Canada. About 60 percent of Northern Telecom's R&D effort is carried out by the 3,058 employees of BNR in Canada and the United States with the remaining 40 percent done through 22 R&D centers in Northern Telecom's manufacturing plants in North America and in the U.K.



This chart is not intended to denote the legal or parent-subsidiary relationships. It reflects the administrative organization of the corporation as at December 31, 1981.

Manufacturing locations

Cable and outside plant
Canada
Amherst, N.S.
Calgary, Alta.
Kingston, Ont.
Lachine, Que.
Regina, Sask.
St. Laurent, Que.
Winnipeg, Man.
United States
Morton Grove, Ill.
Brazil
Rio de Janeiro

Components
Malaysia
Penang

Electronic office systems
Canada
Scarborough, Ont.
United States
Minnetonka, Minn.
Montevideo, Minn.
St. Paul, Minn.
Warwick, R.I.
Ann Arbor, Mich.
Great Britain
Hemel Hempstead

Semiconductor components
Canada
Ottawa, Ont.
United States
San Diego, Cal.

Subscriber apparatus and business communications systems
Canada
Amherst, N.S.
Belleville, Ont.
Calgary, Alta.
London, Ont.
Regina, Sask.
Saint John, N.B.
Montreal North, Que.
North York, Ont.
United States
Nashville, Tenn.
Santa Clara, Cal.
Republic of Ireland
Galway

Switching
Canada
Brampton, Ont.
Calgary, Alta.
Charlottetown, P.E.I.
LaSalle, Que.
Montreal, Que.
St. John's, Nfld.
United States
Creedmoor, N.C.
Raleigh, N.C.
Richardson, Tex.
West Palm Beach, Fla.

Test equipment
United States
Concord, N.H.
Moorestown, N.J.

Transmission
Canada
Aylmer, Que.
Kanata, Ont.
St. Laurent, Que.
Saskatoon, Sask.
Winnipeg, Man.
United States
Atlanta, Ga.

Senior management of principal subsidiaries

Bell-Northern Research Ltd.

Chairman of the Board and President
Donald A. Chisholm

Executive vice-president
John A. Roth

Group vice-president
L. Colin Beaumont
Office products

Vice-presidents
Howard M. Bender
Digital switching

John S. Buchan
Corporate development

Klaus M. Buechner
Terminal products

John Elliott
Network products

Tom M. Hennebury
Human resources and administration

Robert Kenedi
Systems

Lloyd A. Taylor
Technology

Secretary and legal counsel
Roméo C. Champagne

Treasurer and controller
Frank T. Chaikowsky

BNR Inc.

Chairman of the Board
John A. Roth

Vice-presidents
Ray Kavlick
Data products

Peter J. Worsley
Business development

Secretary
Roméo C. Champagne

Treasurer
Frank T. Chaikowsky

Data 100 Europe B.V.

Managing director
Barry W. Eames

Northern Telecom A.G.

Managing director
Hugh A. Hamilton

Northern Telecom (Asia) Limited

Managing director
Mendel C. Cohen

Northern Telecom (CALA) Corporation

President and general manager
Jean-Paul Gagnon

Northern Telecom Canada Limited

President
Basil A. Beneteau

Executive vice-presidents
Donald A. Noble
Finance and administration

C. Denis Hall
Marketing and technology

Group vice-presidents
André J. Boutin
Cable

Ewart O. Bridges
Switching

David G. Vice
Transmission

Kenneth H. Woodley
Subscriber equipment

Vice-presidents
David D. Archibald
Secretary and general counsel

James W. Brown
Finance

Robert M. Cuddy
Manufacturing

Richard A. Fortier
Personnel and industrial relations

Robert H. Lane
Customer services

Roy McClean
Apparatus

Roy Merrills
Subscriber switching

Elliott Turcot
Advanced switching

D. Wynn Walters
Public relations

R.R. Watt
Cable operations

Northern Telecom Inc.

President
Edmund B. Fitzgerald

Executive vice-presidents
John W. Caffry
Finance and administration

Desmond F. Hudson
Integrated office systems

George W. Sullivan
Corporate development

Group presidents
Marcelo A. Gumucio
Electronic office systems

Charles G. Millar
Digital switching systems

Group vice-presidents
Bob G. Davis
Network systems

Edward J. Mattiuz
Business communications systems

Thomas R. Worthy
Digital switching systems

Vice-presidents
William C. Cawthon
Operations

Roy T. Cottier
Public relations

Jerry L. Kreiger
Human resources

John MacDonald
Treasurer

Edward B. Matthews
Business systems

Richard R. Standel, Jr.
General counsel & secretary

Northern Telecom Industries Sdn. Bhd.

Managing director
Ho Boon Theam

Secretary
Raju Jayaraman Kerpaya

Northern Telecom International Limited

President
William T. Simpson

Vice-president
Jean-Paul Gagnon

Secretary
David D. Archibald

Northern Telecom (Ireland) Limited

Chairman of the Board
Lord Killanin

Managing director
Patrick J. Hogan

Northern Telecom (Middle East) Limited

Managing director
Brian Baynes

Semiconductors: Critical elements of the Intelligent Universe

In 1947, American Telephone & Telegraph's (AT&T) Bell Labs demonstrated the first successful transistors. These small, low-powered amplifiers quickly replaced less reliable, large, and power-hungry vacuum tubes. The development of transistors made possible the evolution of the micro-electronic circuits and modern computers that we now encounter in every aspect of our daily lives.

In the mid-1950s, engineers first learned how to batch process multiple transistors on wafer-thin slices of silicon (see glossary). Northern Telecom was involved in these developments as early as 1952 when, as a licensee of AT&T's Western Electric, it began making experimental silicon-based devices for central office telephone switching systems. Small-scale production began in 1959.

The next major industry breakthrough was the development in 1959 of the integrated circuit. Basically, an integrated circuit permits interconnection of transistors and other electronic components by the flow of electricity over a medium, such as a conducting film on silicon, rather than by the physical connection of wires.

In the early 1960s, perhaps 10 transistors could be placed on a chip of silicon. Since then the pace of development has been astonishing. An individual integrated circuit on a chip perhaps one-quarter-inch square may now have more electronic elements on it than the most complex electronic system that could be built 30 years ago.

For example, integrated circuits, or semiconductors as they are now commonly called, one-twentieth-of-an-inch square may contain about 200 transistor elements. Another semiconductor about one-quarter of an inch on one side and 1.5 inches long, can contain 200,000 transistor elements. When five of these chips are packaged end-to-end, they produce a component containing approximately one million transistor elements in a 7.5-inch long package. These are the smallest and largest semiconductors custom designed and manufactured by Northern Telecom. The small chip is an essential element in the corporation's electronic telephones. The large semiconductor was developed, and is produced, for another company which uses it in special-purpose cameras.

A strategic advantage

Northern Telecom's expertise in semiconductor technology – applying commercially available devices, and designing and manufacturing custom semiconductors – is one of its most important strategic competitive strengths.

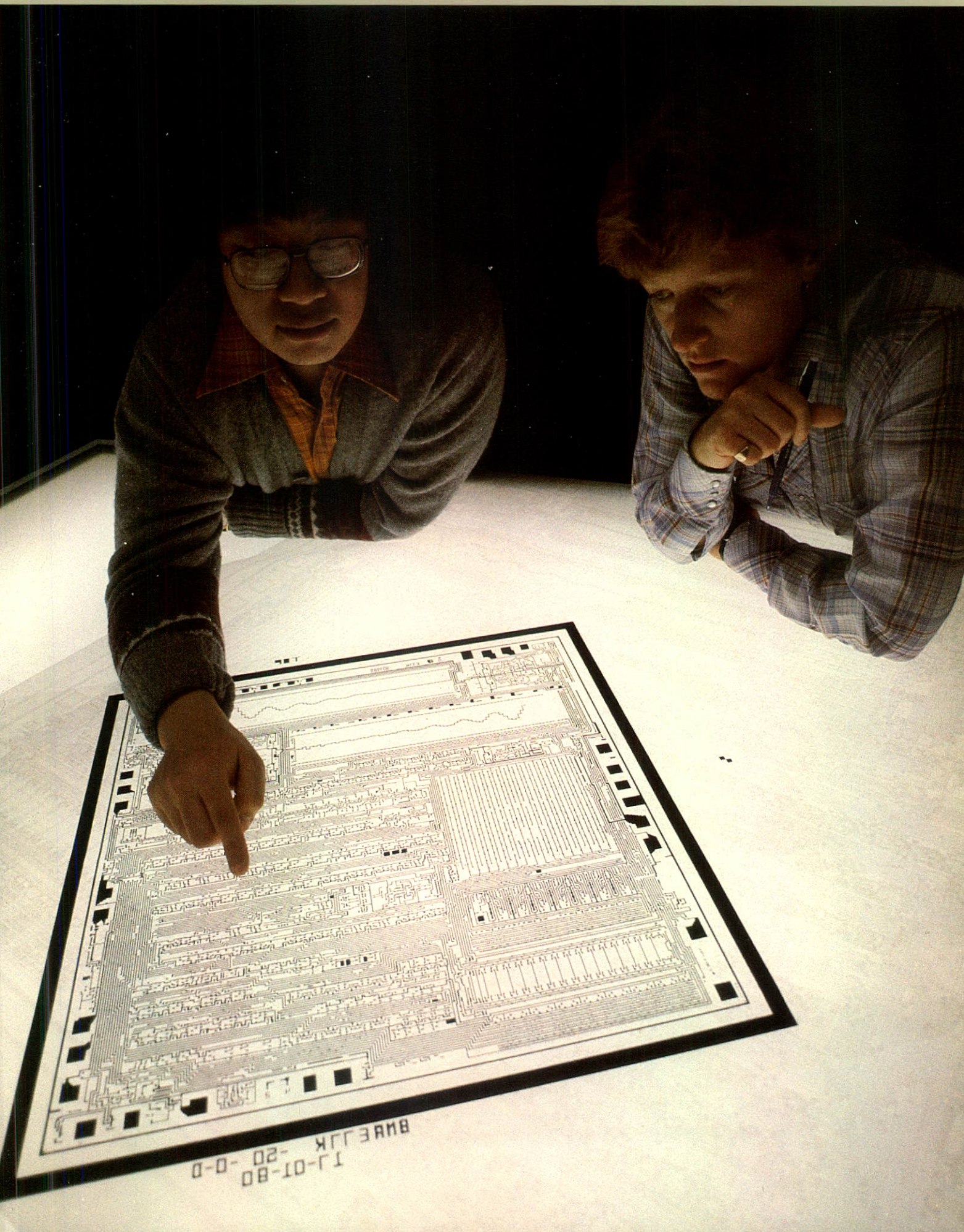
Expertise in semiconductors makes it possible for Northern Telecom to design systems that offer customers feature capabilities that might be technically, but not economically, practical without the critical application of these chips in the design of the systems. Semiconductors have reduced the cost, size, and power requirements of telecommunications and electronic office systems; they have permitted the addition of new functions and the distribution of these functions from huge centralized systems to locations closer to the user – even on desktops.

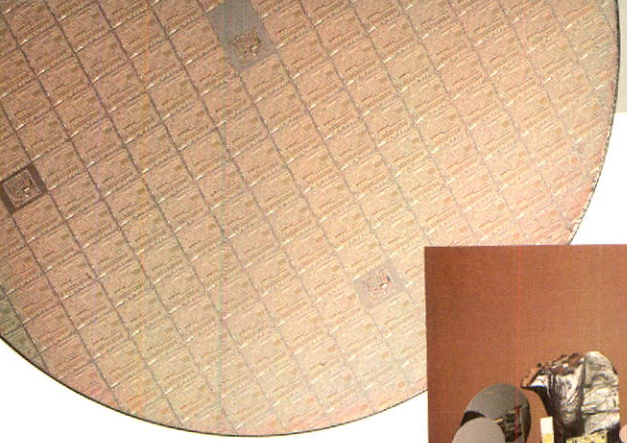
The application of commercially available components by a manufacturer is important. However, if a manufacturer uses only commercially produced semiconductors, available to everyone including its competitors, then no matter how innovative its designers may be in applying these chips in its products, it will be difficult for that company to achieve clear leadership in its product technology.

A key factor in attaining leadership in the electronics industries is the ability of a company to design and produce its own integrated circuits. Custom semiconductors offer systems designers the freedom to innovate ahead of their industry. Unique semiconductors can be designed to provide complex functions at low cost. In the past, such unique circuits used in a single company's products generally have been of little interest to commercial, so-called merchant, semiconductor manufacturers. And, it is still true that if a company wants to seize and maintain product leadership using its own custom chips, it must be able to design and produce them itself.

Custom design of semiconductors also enables the manufacturer to protect the proprietary nature of product designs more easily, and for a longer period, than may be possible if off-the-shelf components are used, or if the custom circuits are developed and farmed out for production by merchant producers. The ability to design semiconductors which may have a higher degree of performance and reliability standards

Design engineers check plot of LSI circuit prior to mask making.





Glossary

Bipolar
Refers to transistors formed with two semiconductor types (negative and positive carriers).

Channels
Gateways between input and output poles of a Metal Oxide Semiconductor (MOS) transistor.

Chip
A single square or rectangular piece of semiconductor material into which an integrated circuit device has been fabricated. Chip, semiconductor, and integrated circuit are terms often used interchangeably in writing and speech.

CMOS
Complementary Metal Oxide Semiconductor, a technology used in the manufacture of logic integrated circuits by combining N-channel and P-channel MOS transistors.

Codec
A device that converts analog voice signals to digital (pulse code modulation) form and back to analog form (a COder/DECoder).

Device
A part of a system that has a recognizable function; often an electronic part that contains one or more active elements, such as a transistor, diode, or integrated circuit. It is often used as a synonym for a chip.

Filter
A device that selects the voice frequency components from the signal produced by decoding a digital pulse train to recover the analog signal.

Filter-codec
A device which combines the filter and codec functions on a single chip.

Integrated circuit
A functional circuit whose components and interconnecting leads are chemically formed on a single chip of semiconductor material.

Large-scale integration (LSI)
Large functional circuits made up of hundreds of circuits etched into a single piece of semiconductor.

Logic circuit
An electronic element which takes a series of electronic pulses at the inputs and produces outputs according to the specific function the element is designed to perform.

NMOS
N-channel Metal Oxide Semiconductor, using electrons (or negative charges) to conduct current in the semiconductor channel; a technology used in silicon chip fabrication.

PMOS
P-channel Metal Oxide Semiconductor using positive charges to conduct current in the semiconductor channel; a technology used in silicon chip fabrication.

Resistor
A circuit component which provides a predetermined amount of resistance to electrical current.

Semiconductor
A material with properties of both a conductor and an insulator. The particular property is dependent on the voltage polarity and level applied to it. Silicon is the most widely used semiconductor in microelectronics.

Silicon
A dark grey, hard, crystalline solid; second most abundant element in the earth's crust.

Transistor
A three-terminal electrical device made of semiconductor material and capable of performing amplification or switching of electrical signals.

than those chips commercially available, is a third distinct advantage of having custom design and manufacturing capability.

Finally, a company gains significantly greater control and certainty of availability and cost, critical factors in ensuring deliverability of products to customers at the promised date and price, when it designs and produces its own key circuits for its products.

All of these factors, and the recognition that micro-electronics technology was the wave of the future, contributed to Northern Telecom's strategic decision in the 1960s to begin designing and producing its own integrated circuits.

Designing circuits in the Sixties

Northern Telecom established an in-house research capability in semiconductors in 1961 in its Ottawa laboratories (which in 1971 became Bell-Northern Research Ltd.). In the mid-1960s, these laboratories developed custom logic circuits based on the state-of-the-art technology then used, called bipolar, for the corporation's SP-1 stored-program-controlled central office telephone switching system.

The motivation for this development came from the fact that circuits needed to meet the telecommunications industry's stringent reliability standards were not then commercially available. Had Northern Telecom waited for the semiconductor industry to catch-up to its requirements, it could not have produced a working laboratory model of SP-1 by 1967, had it in field trial by 1969, and launched it in the market by 1971.

The quality of the SP-1 and Northern Telecom's leadership in developing it ahead of similar systems introduced several years later by competitors, enabled the SP-1 to become the largest selling switch of its kind in North America, outside of the AT&T system. Through 1981, Northern Telecom has recorded more than $1 billion in sales of SP-1s.

Even as Northern Telecom was introducing the SP-1, the R&D people at the corporation's Ottawa laboratories were exploring new advances in semiconductor technology. Based on these, they prepared preliminary specifications and designs for what they called the "E Thing".

By 1976, the "E Thing" would make the SP-1, and every similar switching system by then available in the industry, effectively obsolete. This was Northern Telecom's pioneering announcement of the Digital World, when it became the first corporation in the world to

announce firm plans and introduction dates for a complete family of digital switching and transmission systems to replace such analog products as the SP-1.

This announcement was made possible by Bell-Northern Research's (BNR) successful development of four unique semiconductors based on advanced CMOS technology. The first application of these circuits was in the SL-1 digital business communications system introduced in December 1975.

Chips for Digital World

BNR and Northern Telecom recognized that to make fully digital telecommunications economically viable, coding and decoding of signals on each telephone line would have to be done by an integrated circuit, but none were then commercially available in the early 1970s. BNR developed a large-scale integrated (LSI) circuit called a single-channel (one line) monolithic codec (COde/DECode). It was determined that the expected sales for SL-1 and the DMS (Digital Multiplex System) switching and transmission products would make the volume and related cost of codecs practical, and the project went ahead.

Like SP-1, SL-1 became a market leader. Worldwide cumulative sales of SL-1s through 1981 total $837 million, with about a 40 percent increase in revenues recorded in 1981 to nearly $318 million. The technology of the SL-1 PBX (private branch exchange) has been upgraded every year to take advantage of new developments in semiconductors and to add new capabilities such as integrated voice and data. It continues to be one of the most advanced and fully featured PBX systems available anywhere in the world.

Excluding a pilot line manufacturing capability, the custom LSIs used in the SL-1 were manufactured during the first few years by external suppliers. However, by 1977, it was obvious that the demand for the SL-1 and the DMS products was going to exceed substantially the corporation's initial forecasts. Northern Telecom became concerned about the semiconductor industry's ability to meet its requirements in future years. The corporation also recognized the potential savings and other competitive advantages it could gain by producing its own chips.

Semiconductor Components Group

In 1977, the pilot line in BNR's central laboratories, capable of processing two-inch diameter silicon wafers, was moved to its nearby Corkstown laboratories and upgraded to a three-inch diameter capability.

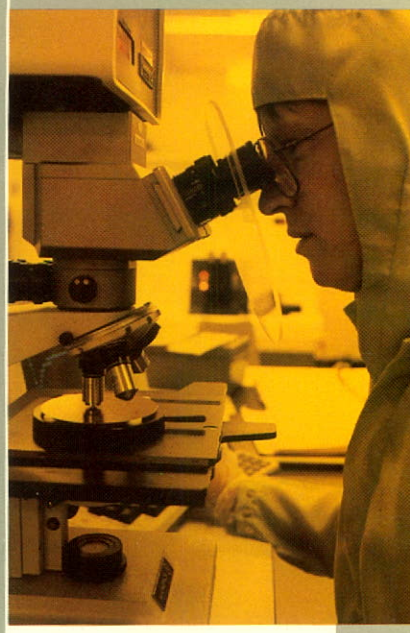
In December 1978, Northern Telecom created the Semiconductor Components Group (SCG) to design and produce custom LSIs. This was quickly followed by a decision to establish integrated design and manufacturing facilities in the Corkstown building, and a second manufacturing plant in San Diego, California.

SCG, working closely with BNR, has continued Northern Telecom's development of advanced semiconductors. Total R&D spent on semiconductor development during the past eight years was about $60 million. Among the most significant developments resulting from this program was the design of the single-chip filter-codec.

Northern Telecom conceived the idea of a single-chip filter-codec in 1976 as a means to make the DMS-100 Family of switches, scheduled for introduction in 1979, cost effective for manufacturing. It marked a new level of chip integration, combining the monolithic single-channel codec developed earlier with another key device, called a filter, on a single chip. Sounds simple. However, from the start-up of production in 1979 through 1981, SCG produced more than two million of these chips while no other manufacturer in the world had begun production of them in commercial quantities.

E99 – obsoleting the filter-codec

In September, 1981, the Semiconductor Components Group announced the development of a new chip, which will maintain Northern Telecom's two-to-three year leadership in this area by obsoleting the single-chip filter-codec. The new LSI, called an E99 line card chip, combines the filter-codec, a second chip called a controlled access circuit, and about 30 other discrete components from the telephone line card, all in one chip about two-tenths-of-an-inch



During the wafer fabrication process, a process operator inspects LSIs for proper line width.

square. Packed into this tiny chip are the equivalent of 10,000 transistors, 400 logic cells, and 8,000 wirings.

The E99 line card chip will be in production in 1982 and will be featured in Northern Telecom's DMS-100 Family switches. It will make possible further cost reduction of the systems, greater reliability (fewer discrete components and connections that can fail), and by 1983, a new compact design which will pack into one frame as many line cards as are now contained in two frames – a 50 percent reduction.

The E99 will join some 32 other types of custom LSIs now manufactured by SCG in its two facilities.

The 120,000-square-foot Corkstown facility employs about 550 people in the development, manufacture, and procurement of semiconductors. Representing a total capital investment of more than $36 million, it features three-inch wafer and new four-inch wafer production lines. SCG increased its production output in 1981 to 350,000 CMOS and NMOS semiconductor devices per month compared with 200,000 per month in 1980. This output can be expanded as required.

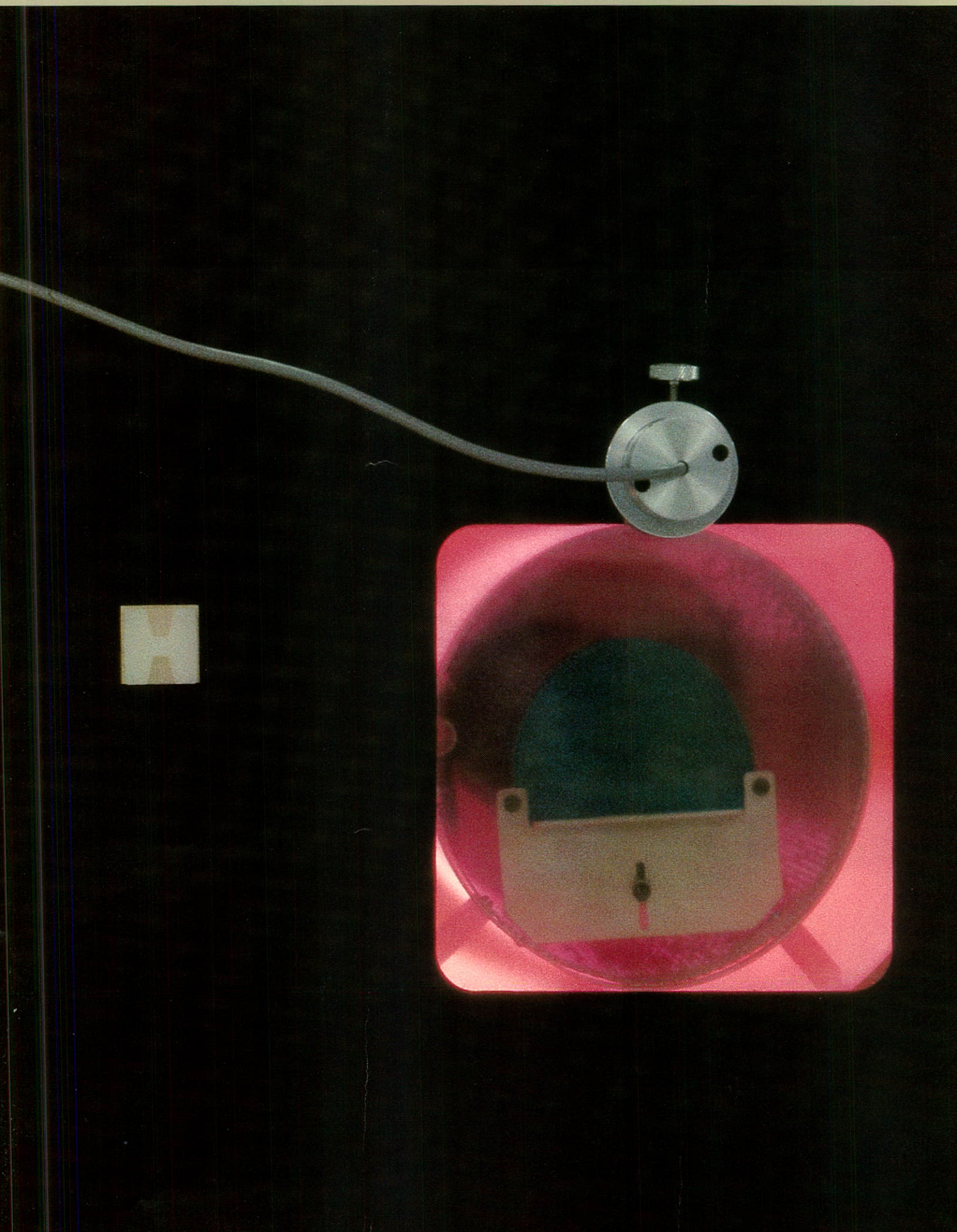
The new San Diego plant began production in June 1981, just 18 months after the ground breaking. The planned capacity is about 500,000 devices per month in CMOS and NMOS technologies. The 63,000-square-foot facility, representing a US$23 million investment, now employs about 160, and expects to employ 220 in 1982.

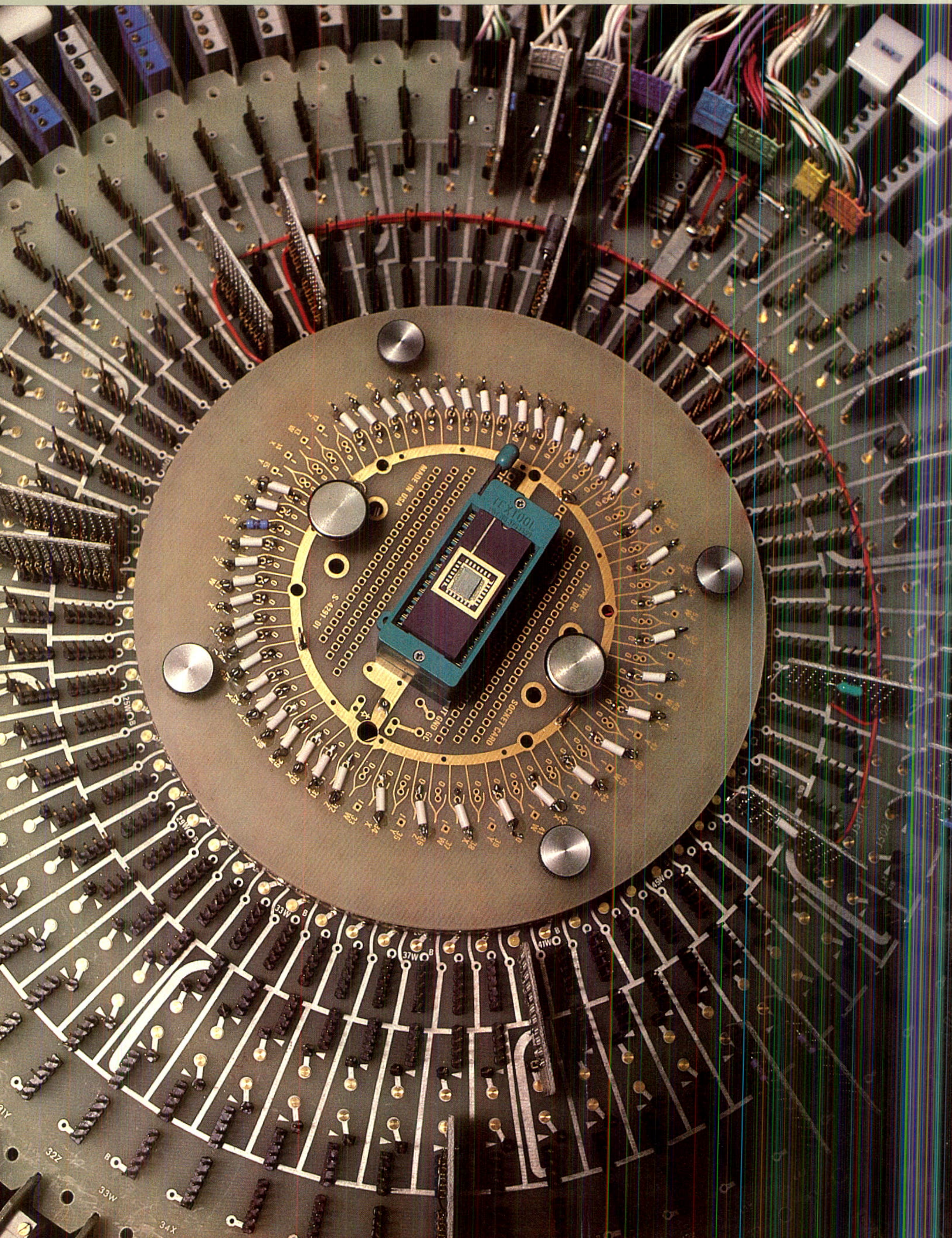
A third SCG facility is located in Northern Telecom's business communications systems manufacturing plant in Santa Clara, California. This SCG facility is used to test, qualify, and control the quality levels of semiconductors and other components purchased externally.

In 1975, external purchases and the output of the pilot production line amounted to only a few hundred thousand dollars worth of custom integrated circuits. In 1981, Northern Telecom's use of custom and commercially available semiconductors more than doubled to about $85 million (based on intra-company prices for SCG-produced chips; this amount would easily exceed $100 million if based entirely on equivalent external prices).

Trays of silicon wafers are loaded into a diffusion furnace which is controlled to introduce impurities into the silicon to define the semiconductor characteristics.

Plasma etching of integrated circuit pattern on silicon wafers





This includes about 53 percent, or $45 million worth, of custom circuits. Of the custom circuits, about 57 percent are used in the DMS-100 Family switches; 25 percent in the SL-1, and the remainder in the DMS-10 small local switch, DMS-1 subscriber carrier systems, and electronic telephones.

SCG's vital role

SCG gives Northern Telecom a substantial strategic advantage in the hotly competitive telecommunications and electronic office systems markets in several ways.

First, SCG works closely with Northern Telecom's and BNR's R&D people and the manufacturing divisions to identify cost reduction opportunities where the application of either custom or commercial semiconductors and other electronic components may reduce or eliminate more costly devices.

Second, the interaction is increasing between the Semiconductor Components Group and the design people developing systems in BNR and Northern Telecom. The objective is to identify at the earliest possible stage how semiconductors may be included in initial product designs to reduce product manufacturing costs, increase reliability and to provide additional features and capabilities that might not be practical without the use of semiconductors. When these applications are identified, SCG will then determine where the best leverage lies: designing and producing new custom circuits, or sourcing the devices from commercial suppliers.

In making this assessment, SCG relies on the assistance of the extensive computerized data base it has built-up in its Component Engineering Organization. It includes the information gathered by SCG personnel on industry orders, production plans and availability of components, customer service from suppliers, quality levels, pricing, and other information.

Northern Telecom's new Displayphone terminal, announced in February 1981, is an example of the growing role SCG will play in the development of intelligent terminals.

Displayphone is an innovative integrated voice and data terminal that combines a telephone, CRT display screen, and keyboard in a compact, desk-top system, which is easy to use ("user-friendly" in current electronics vernacular) for such applications as accessing data bases, electronic mail, and teleconferencing. The initial models of Displayphone were developed with commercially available semiconductors. Future models, however, will offer an expanded array of features and capabilities and will be based on proprietary LSIs designed and produced by SCG.

Towards the Intelligent Universe

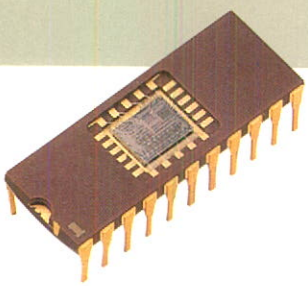
Advances in semiconductor technology have already profoundly affected all of us. The amount of computing power that can be placed on a chip has doubled every two years at no additional cost for more than the past decade, and indications are that this will continue through the 1980s. Computers that once filled rooms just 30 years ago, could not match the capabilities, cost or energy consumption of the hand-held calculators of today. The shape, size, function, and cost of products and systems familiar to us today, and many not yet developed, will have an even greater affect on our offices, factories, educational institutions, and homes.

In 1979, Northern Telecom first described this concept of the future as the Intelligent Universe. Intelligent terminals, such as telephones and computers, and, borne of the marriage of the two, new kinds of terminals like the Displayphone, provide easy, instant and universal access to information by communicating through intelligent telecommunications networks.

Market researchers estimate that Northern Telecom is already one of the 10 largest users of semiconductors in the world. The corporation gained this position because of the success of its Digital World products and its early recognition of the critical strategic role semiconductors would play in the evolution towards the Intelligent Universe.

Northern Telecom intends to exploit further its competitive advantages in the application of commercial semiconductors and the development and manufacture of custom-LSIs, and, in future, VLSIs (very large-scale integrated) for the enhancement of its Digital World products and the development of new intelligent telecommunications and electronic office systems for the Intelligent Universe.

To check an E99 line card chip, SCG uses a proprietary system that can perform up to 90 separate tests of an LSI in five seconds.



Northern Telecom employs about 550 people in the development, manufacture, and procurement of semiconductors at SCG's 120,000-square-foot Corkstown facility, near Ottawa. Additional space in the building is used by Bell-Northern Research.

How to make a chip

Producing semiconductors is a highly complex manufacturing process that is becoming more complex as the intricacy of these chips increases. Tens of thousands of electronic elements may be contained in an area one-quarter-of-an-inch square. It contains structures on silicon that cannot be seen by conventional microscopes, let alone the naked eye. It must be carried out in an extremely clean environment; the smallest particle of dust can ruin a chip.

A single chip may be compared to a city. One such chip designed and produced by Northern Telecom's Semiconductor Components Group (SCG) is equivalent to a 20-square-mile city comprising 400 city blocks, more than 10,000 buildings, 1,000 miles of highways, and 40,000 intersections in a space two-tenths-of-an-inch square. The connecting lines, or highways, on each layer may be four-to-six microns wide; a human hair is about 50 microns in diameter. But that is only 15 percent of the chip – the surface level; the other 85 percent is contained in multiple "below ground" levels, each perhaps one-tenth of one-thousandth-of-an-inch thick.

Producing such chips requires an investment of tens of millions of dollars for production and test facilities. The production process may involve anywhere from about 130 to more than 160 different steps. At the SCG facilities, the entire operation takes an average of about 54 working days (down from 83 days in January 1981).

The complexity of the fabrication process and unforgiving tolerances for errors make chip making a low-yield batch manufacturing process.

The process begins with design. Once the design engineers determine what the chip must do, they use computer-aided design systems (color-graphics terminals) on which they can display blocks of circuitry designed and used in the past and stored in the computer library. The designers use these standard circuit blocks, or cells (city blocks according to the analogy), connecting them together on the computer terminal. The computer at SCG can currently call up more than 200 different cells with all the associated electrical information which describes their performance properties.

The computer can then simulate the function of the new integrated circuit to test its performance and identify errors to be corrected by the designer. New cells are designed and added to the computer library from time-to-time as new circuit functions are required.

The challenge is not only to design a circuit which will function as intended, but to lay it out in the most efficient way achievable. Using the computer terminal, it is important to identify early design errors, such as improper circuit connections; once production of the chip begins, discovery of mistakes at this stage may cost $50,000 or more.

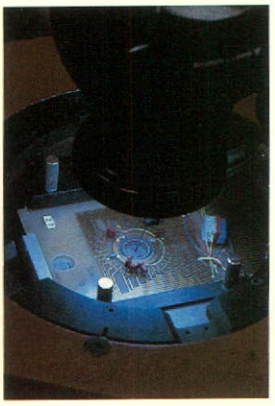
After the design has been thoroughly checked and accepted by the designer, it is entered into a computer which will control the production of the design on a series of photographic plates, called masks. Many masks may be made for one semiconductor device, one for each layer on the chip. The design is transferred, or engraved, on to the mask by an electron beam fired by a device called a reticle generator. Firing at a speed of about five times a second, the reticle generator may take five hours or more to make a fairly complex mask. Then, in what is called a "step and repeat" process, the original image (or reticle) is reduced photographically 10 times to the actual device size and is stepped in rows and columns across another photographic plate, or mask. These masks may contain up to 400 or more identical circuit images.

The typical semiconductor may have from 7 to 15 masks. The masks will later be aligned on the circuit, which is analogous to laying down 7 to 15 football fields on top of each other within a three-inch accuracy.

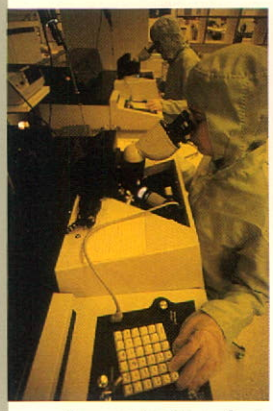
After vigorous inspection routines, the masks move into the silicon wafer fabrication or manufacturing area. Using furnaces containing exotic gases and with temperatures up to 1,000 degrees celsius, controlled to within one degree, and through a series of chemical treatments, the patterns of the masks are etched on to the silicon and the electrical properties of the silicon are changed. These processes are controlled with the aid of computers.

When the plasma etchers (an ionized gas system which replaces older wet chemical processes), sputterers (for depositing metal layers), ion implanters (for changing the property of the silicon material), and other systems have done their jobs, the silicon wafer containing hundreds of individual chips is ready for testing. SCG uses a proprietary system that can perform up to 90 separate tests of a single chip in five seconds. If the chip fails any single test, it is defaced with an ink blot dispensed by a needle at the center of the tester, branding it as a failure.

The good chips are cut from the wafer, mounted into packages, connected to the package leads using wires thinner than a human hair, and are sealed from the atmosphere. They are tested again in final package form before they are shipped to Northern Telecom's manufacturing divisions.

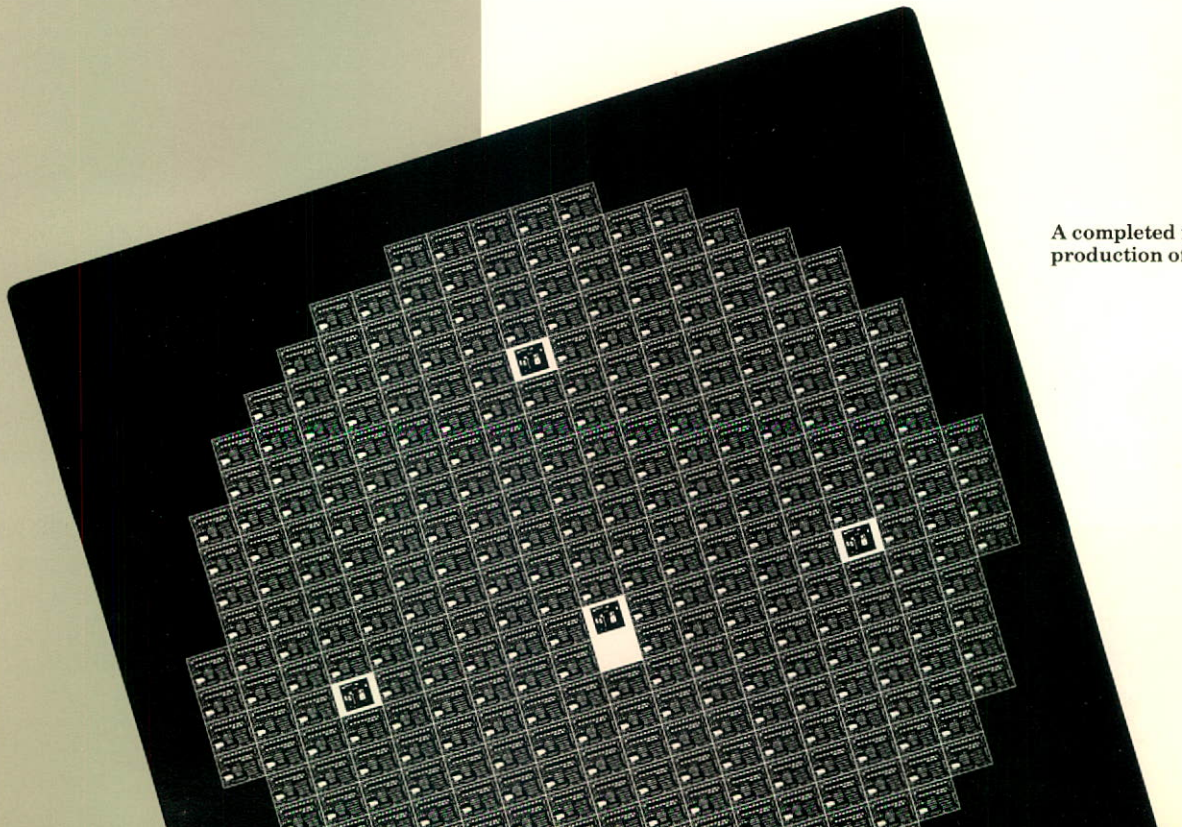


In the probe test of completed silicon wafers, defective circuits on the wafer are defaced by an ink blot from the needle.



Inspecting the photo resist pattern on wafers prior to the etching process, an operator can sort out bad wafers for reprocessing.

SCG technician uses plotter to enter an integrated circuit design into a computer.



A completed mask used in the production of LSIs

Strong demand for Northern Telecom's digital switching and transmission systems and other telecommunications products contributed to a 25.1 percent increase in consolidated revenues in 1981 to a record $2.571 billion compared with $2.055 billion in 1980 and $1.901 billion in 1979. These increases have been mainly the result of volume growth rather than price increases.

Telecommunications equipment revenues up 28.4 percent

Telecommunications equipment revenues rose 28.4 percent to $2.249 billion in 1981 from $1.751 billion in 1980; revenues in 1979 were $1.505 billion.

The strongest performance was recorded by central office switching systems, up 53.6 percent in 1981 to $776 million. Switching systems accounted for 34.5 percent of telecommunications equipment revenues in 1981, compared with 28.8 percent in 1980, and 25.7 percent in 1979. The growth was due to increased shipments of DMS (Digital Multiplex System) switches, particularly the DMS-100 Family of large switches. DMS switching revenues rose 93.7 percent to $521 million in 1981, or 67.1 percent of total central office switching revenues. This compares with $269 million in 1980 (53.2 percent of the total), and $127 million (32.9 percent of the total) in 1979. The balance of central office switching revenues includes sales of additional equipment for previously installed analog systems such as the SP-1.

Subscriber apparatus and business communications systems revenues were up 19.6 percent to $739.9 million from $618.6 million in 1980, a 17.9 percent increase from the 1979 level of $524.7 million. The principal factor for this growth continued to be demand for the SL-1 digital business communications system. SL-1 revenues rose 40.7 percent to $318 million in 1981. Network systems revenues from specialized common carriers and other customers in the U.S. increased 41.6 percent to $122.2 million in 1981.

Transmission equipment revenues rose 47.3 percent in 1981 to $409 million from $277.6 million in 1980; in 1979 they were $227.3 million. Increased revenues from such digital products as the DRS-8 microwave radio system, optical systems, and the LD-1 carrier, as well as analog VF-300 voice frequency equipment, were mainly responsible for the growth. Test equipment revenues which are included in this product line, were up 12 percent in 1981 to $59.4 million.

Wire, cable and outside plant product revenues at $323.6 million were modestly down from 1980 and 1979 levels ($349.9 million and $366.7 million, respectively). The declines were mainly the result of phasing out power cable operations in 1980 and early 1981.

Total revenues from Bell Canada, its telephone subsidiary and associated companies, rose 26.2 percent to $911.7 million in 1981, from $722.2 million in 1980, and $695.9 million in 1979. Revenues from this group accounted for 35.5 percent of consolidated revenues in 1981, 35.2 percent in 1980, and 36.6 percent in 1979.

Electronic office systems

Electronic office systems (EOS) revenues were up 5.9 percent in 1981 to $274.2 million, compared with $259 million in 1980, a 26 percent decrease from $349.8 million in 1979. While there has been a continuing decline in the revenues generated by equipment leased to customers, increased sales to customers contributed to the 1981 gain in revenues. The 1980 decrease in revenues resulted primarily from the second quarter 1980 decision to discontinue the sales to third parties of equipment leased to customers, and declining demand for older products. In addition, disruptions in the production of new systems and refurbishing of equipment contributed to the decline in 1980 revenues.

During 1981, a dozen new EOS products or enhancements to existing systems were announced or introduced. These contributed

only marginally to 1981 revenues. In 1982, they are expected to offset partially the declining lease base revenues of older equipment.

U.S. revenues top $1 billion

On a geographic basis (the location of the selling organization), U.S. customer revenues rose 29.7 percent in 1981 to $1.047 billion, or 40.7 percent of consolidated revenues. This compared with $807 million, or 39.3 percent, in 1980, and $739.6 million, or 38.9 percent, in 1979.

Canadian revenues grew 23.1 percent in 1981, to $1.335 billion, or 51.9 percent of consolidated revenues, compared with $1.084 billion in 1980, and $1.001 billion in 1979, or 52.7 percent in both years.

Revenues outside of North America accounted for the balance, $189.3 million, or 7.4 percent of the total in 1981; $163.6 million, or 8 percent of the total in 1980; and $160.1 million, or 8.4 percent in 1979.

While the financial statements indicate revenues by location of the selling organization (point of origin), it is also worthwhile to examine the business by the markets where the products are bought.

By destination (where the customers are located), revenues in the U.S. were $1.052 billion in 1981, 40.9 percent of consolidated revenues, up 32.6 percent from 1980; $793.7 million in 1980, or 38.6 percent of the total; and $753.1 million in 1979, 39.6 percent of the total.

Revenues in Canada were $1.248 billion in 1981, 48.5 percent of total revenues, up 22.5 percent from 1980 when they were $1.018 billion, or 49.6 percent of the total; in 1979 they were $946.2 million, or 49.8 percent of total revenues.

Revenues from customers outside North America rose 11.8 percent in 1981 to $271.2 million, 10.6 percent of consolidated revenues. In 1980 they were $242.6 million (11.8 percent of the total), and in 1979 they amounted to $201.2 million (10.6 percent).

Gross margins

Gross profit in 1981 increased to $728.5 million, compared with $504.1 million in 1980, and $596.4 million in 1979. Gross margins improved to 28.3 percent in 1981 from 24.5 percent in 1980; in 1979 they were 31.4 percent.

The increased gross profit and margin in 1981 compared with 1980 reflect mainly the impact of the higher unit volumes as well as the improving profit margin on sales of DMS switching equipment.

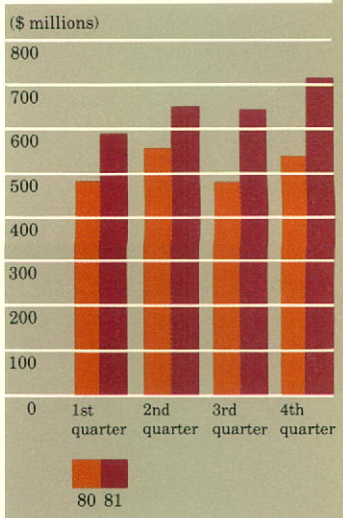
DMS switching operations achieved their first profitable quarter in the first quarter 1981 and became increasingly profitable during the year. At yearend 1981, profit margins for DMS switching were still below the margins of Northern Telecom's other principal telecommunications equipment product lines, and also lower than the profit margins of earlier types of central office telephone switching systems. Northern Telecom expects the DMS operations will continue to improve their profit margins during 1982.

In 1980, gross profit was negatively affected by the high start-up costs for DMS as well as provisions and expenses incurred by the EOS business. The EOS costs included expenses related to the closure of three plants, a provision to repurchase from third parties equipment which had previously been sold to them, and unusually high provisions for certain accounts receivable and inventories. In 1979, the gross profit percentage was higher, partially as the result of highly profitable third party lease sales, a practice which was discontinued in the second quarter 1980.

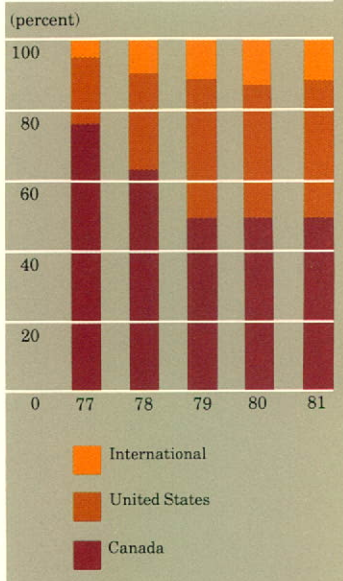
SG&A expenses

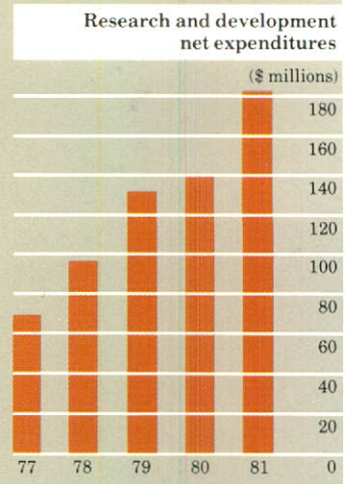
Selling, general and administrative expenses (SG&A) amounted to $359.3 million (14 percent of revenues) in 1981, compared with

Quarterly revenues



Total revenues by customer location





$341.5 million (16.6 percent of revenues) in 1980, and $280 million (14.7 percent of revenues) in 1979.

The lower 1981 percentage of SG&A to revenues reflects a higher level of revenues and improved control over SG&A expenses, particularly in the EOS business. The 1980 percentage reflects, in part, certain restructuring and related costs incurred by the EOS business.

R&D investment up 28.9 percent

Net research and development expenses were increased by 28.9 percent in 1981 to $181.6 million, compared with $140.9 million in 1980, and $132.6 million in 1979. The level of spending was consistent with the corporation's objective to invest annually about seven percent of revenues in R&D. Net R&D expenses in 1981 were 7.1 percent of consolidated revenues, compared with 6.9 percent in 1980, and seven percent in 1979.

Major areas of 1982 development work will include enhanced capabilities for the corporation's DMS and SL family product lines, Displayphone and other new integrated voice and data systems, electronic office systems, optical systems, and new transmission products.

Operating earnings recover

The profitability of the corporation's DMS switching systems, substantially reduced losses in electronic office systems, and solid performance of other product lines, resulted in a recovery of the corporation's operating profits and margins from the depressed 1980 levels. Operating earnings in 1981 were $187.6 million, or 7.3 percent of total revenues, compared with $21.7 million, or 1.1 percent of revenues in 1980; operating earnings in 1979 were $183.8 million, or 9.7 percent of revenues.

Segment operating earnings

Segment operating earnings (see note 18 on page 44) in the telecommunications equipment business in 1981 were $301.8 million, compared with $187.4 million in 1980, and $234.5 million in 1979. Electronic office systems recorded an operating loss of $15.7 million, compared with a loss of $86.7 million in 1980; operating earnings in 1979 were $26 million.

Operating earnings for these business segments do not include general corporate expenses. These corporate expenses rose in 1981 to $100.6 million from $82.5 million in 1980, and $78.4 million in 1979. Higher salary and benefits costs were the principal reasons for the increase.

On a geographic basis (location of selling organization), Canadian operating earnings, mainly derived from sales of telecommunications equipment, were $325 million in 1981, compared with $253.5 million in 1980, and $239.4 million in 1979. U.S. operations, affected by the continuing losses in electronic office systems and a higher proportion of DMS revenues, which were not as profitable as other product lines, recorded operating earnings of $114.6 million, compared with an operating loss in 1980 of $37.1 million and an operating profit in 1979 of $131.9 million. Operating earnings on a geographic basis do not include general corporate or R&D expenses.

Higher interest costs offset by investment income

Increased average borrowings and historically high interest rate levels resulted in interest expense of $64.2 million in 1981, compared with $44.9 million in 1980 and $38.2 million in 1979.

The increased interest expense in 1981 from 1980 was largely offset by the interest income on short-term investments which were held for most of 1981.

Total long-term debt outstanding at yearend 1981 was $26.3 million lower than at the prior yearend, as were notes payable, which declined by $73 million in the same period. It is anticipated that net interest expense in 1982 will be below that of 1981 because of an expected lower average level of borrowings and less dependence on floating rate debt.

Income taxes

The 1981 provision for income taxes was $35.8 million, or 22.9 percent of pre-tax earnings, compared with $7.5 million in 1980, and $35.5 million in 1979. The low 1981 tax rate, compared with the Canadian statutory tax rate of 50.5 percent, reflects the difference between Canadian statutory rates and those applicable to the profits of non-North American operations, as well as certain Canadian income tax incentives.

In 1980, the tax provision reflected the effect of not tax-affecting a part of the losses of foreign subsidiaries, partially offset by the difference between Canadian statutory rates and those applicable to the profits of non-North American operations.

At yearend 1981, foreign subsidiaries had tax loss carryforwards for accounting purposes of $160.2 million on which tax effects have not been recognized in the accounts and are available to reduce taxable income in future years.

Extraordinary items

An extraordinary gain of $16 million, or $0.46 per share, was recorded in the first quarter 1981, on the sale of Northern Telecom's investment in the shares of Intersil, Inc.

In the fourth quarter 1980, the corporation recorded an extraordinary loss of $163.8 million comprising a writeoff of $106.4 million of unamortized goodwill and technology investments and $57.4 million of after-tax expense provisions for the discontinuance of certain operations of the electronic office systems business.

None of these items would be reported as an extraordinary item under U.S. generally accepted accounting principles.

Net earnings and return on equity

Before the extraordinary gain, net earnings for 1981 were $120.7 million, or $3.49 per share. Net earnings, including the extraordinary gain, were a record $136.7 million, or $3.95 per share in 1981. In 1980, including extraordinary items, Northern Telecom reported a net loss of $185.2 million, or $5.48 per share, compared with net earnings of $113.5 million, or $3.70 per share in 1979. The return on average equity in 1981 of 17.2 percent compared with a negative return in 1980 and 15.5 percent in 1979.

Liquidity and capital resources

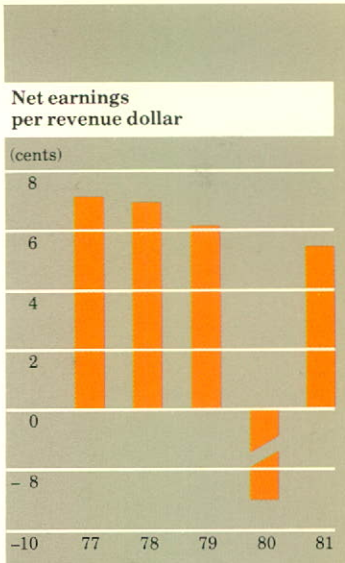
The 1981 improvement in Northern Telecom's earnings contributed to the financial strength of the corporation. The need for capital in 1982 will be met primarily from internally generated cash. However, the corporation intends to take advantage of any opportunities it may identify to obtain financing to refund existing liabilities or fund anticipated future requirements.

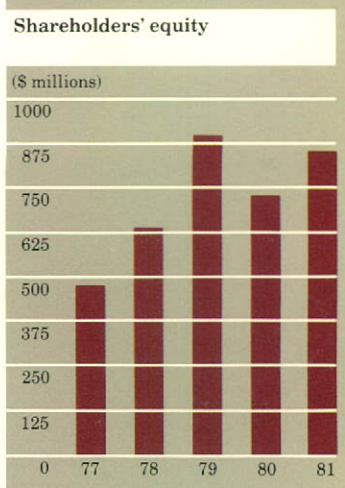
Working capital provided by operations, excluding extraordinary items, rose in 1981 to $169 million from $48.7 million in 1980; in 1979 it was $206.4 million.

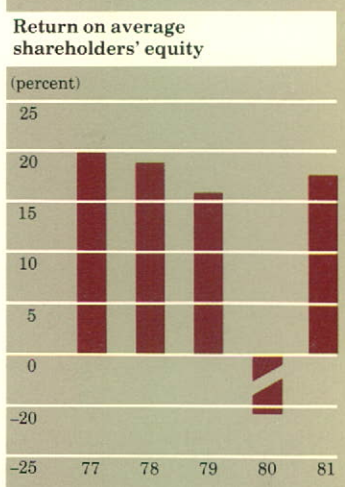
Working capital increased by $48.8 million in 1981 to $501.5 million at yearend compared with the decrease of $104.2 million in 1980 to $452.7 million at yearend 1980; it was $556.9 million at the end of 1979. The current ratio was 1.75:1 at yearend 1981; 1.76:1 at yearend 1980, and 2.32:1 at the end of 1979.

Total long-term debt, including $14.9 million of Scientific Research Investment Contracts (SRICs) amounted to $318 million at yearend 1981, compared with $329.4 million at yearend 1980 and $199.8 million at yearend 1979. In 1981, notes payable declined by $73 million to $59.4 million, compared with the $31.8 million increase in 1980. Total debt as a percentage of total capitalization was 28.6 percent at the end of 1981, 35.8 percent at yearend 1980, and 22.8 percent at yearend 1979 (Total capitalization comprises notes payable, SRICs, total long-term debt, deferred income taxes payable, minority interest, and shareholders' equity).

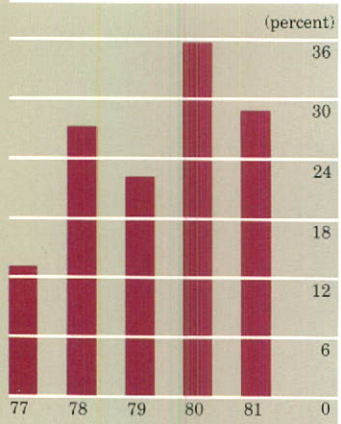
Funds received in 1981 included a $59.7 million special dividend in January from one of Northern Telecom's non-consolidated finance



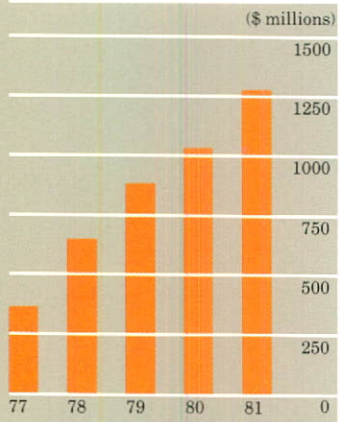




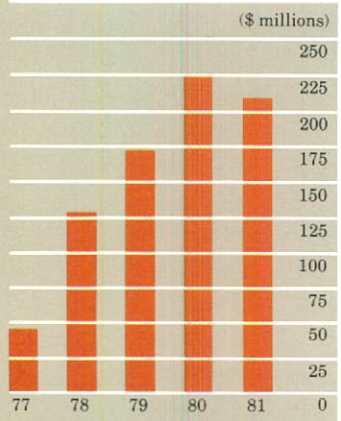
Total debt as a percentage of total capitalization



Order backlog



Capital expenditures



subsidiaries, and $34.9 million after-tax proceeds in February resulting from the sale of the Intersil shares.

In June 1981, a subsidiary of Northern Telecom acquired two companies. The companies, which became non-consolidated finance subsidiaries, then refinanced the majority of the leasebase of electronic office systems equipment which had been acquired by third parties prior to the second quarter of 1980. The transaction was effected by these subsidiaries incurring a $98.6 million obligation to a U.S. bank. On December 31, 1981, these finance subsidiaries transferred to their parent substantially all their assets, including the remaining net book value of $32.8 million of the leasebase, and liabilities, including the remaining $23.7 million balance of the obligation to the bank. These amounts were reported in the respective captions of the corporation's yearend consolidated balance sheet.

In July 1981, Northern Telecom's R&D subsidiary, Bell-Northern Research, received $20 million from investors under the terms of Scientific Research Investment Contracts to fund a portion of the 1981 R&D program. In January 1982, similar arrangements were completed to fund $70 million of 1982 expenditures (see note 13 on page 42).

Through the corporation's Shareholder Dividend Reinvestment and Stock Purchase Plan, introduced at the beginning of 1980, $20 million of dividends and additional cash were invested in 1981 in newly issued common shares of Northern Telecom; $29.6 million was raised by this means in 1980. Those amounts included $19 million and $18.5 million in 1981 and 1980, respectively, of shares purchased by Bell Canada, the corporation's majority shareholder. An investment plan for employees, introduced in October 1981, raised $3.1 million through the issue of the corporation's common shares.

In December 1981, Northern Telecom sold privately in the United States US$50 million ($59.3 million) of 12¼ percent subordinated convertible notes due December 1, 1993. These notes are convertible after December 17, 1986 into common shares of the corporation at a conversion price of US$61.50 per share.

Other significant financings since 1978 included a public offering of two million common shares in September 1979 in the U.S. and Canada, and the coincident issue of two million shares to Bell Canada; these raised $198 million.

In September 1980, US$75 million ($89.5 million) of 12¼ percent 10-year notes were sold publicly in the U.S. A floating rate note sold to a U.S. financial institution in December 1980 raised US$25 million ($29.8 million).

On September 30, 1981, holders of the corporation's sinking fund debentures agreed to amend the related Trust Agreement to eliminate certain restrictions and achieve uniformity of covenants with other loan agreements.

Capital expenditures, including additions to the leasebase, amounted to $209.6 million in 1981, $225.6 million in 1980, and $173.5 million in 1979. The corporation expects to increase its capital spending in 1982 to about $255 million.

Order backlog

The order backlog at December 31, 1981 was $1.256 billion, 25.1 percent higher than the $1.004 billion of orders on hand at the end of 1980; the backlog at the end of 1979 was $874 million. The 1981 backlog was substantially all for telecommunications equipment.

Historically, orders for central office switches account for the largest portion of the corporation's order backlog due to the time required between order receipt and production and delivery of these large systems. This, and the continuing good demand for Northern Telecom's DMS family of digital switches, explains why 39.5 percent of the orders on hand at yearend 1981 were for digital switches.

Stock hits new high

Northern Telecom's shares are listed on the Montreal, Toronto, Vancouver, and New York stock exchanges. The following table shows the high and low sale prices of the shares on the Montreal and Toronto exchanges (taken together), and on the New York Stock Exchange as reported on the composite tape in the United States, which includes trading on the New York Stock Exchange. In November 1981, Northern Telecom's shares traded at 60¼, the highest level reached since the corporation first publicly issued shares in 1973.

	Montreal and Toronto (C$)		United States composite tape (US$)	
	High	Low	High	Low
1980				
First Quarter	55½	37¼	48	31⅛
Second Quarter	41½	38⅜	36	32⅝
Third Quarter	45½	36½	38½	32
Fourth Quarter	41½	29¾	35¾	25⅛
1981				
First Quarter	40¾	32½	34⅜	27
Second Quarter	54½	38½	45¾	32½
Third Quarter	52	41	42⅛	34⅜
Fourth Quarter	60¼	47	51⅛	39⅛

At February 5, 1982 Bell Canada owned 55.1 percent of Northern Telecom's shares. The remaining 44.9 percent of the shares were owned by about 11,186 other shareholders.

Dividends

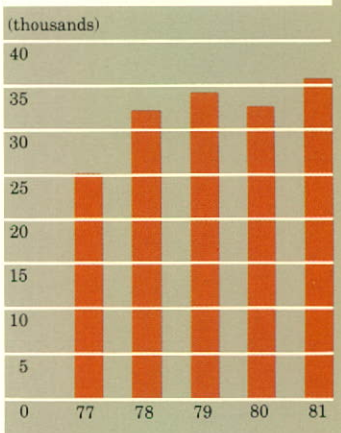
In 1981 and 1980, Northern Telecom paid a cash dividend each quarter of $0.25 per share, for a total of $1.00 per share each year. The total amounts paid out as dividends in 1981 and 1980 were $34.7 million and $33.8 million, respectively. The corporation's dividends are declared in Canadian funds, however, shareholders may choose to receive payment in U.S. funds (based on a conversion rate) or to reinvest the funds under the Shareholder Dividend Reinvestment and Stock Purchase Plan.

Northern Telecom intends to continue paying quarterly dividends. The level of future payments will be determined by the Board of Directors based on such considerations as the level of earnings from operations, capital requirements, and the financial condition of the corporation.

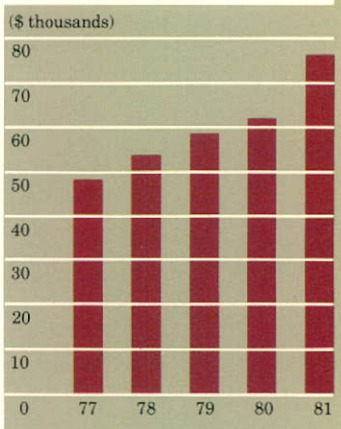
Existing legislation and budget measures announced in November 1981 by the Government of Canada, establish the withholding tax on dividends paid or credited on Northern Telecom shares at 25 percent (unless reduced by treaty). Under the present United States-Canada Tax Treaty, the rate of withholding tax on Northern Telecom dividends paid or credited to individuals residing in, or corporations organized under the laws of the United States, and not having a "permanent establishment" in Canada, is 15 percent.

The present United States-Canada Tax Treaty also states that gains derived in Canada from the sale or exchange of Northern Telecom shares by a resident or corporation of the United States are exempt from taxation in Canada provided that the resident or corporation has no "permanent establishment" in Canada.

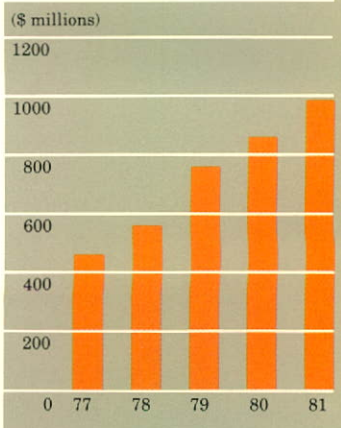
Number of employees



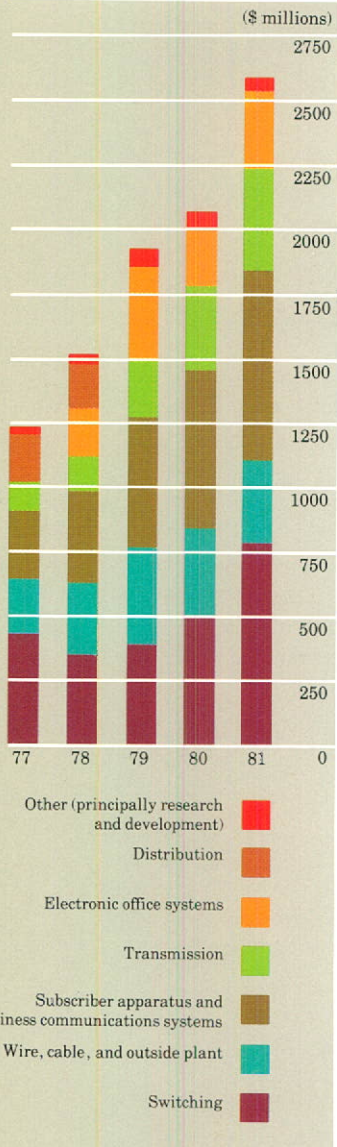
Revenues per employee



Total compensation



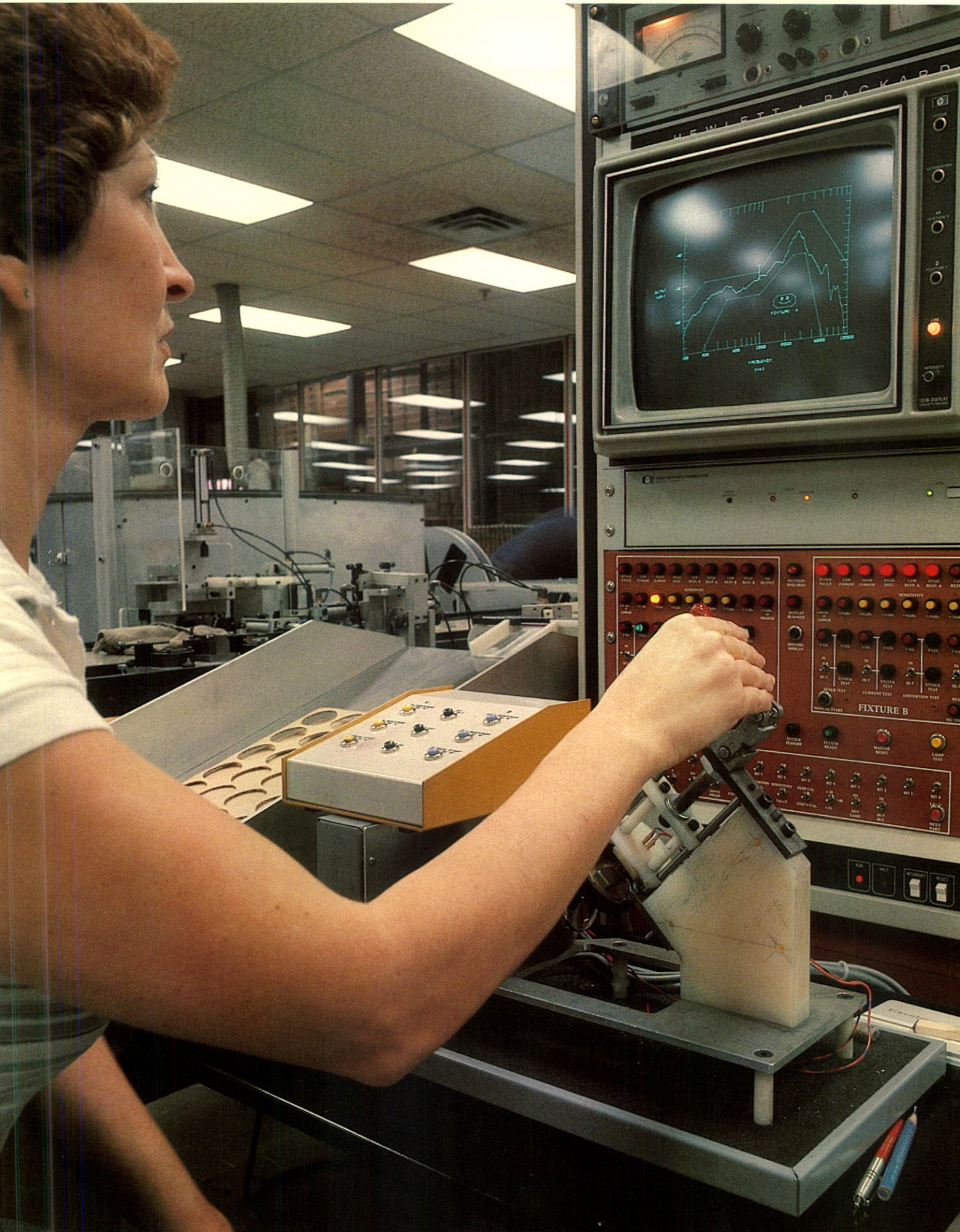
Revenues by principal products and services



(millions of dollars)	1981	1980	1979	1978	1977
Business segments and principal product lines					
Revenues					
Telecommunications equipment					
Central office switching	**$ 776.0**	$ 505.1	$ 386.0	$ 338.9	$ 412.6
Subscriber apparatus and business communications systems	**739.9**	618.6	524.7	374.3	275.3
Wire, cable, and outside plant	**323.6**	349.9	366.7	276.6	215.1
Transmission	**409.0**	277.6	227.3	141.3	114.5
	2,248.5	1,751.2	1,504.7	1,131.1	1,017.5
Electronic office systems	**274.2**	259.0	349.8	171.5	—
Electrical and electronic products distribution*	**—**	—	—	162.9	173.7
Other (principally research and development)	**48.2**	44.4	46.0	39.1	30.7
Total	**$2,570.9**	$2,054.6	$1,900.5	$1,504.6	$1,221.9
Operating Earnings					
Telecommunications equipment	**$ 301.8**	$ 187.4	$ 234.5	$ 180.9	$ 184.6
Electronic office systems	**(15.7)**	(86.7)	26.0	30.0	—
Electrical and electronic products distribution	**—**	—	—	8.9	8.0
Other	**2.1**	3.5	1.7	—	—
Total	**$ 288.2**	$ 104.2	$ 262.2	$ 219.8	$ 192.6

*Business discontinued effective December 31, 1978.

An electronic transmitter undergoes final testing in the London, Ontario station apparatus plant before installation in Northern Telecom's ePhone electronic telephones.


FIXTURE B

Consolidated statement of operations

Year ended December 31 (millions of dollars except per share figures)	1981	1980	1979
Revenues (note 18)	$2,570.9	$2,054.6	$1,900.5
Cost of revenues	1,842.4	1,550.5	1,304.1
Gross profit	728.5	504.1	596.4
Selling, research and development, and general and administrative expenses (note 3)	540.9	482.4	412.6
Operating earnings	187.6	21.7	183.8
Investment and other income (net) (note 4)	31.1	10.5	3.8
Interest charges – long-term debt	(41.1)	(20.2)	(26.4)
– other	(23.1)	(24.7)	(11.8)
Foreign currency gains (losses)	2.0	(1.2)	(.4)
Earnings (loss) before income taxes and extraordinary items	156.5	(13.9)	149.0
Provision for income taxes (note 5)	(35.8)	(7.5)	(35.5)
Earnings (loss) before extraordinary items	120.7	(21.4)	113.5
Extraordinary items (notes 2 and 6)	16.0	(163.8)	—
Net earnings (loss) (note 2)	$ 136.7	$ (185.2)	$ 113.5
Earnings (loss) per share* (note 2)			
– before extraordinary items	$3.49	$(0.63)	$3.70
– after extraordinary items	$3.95	$(5.48)	$3.70
Dividends declared per common share	$1.00	$ 1.00	$0.85
*Based on weighted average number of common shares outstanding (thousands)	34,629	33,795	30,656

The important differences between Canadian and United States generally accepted accounting principles affecting the Consolidated statement of operations are described and reconciled in note 2 of Notes to consolidated financial statements.

Northern Telecom Limited

Consolidated statement of retained earnings

Year ended December 31 (millions of dollars)	1981	1980	1979
Balance at beginning of year	**$254.7**	$473.7	$389.0
Add: Net earnings (loss)	**136.7**	(185.2)	113.5
	391.4	288.5	502.5
Deduct: Dividends paid	**34.7**	33.8	26.2
Expenses of issue of capital stock, less applicable income taxes of $2.0	**—**	—	2.6
	34.7	33.8	28.8
Balance at end of year	**$356.7**	$254.7	$473.7

Consolidated balance sheet

As at December 31 (millions of dollars)	1981	1980
Assets		
Current		
Cash and short-term investments at cost (approximates market value)	$ 26.1	$ 13.4
Accounts receivable		
Affiliated companies	70.0	63.3
Trade (less provision for uncollectibles $8.3 for 1981 and $12.5 for 1980)	436.2	355.3
Inventories (note 7)	614.9	548.7
Prepaid expenses	10.7	11.3
Tax benefit of loss carryforward	—	32.6
Deferred income taxes	12.0	25.2
	1,169.9	1,049.8
Long-term receivables (note 8)	29.0	33.1
Investments		
Non-consolidated finance subsidiaries (note 9)	353.0	347.9
Associated companies and other	6.5	23.9
	359.5	371.8
Plant and equipment – net (note 10)	559.8	497.9
Goodwill and other assets (notes 1 and 11)	29.1	33.0
Total assets	$2,147.3	$1,985.6

On behalf of the Board of Directors

J. Douglas Gibson, O.B.E.
Director

Charles Perrault
Director

	1981	1980
Liabilities		
Current		
Notes payable	$ 59.4	$ 132.4
Accounts payable and accrued liabilities		
Affiliated companies	.9	.6
Employees' payroll	15.4	19.1
Vacation pay accrued	26.7	22.3
Interest accrued	12.5	7.3
Trade and other	424.6	384.0
Taxes payable	41.2	4.6
Due to non-consolidated finance subsidiaries (note 9)	30.6	19.1
Long-term debt instalments due within one year (note 14)	57.1	7.7
	668.4	597.1
Deferred income	4.7	3.2
Due to non-consolidated finance subsidiaries (note 9)	276.3	236.8
Scientific research investment contracts (note 13)	12.1	—
Long-term debt (note 14)	246.0	321.7
Deferred income taxes	74.1	86.5
Minority interest in subsidiary companies		
Stated capital	11.3	11.6
Retained earnings	1.0	.4
	1,293.9	1,257.3
Shareholders' equity		
Stated capital		
34,947,544 common shares outstanding in 1981 and 34,432,788 in 1980 (note 15)	496.7	473.6
Retained earnings	356.7	254.7
	853.4	728.3
Commitments and contingencies (note 17)		
Total liabilities and shareholders' equity	$2,147.3	$1,985.6

The integrity and objectivity of the financial statements and accompanying notes in the annual report are the responsibility of management.

To fulfill this responsibility, Northern Telecom Limited maintains internal control systems to provide reasonable assurance that the books and records, from which the financial statements are derived, accurately reflect all transactions and that established policies and procedures are followed. The internal control systems are supported by regular reviews by internal auditors and by examination of the financial statements by Touche Ross & Co., independent chartered accountants.

The Audit Committee of the Board of Directors meets regularly with the independent chartered accountants and with representatives of management and the internal auditors to approve the scope of audit work and to assess reports on audit work performed. The independent auditors have full access to the Audit Committee, with and without management present. The Audit Committee reviews quarterly and annual financial statements and presents minutes of its meetings to the full Board of Directors for approval.

Consolidated statement of changes in financial position

Year ended December 31 (millions of dollars)	1981	1980	1979
Cash and short-term investments were provided by (used in)			
Operations	**$ 90.4**	$ 41.0	$ (50.1)
Investment	**(132.9)**	(210.0)	(136.6)
Financing	**55.2**	175.6	176.2
Increase (decrease) in cash and short-term investments	**12.7**	6.6	(10.5)
Cash and short-term investments at beginning of year	**13.4**	6.8	17.3
Cash and short-term investments at end of year	**$ 26.1**	$ 13.4	$ 6.8
Funds provided by operations			
Earnings (loss) before extraordinary items	**$ 120.7**	$ (21.4)	$ 113.5
Items not requiring funds			
Depreciation and amortization	**119.8**	119.6	95.8
Equity earnings in non-consolidated finance subsidiaries	**(56.7)**	(58.2)	(21.5)
Deferred income taxes	**(12.4)**	8.4	17.6
Other	**(2.4)**	0.3	1.0
Working capital provided by operations	**169.0**	48.7	206.4
Extraordinary item	**—**	(57.4)	—
Net (increase) decrease in operating working capital	**(43.9)**	83.5	(230.3)
Dividends	**(34.7)**	(33.8)	(26.2)
Cash and short-term investments provided by (used in) operations	**$ 90.4**	$ 41.0	$ (50.1)
Funds invested			
Expenditures for plant and equipment	**$ 209.6**	$ 225.6	$ 173.5
Disposals of plant and equipment	**(28.2)**	(34.8)	(33.7)
Extraordinary item	**(54.8)**	—	—
Other	**6.3**	19.2	(3.2)
Net investment of cash and short-term investments	**$ 132.9**	$ 210.0	$ 136.6

	1981	1980	1979
Financing			
Decrease in long-term receivables	**$ 4.1**	$ 8.2	$ 3.6
Increase (decrease)			
– notes payable	**(73.0)**	31.8	37.0
– due to non-consolidated finance subsidiaries	**51.0**	(13.0)	161.5
Proceeds from scientific research investment contracts	**20.0**	—	—
Proceeds from long-term debt	**83.0**	224.8	330.3
Repayment of long-term debt	**(105.8)**	(95.2)	(330.4)
Capital contribution by minority shareholders	**—**	—	10.3
Net proceeds from issue of capital stock	**23.1**	29.6	197.7
Investment in non-consolidated finance subsidiaries	**(6.9)**	(10.6)	(233.8)
Dividend from non-consolidated finance subsidiary	**59.7**	—	—
Cash and short-term investments provided by financing activities	**$ 55.2**	$ 175.6	$ 176.2
Net (increase) decrease in operating working capital is provided by			
(Increase) decrease in			
Accounts receivable	**$ (87.6)**	$ 5.9	$(111.4)
Inventories	**(66.2)**	(56.2)	(131.1)
Prepaid expenses	**.6**	5.0	(8.2)
Tax benefit of loss carryforward	**12.7**	(32.6)	—
Deferred income taxes	**13.2**	12.7	(8.5)
Increase (decrease) in			
Accounts payable and accrued liabilities	**46.8**	166.3	15.3
Taxes payable	**36.6**	(17.6)	13.6
	$ (43.9)	$ 83.5	$(230.3)

Consolidated ten-year review

(millions of dollars)	1981	1980	1979
Earnings and related data* **			
Revenues	**$2,570.9**	$2,054.6	$1,900.5
Depreciation on plant and equipment	**117.7**	112.7	88.4
Research and development expense	**181.6**	140.9	132.6
Interest charges	**64.2**	44.9	38.2
Provision for income taxes*	**55.7**	4.3	35.5
Net earnings (loss)	**136.7**	(185.2)	113.5
Earnings (loss) per revenue dollar (cents)	**5.3**	(9.0)	6.0
Earnings (loss) per share (dollars)			
– before extraordinary items	**3.49**	(0.63)	3.70
– after extraordinary items	**3.95**	(5.48)	3.70
Dividends per share (dollars)	**1.00**	1.00	0.85
Financial position at December 31			
Working capital	**501.5**	452.7	556.9
Plant and equipment (at cost)	**973.1**	835.9	692.7
Accumulated depreciation	**413.3**	338.0	271.7
Total assets	**2,147.3**	1,985.6	1,884.5
Long-term debt**	**246.0**	321.7	192.0
Shareholders' equity	**853.4**	728.3	917.6
Capital expenditures	**209.6**	225.6	173.5
Compensation			
Payroll	**847.7**	730.2	651.8
Benefits	**144.2**	131.5	108.1
Total	**$ 991.9**	$ 861.7	$ 759.9
Employees at December 31	**35,444+**	31,915+	33,301+

\+ Excludes NETAS – Northern Electric Telekomünikasyon A.S. – employees.

* Includes income tax effects of extraordinary items.

** Excludes long-term debt of non-consolidated finance subsidiaries incorporated in 1978 and 1979.

*** If the disposals of segments and the extraordinary items had been classified in accordance with United States generally accepted accounting principles, results from continuing operations would have been as follows:

	1981	1980	1979	1978	1977	1976	1975	1974	1973	1972
Revenues	**$2,570.9**	$2,054.6	$1,900.5	$1,365.9	$1,074.3	$925.6	$832.7	$772.4	$487.8	$455.6
Net earnings (loss)	**136.7**	(185.2)	113.5	102.5	83.4	73.5	67.4	56.9	35.4	21.8
Earnings (loss) per share (dollars) (after extra-ordinary items)	**3.95**	(5.48)	3.70	3.61	3.15	2.77	2.55	2.17	1.49	0.93

1978	1977	1976	1975	1974	1973	1972
$1,504.6	$1,221.9	$1,083.5	$ 996.8	$ 957.7	$ 608.1	$ 531.3
52.5	30.9	24.1	23.3	25.4	16.2	12.8
97.8	68.2	61.4	49.0	44.0	32.7	28.0
17.1	6.6	6.8	8.3	7.7	6.5	5.6
36.7	44.9	48.0	44.7	49.6	30.5	21.0
100.7	85.3	77.1	67.5	53.8	32.0	20.1
6.7	7.0	7.1	6.8	5.6	5.3	3.8
3.33	3.09	2.79	2.65	2.05	1.35	0.86
3.55	3.22	2.91	2.55	2.05	1.35	0.85
0.74	0.66	0.61	0.60	0.525	0.50	0.50
367.3	337.1	307.6	284.9	281.4	209.7	175.3
602.1	388.8	360.1	287.2	273.4	257.3	233.8
231.5	203.1	189.2	164.2	156.6	141.3	127.6
1,344.2	760.1	674.8	570.4	555.2	494.3	370.4
189.8	52.4	58.3	67.8	104.5	69.6	73.5
632.6	468.6	400.8	339.9	285.2	245.0	192.1
127.2	44.7	38.2	31.7	33.2	26.3	19.1
482.9	395.3	347.2	325.0	301.2	214.1	192.2
93.3	75.0	58.0	45.0	41.2	35.1	30.0
$ 576.2	$ 470.3	$ 405.2	$ 370.0	$ 342.4	$ 249.2	$ 222.2
31,756+	24,962	25,277	23,751	26,147	25,073	20,787

Notes to consolidated financial statements

(millions of dollars, except per share figures)

1. Accounting policies

The accompanying financial statements have been prepared in accordance with Canadian generally accepted accounting principles and conform in all material respects with International Accounting Standards. On the consolidated statement of changes in financial position, the amounts reported for 1980 and 1979 were reclassified to conform with the presentation adopted in 1981. With respect to the consolidated financial statements of Northern Telecom Limited and its subsidiary companies, the important differences between Canadian and United States generally accepted accounting principles are described and reconciled in note 2.

a) Principles of consolidation

The consolidated financial statements include the accounts of the corporation and all subsidiary companies except the finance subsidiary companies, which are accounted for on the equity basis. When stock ownership with control of subsidiary companies is acquired, the operations of these companies are included in the consolidated financial statements from the date of acquisition of control.

The finance subsidiaries are not consolidated as their business is fundamentally different from that of the consolidated group. In the consolidated statement of operations, the earnings from operations of the finance subsidiaries reduce long-term interest charges and foreign currency gains or losses and income taxes are included in the respective captions.

b) Translation of foreign currencies

Current assets (excluding inventories and prepaid expenses), current liabilities and long-term monetary assets and liabilities are translated at the rates in effect at the balance sheet date, whereas other assets (including inventories and prepaid expenses) and other liabilities are translated at rates prevailing at the respective transaction dates. Revenues and expenses are translated at average rates prevailing during the year except for cost of inventory used, depreciation and amortization which are translated at exchange rates prevailing when the related assets were manufactured or acquired. Currency gains and losses are reflected in net earnings of the year, except for unrealized currency gains and losses on long-term monetary assets and liabilities which are amortized over the remaining lives of the related items.

c) Rental revenue

For operating leases, rental revenue is recognized when billed to customers. For leases which qualify as sales-type leases, the present value of future rental payments is recorded as sales revenue at the inception of the lease.

d) Depreciation

Depreciation is calculated generally on the straight-line method using rates based on the expected useful lives of the respective assets as follows:

Buildings 20 to 40 years; machinery and equipment 3 to 16 years; and equipment for lease to customers four years.

e) Research and development

Research and development expenditures are charged to earnings in the years in which they are incurred, except for expenditures incurred pursuant to specific contracts with third parties for the

manufacture of telecommunications equipment, which are charged to earnings in the same period as the related revenue is recognized.

f) Income taxes

The corporation and its subsidiary companies follow the practice of providing for income taxes based on taxable income included in the financial statements regardless of when such income is subject to payment of taxes under the tax laws.

g) Inventories

Inventories are valued at the lower of cost (calculated generally on a first-in, first-out basis) and net realizable value. The cost of finished goods and work-in-process inventories is comprised of material, labor and manufacturing overhead.

h) Goodwill

Goodwill represents the unamortized excess of the acquisition costs over the net assets of subsidiary companies and is amortized over periods not exceeding 40 years.

2. Differences between Canadian and United States generally accepted accounting principles

The important differences between Canadian and United States generally accepted accounting principles consist of:

a) Translation of foreign currencies

If the financial statements had been prepared as required in the United States by the Financial Accounting Standards Board's Statement No. 8, earnings before extraordinary items as reported would have increased (decreased) as follows:

	1981	1980	1979
Earnings before extraordinary items	**$ (0.6)**	$ (0.1)	$ 2.8
Earnings per share before extraordinary items	**$(0.02)**	$ —	$0.09

b) Extraordinary items

1981

The extraordinary gain of $16 ($0.46 per share) as described in note 6, does not meet the criteria of an extraordinary item under United States practice; consequently that amount would have increased earnings before extraordinary item for that year. Net earnings are identical under both Canadian and United States reporting practices.

1980

The extraordinary loss of $163.8 ($4.85 per share) reported in 1980, as described in note 6, does not meet the criteria of an extraordinary item under United States practice; consequently that amount would be deducted to determine earnings before extraordinary item for that year. Net earnings are identical under both Canadian and United States reporting practices.

If the above items were reported in accordance with United States generally accepted accounting principles, the results of operations would have been as follows:

	1981	1980	1979
Earnings (loss) before extraordinary items	**$136.1**	$(185.3)	$116.3
Net earnings (loss)	**$136.1**	$(185.3)	$116.3
Earnings (loss) per share			
– before extraordinary items	**$ 3.93**	$ (5.48)	$ 3.79
– net earnings (loss)	**$ 3.93**	$ (5.48)	$ 3.79

3. Research and development

Research and development expenditures for the years ended December 31, 1981, 1980, and 1979 amounted to $238.7, $193.2, and $178.5, respectively. These expenditures included the costs of research and development charged to customers of Bell-Northern Research Ltd. and its subsidiaries, principally to Bell Canada, and costs expended pursuant to specific contracts for the manufacture of telecommunications equipment which are accounted for as contract costs. The net expense of research and development to the corporation in the years 1981 through 1979 inclusive was $181.6, $140.9, and $132.6.

4. Investment and other income (net)

Investment and other income (net) includes equity in the net earnings of associated companies of $1.4, $3.5, and $2.4 for the years ended December 31, 1981, 1980, and 1979, respectively.

5. Provision for income taxes

A reconciliation showing income taxes calculated at the Canadian statutory rate to the provision for income taxes is as follows:

	1981	1980	1979
Income taxes at Canadian statutory rate including provincial income taxes	**$ 79.0**	$ (7.1)	$ 72.8
(i) Reduction of Canadian taxes applicable to:			
Manufacturing profits	**(1.4)**	(2.7)	(6.9)
Research and development incentives	**(13.6)**	(17.6)	(13.2)
Inventory credit	**(3.7)**	(3.6)	(2.9)
(ii) Non-taxable portion of unrealized currency gains	**(2.2)**	(.6)	—
(iii) Difference between Canadian statutory rate and rates applicable to foreign subsidiaries	**(35.8)**	(31.6)	(15.9)
(iv) Effect of losses of foreign subsidiaries not recognized	**11.0**	65.8	—
(v) Other	**2.5**	4.9	1.6
	$ 35.8	$ 7.5	$ 35.5

Details of the provision for income taxes are as follows:

	1981	1980	1979
Current	**$ 35.7**	$ 31.9	$ 31.9
Deferred	**(12.6)**	8.2	3.6
Tax effect of operating loss	**12.7**	(32.6)	—
Total provision for income taxes	**$ 35.8**	$ 7.5	$ 35.5
Canadian	**$ 16.8**	$ 24.4	$ 32.3
Foreign	**19.0**	(16.9)	3.2
Total provision for income taxes	**$ 35.8**	$ 7.5	$ 35.5

Earnings (loss) before income taxes and extraordinary items are as follows:

	1981	1980	1979
Canadian	**$ 53.9**	$ 81.8	$105.8
Foreign	**102.6**	(95.7)	43.2
Total	**$156.5**	$ (13.9)	$149.0

Deferred income taxes result principally from deductions for tax purposes in respect of plant and equipment being in excess of amounts currently charged to operations.

At December 31, 1981 foreign subsidiaries had tax loss carryforwards for accounting purposes of $160.2, on which tax effects have not been recognized in the accounts and are available to reduce taxable income in future years. Of the total, $1.2 will expire if not used in 1982, $5.1 will expire between 1983 and 1987, $138.8 will expire in 1995, $11.5 will expire in 1996, while $3.6 can be carried forward indefinitely.

6. Extraordinary items

		($ per share)
1981		
Gain on sale of shares of Intersil, Inc. less income taxes of $19.9	$16.0	$0.46
1980		
Writeoffs in the fourth quarter of:		
– Unamortized goodwill and technology due to unsatisfactory operating performance of the electronic office systems business, and $8.5 relating to Danray, Inc. technology	$(106.4)	$(3.15)
– Costs relating to the discontinuance of certain elements of the electronic office systems business (less applicable income taxes of $3.2)	(57.4)	(1.70)
	$(163.8)	$(4.85)

7. Inventories

At December 31, inventories consisted of the following:

	1981	1980
Raw materials	**$138.8**	$174.8
Work-in-process	**253.6**	191.2
Finished goods	**222.5**	182.7
	$614.9	$548.7

8. Long-term receivables and lease commitments (corporation as lessor)

At December 31, 1981 amounts due to the corporation and consolidated subsidiaries under non-cancellable leases and instalment receivables were as follows:

	Operating leases	Sales-type leases and instalment receivables
1982	$29.9	$ 21.9
1983	7.6	18.3
1984	2.1	9.3
1985	.3	3.0
1986	—	.8
Thereafter	—	1.2
	$39.9	54.5
Less: unearned income		(7.2)
current portion		(18.3)
		$ 29.0

Certain of the rights to receive revenue under operating and sales-type leases have been sold to finance subsidiaries and are not included above (see note 9).

9. Investments in non-consolidated finance subsidiaries

Finance subsidiaries purchase from other subsidiaries of the corporation rights to receive rental revenues and other income and conduct certain other financial activities.

In June 1981, a subsidiary of the corporation acquired two additional finance subsidiaries. On December 31, 1981 these finance subsidiaries transferred substantially all their assets and liabilities to their parent company. These amounts are reported in the respective captions of the corporation's consolidated balance sheet.

The following is a summary of the combined assets and liabilities of the finance subsidiaries at December 31:

	1981	1980
Assets		
Cash and short-term investments	**$ —**	$ 59.4
Receivables	**63.6**	39.4
Rights to receive rental revenue under:		
Sales-type leases	**37.9**	27.3
Operating leases	**80.6**	58.6
Inter-group loans	**226.3**	197.3
Other	**1.5**	1.4
	$409.9	$383.4
Liabilities		
Variable rate bank loan (U.S. dollars). At December 31, 1981 the effective rate was 13⅜%	**$ 6.0**	$ 6.0
13⅜% notes payable (U.S. dollars) due April 4, 1984	**11.9**	11.9
Other liabilities	**39.0**	17.6
Shareholders' equity	**353.0**	347.9
	$409.9	$383.4

The following is a summary of the combined operations of the finance subsidiaries for the years ended December 31, 1981, 1980, and 1979.

	1981	1980	1979
Interest income			
– Northern Telecom subsidiaries (net)	**$ 68.8**	$ 49.5	$ 30.2
– other	**12.7**	15.6	2.8
Rental income	**26.6**	—	—
Interest charges	**(11.6)**	(2.2)	(5.6)
Depreciation expense – leasebase	**(21.2)**	—	—
Administrative expenses	**(5.2)**	(1.9)	(.6)
Earnings from operations	**70.1**	61.0	26.8
Foreign currency gains (losses)	**.2**	6.0	(.9)
Provision for income taxes	**(12.1)**	(8.8)	(4.4)
Net earnings	**$ 58.2**	$ 58.2	$ 21.5

Amounts due to finance subsidiaries under non-cancellable leases as at December 31, 1981 were as follows:

	Operating leases	Sales-type leases
1982	$13.9	$ 23.6
1983	2.9	12.9
1984	.7	4.4
1985	.2	1.2
1986	—	.3
	$17.7	42.4
Less: unearned income		(4.5)
		$ 37.9

10. Plant and equipment

At December 31, plant and equipment consisted of the following:

	1981	1980
Cost		
Land	**$ 22.0**	$ 16.5
Buildings	**156.8**	141.3
Machinery and equipment	**640.3**	557.9
Equipment for lease to customers	**121.3**	86.9
Property under capital leases	**32.7**	33.3
	973.1	835.9
Less:		
Accumulated depreciation and amortization		
Buildings	**42.4**	32.1
Machinery and equipment	**319.5**	269.6
Equipment for lease to customers	**41.6**	28.9
Property under capital leases	**9.8**	7.4
	413.3	338.0
	$559.8	$497.9

Using Loop Reporting Systems, manufactured in Northern Telecom's Concord, N.H. plant, telephone companies can centralize and automate their repair service operations. The system's modularity means it can be economically expanded as a company's operations increase.

11. Goodwill and other assets

At December 31, goodwill and other assets consisted of the following:

	1981	1980
Goodwill	**$23.3**	$23.9
Technology	**3.1**	5.6
Deferred charges	**2.7**	3.5
	$29.1	$33.0

Total amortization charged to operations for the years 1981 through 1979 was $2.1, $113.4, and $8.6, respectively. The $113.4 amortization included the writeoff in the fourth quarter of 1980 of $89.4 of goodwill and $17 of technology.-

12. Unused bank lines of credit

At December 31, 1981, the corporation and certain subsidiary companies had unused bank lines of credit, generally available at the prime bank rate of interest, of approximately $358.2.

13. Scientific Research Investment Contracts

During 1981, the corporation and a subsidiary concluded arrangements to fund a portion of 1981 research and development expenditures. The subsidiary received $20 in cash in exchange for an obligation to pay fixed and variable royalties based on sales of certain products during the years 1981 through 1986. The arrangements provide for the investors to treat their investment as research and development for tax purposes and thus research and development income tax incentives in respect of the expenditure are available to the investors and not to the corporation. At December 31, 1981, estimated payments under the Scientific Research Investment Contracts for the years 1982 through 1986 amount to $2.8, $3.4, $4.6, $3.9, and $.2, respectively.

In January 1982, an additional $70 was received under similar arrangements to fund a portion of 1982 research and development expenditures.

14. Long-term debt

	1981	1980
Sinking fund debentures		
6½% 1962 Series due December 15, 1982	**$ .2**	$ 4.7
7¼% Series C due April 15, 1986	**1.2**	3.7
10½% Series D due April 30, 1990	**12.6**	26.4
	14.0	34.8
7% Instalment notes (U.S. dollars)	**4.6**	9.2
Variable rate obligation to bank (U.S. dollars) bearing interest at 18.2% at December 31, 1981, due in monthly instalments, both principal and interest, of a minimum of US$2.5	**23.7**	—
Variable rate revolving bank loans of European subsidiaries (various currencies) bearing interest at an average rate of 15.7%	**26.5**	40.9
Variable rate term loan (U.S. dollars), due on December 20, 1985. At December 31, 1981 the effective rate was 16.4%	**29.6**	29.8
Variable rate bank loan (U.S. dollars). At December 31, 1981 the effective rate was 15.7%	**29.6**	95.4
12¼% notes (U.S. dollars) due on October 1, 1990	**88.9**	89.5
12¼% Subordinated convertible notes (U.S. dollars) due December 1, 1993	**59.3**	—
Obligations under capital leases	**25.7**	28.0
Other	**1.2**	1.8
	303.1	329.4
Less amount included in current liabilities	**57.1**	7.7
	$246.0	$321.7

On September 30, 1981, holders of the corporation's sinking fund debentures agreed to amend the related Trust Agreement permitting the corporation to eliminate certain restrictions and to achieve uniformity of covenants under the Trust Agreement and the United States Indenture relating to the US$75 of 12¼ percent notes due 1990. In addition, the amendments provided for increases of three-quarters of one percent in the interest rates of each of the three outstanding issues effective October 31, 1981.

On December 16, 1981, the corporation sold privately US$50 of 12¼ percent subordinated convertible notes, maturing December 1, 1993. These notes are convertible after December 17, 1986 into common shares of the corporation at a conversion price of US$61.50 per share. On or after January 1, 1982, the corporation may prepay the notes under certain circumstances, in which case the holders have the right to convert their notes.

At December 31, 1981, the amount of long-term debt payable, including net sinking fund requirements, in the years 1982 through 1986 was $57.1, $1.6, $1.3, $36.6, and $8, respectively.

15. Stated capital

The corporation has an unlimited number of authorized shares with no limit to the consideration to be received by it upon issue of such shares. At December 31, 1981, Bell Canada owned 55.1 percent of the outstanding shares of the corporation.

Outstanding shares at December 31 and consideration received were:

	1981		1980	
	Shares	**$**	Shares	$
January 1	**34,432,788**	**$473.6**	33,592,901	$444.0
Issued during the year	**514,756**	**23.1**	839,887	29.6
December 31	**34,947,544**	**$496.7**	34,432,788	$473.6

On September 25, 1979, the corporation sold 4,000,000 common shares for an aggregate consideration of $200.4. Bell Canada purchased 2,000,000 common shares and 2,000,000 common shares were sold to the public.

During the years 1981 and 1980, 459,893 and 839,887 common shares were issued under the Shareholder Dividend Reinvestment and Stock Purchase Plan which came into effect January 1980. At December 31, 1981, 1,450,220 common shares were reserved for issue under the plan.

During the year 1981, 54,863 common shares were issued under the Investment Plan for Employees – Canada which came into effect October 1981. At December 31, 1981, 595,137 common shares were reserved for issue under the plan.

At December 31, 1981, 250,000 shares were reserved for issue under the Employee Thrift/Savings Plan – U.S.A. Employees in the plan became eligible for shares beginning in January 1982.

16. Plans for employees' pensions

Northern Telecom and most of its subsidiary companies have non-contributory defined benefit plans which provide for service pensions based on length of service and rates of pay for substantially all their employees.

The policy is to fund pension costs through contributions based on various actuarial cost methods as permitted by pension regulatory bodies. Such costs are funded as accrued and reflect actuarial assumptions regarding salary projections. Pension costs charged to earnings were $52.2 for the year ended December 31, 1981 ($52.4 in 1980 and $43.8 in 1979) which included costs associated with voluntary payments for retired employees.

In compliance with the United States Financial Accounting Standards Board's Statement No. 36, the disclosure of the following information is required to exclude actuarial assumptions regarding salary projections. A comparison of accumulated plan benefits and plan net assets is provided as follows:

January 1,	**1981**	1980
Actuarial present value of accumulated plan benefits		
Vested	**$452.0**	$441.0
Non-vested	**17.0**	15.0
	$469.0	$456.0
Net assets available for benefits at market value	**$564.0**	$467.0

The weighted average assumed rate of return used in determining the actuarial present value of accumulated plan benefits was seven percent for both 1981 and 1980.

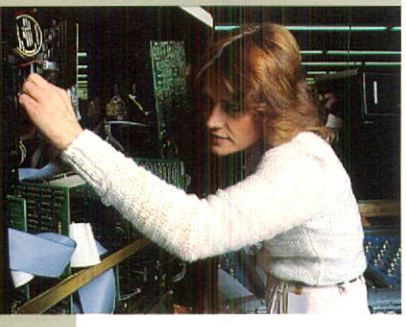
17. Leased property and commitments

At December 31, 1981 future minimum lease payments under capital and operating leases were as follows:

	Capital	Operating
Year ending December 31		
1982	$ 5.8	$16.5
1983	4.8	13.4
1984	4.8	11.5
1985	4.6	9.5
1986	4.4	8.4
Thereafter	41.5	33.6
Total commitments	$65.9	$92.9

Included in capital lease commitments were amounts representing estimated executory costs of $8.7 and interest of $31.5. Future sublease rentals related to operating leases were $5.

Rental expense on operating leases for the years 1981 through 1979 amounted to $31.1, $30, and $25.5, respectively.



Electronic office systems began producing in 1981 in its Minnetonka, Minn. plant the Model 585, its most powerful, distributed data processing system. The Model 585 is capable of handling up to 16 data display stations.

18. Information on business segments and geographic areas

Business segments

Northern Telecom operates in two major businesses: (1) telecommunications equipment which involves the design, manufacture and marketing of central office switching equipment, subscriber apparatus and business communications systems, transmission equipment, and wire, cable, and outside plant products; and (2) electronic office systems, which involves the design, manufacture and marketing of computer terminals and peripheral equipment. In addition, Northern Telecom has a research and development organization, Bell-Northern Research Ltd., which undertakes the major part of the research activities of Northern Telecom and Bell Canada including research, design, development, long-range planning and systems engineering in all phases of telecommunications and electronic office systems.

The following table sets forth information concerning the business segments for the years ended December 31, 1981, 1980, and 1979.

	1981	1980	1979
Total revenues*			
Telecommunications equipment			
Customers	**$2,248.5**	$1,751.2	$1,504.7
Intersegment	**3.4**	2.1	2.5
	2,251.9	1,753.3	1,507.2
Electronic office systems			
Customers	**274.2**	259.0	349.8
Intersegment	**2.9**	—	.3
	277.1	259.0	350.1
Other			
Customers	**48.2**	44.4	46.0
Intersegment	**149.4**	98.9	68.2
	197.6	143.3	114.2
Elimination of intersegment revenues	**(155.7)**	(101.0)	(71.0)
Total customer revenues	**$2,570.9**	$2,054.6	$1,900.5
Operating earnings (losses)			
Telecommunications equipment	**$ 301.8**	$ 187.4	$ 234.5
Electronic office systems	**(15.7)**	(86.7)	26.0
Other	**2.1**	3.5	1.7
Segment operating earnings	**288.2**	104.2	262.2
General corporate expenses	**(100.6)**	(82.5)	(78.4)
Operating earnings	**187.6**	21.7	183.8
Equity earnings			
Telecommunications equipment	**—**	.1	—
Other	**1.4**	3.4	2.4
Equity earnings	**1.4**	3.5	2.4
Other income (expense)	**(32.5)**	(39.1)	(37.2)
Earnings (loss) before income taxes and extraordinary items	**$ 156.5**	$ (13.9)	$ 149.0

	1981	1980	1979
Identifiable assets			
Telecommunications equipment	**$1,383.6**	$1,145.8	$ 983.5
Electronic office systems	**300.6**	393.1	503.8
Other	**106.5**	80.6	76.3
Adjustments and eliminations	**(73.9)**	(77.4)	(53.8)
Identifiable assets	**1,716.8**	1,542.1	1,509.8
Investments in non-consolidated subsidiaries and associated companies and other			
Telecommunications equipment	**—**	—	1.7
Not identifiable with a business segment	**359.5**	371.8	300.1
Total investment	**359.5**	371.8	301.8
Corporate assets	**71.0**	71.7	72.9
Total assets as at December 31	**$2,147.3**	$1,985.6	$1,884.5

	Depreciation			Capital expenditures		
	1981	1980	1979	**1981**	1980	1979
Depreciation and capital expenditures						
Telecommunications equipment	**$ 49.3**	$ 41.9	$33.6	**$ 91.8**	$127.8	$ 79.0
Electronic office systems	**49.7**	57.2	43.7	**97.3**	78.1	70.1
Other	**12.9**	10.5	7.7	**16.7**	16.0	18.7
Corporate	**5.8**	3.1	3.4	**3.8**	3.7	5.7
Total	**$117.7**	$112.7	$88.4	**$209.6**	$225.6	$173.5

Geographic areas

The following table sets forth information by geographic area for the years ended December 31, 1981, 1980 and 1979.

Business segments by geographic areas	1981	1980	1979
Total revenues*			
Canada			
Customers	**$1,334.6**	$1,084.0	$1,000.8
Transfers between geographic areas	**160.2**	87.5	66.9
	1,494.8	1,171.5	1,067.7
United States			
Customers	**1,047.0**	807.0	739.6
Transfers between geographic areas	**85.3**	67.4	20.5
	1,132.3	874.4	760.1
Other			
Customers	**189.3**	163.6	160.1
Transfers between geographic areas	**15.5**	2.8	—
	204.8	166.4	160.1
Eliminations of transfers between geographic areas	**(261.0)**	(157.7)	(87.4)
Total customer revenues	**$2,570.9**	$2,054.6	$1,900.5
Operating earnings			
Canada	**$ 325.0**	$ 253.5	$ 239.4
United States	**114.6**	(37.1)	131.9
Other	**31.2**	26.9	24.8
Adjustments and eliminations	**(1.0)**	1.8	(1.3)
Operating earnings before research and development expense	**469.8**	245.1	394.8
Research and development expense	**(181.6)**	(140.9)	(132.6)
Segment operating earnings	**288.2**	104.2	262.2
General corporate expenses	**(100.6)**	(82.5)	(78.4)
Operating earnings	**187.6**	21.7	183.8
Non-operating expenses less other income**	**(31.1)**	(35.6)	(34.8)
Earnings (loss) before income taxes and extraordinary items	**$ 156.5**	$ (13.9)	$ 149.0
Identifiable assets			
Canada	**$ 815.3**	$ 663.1	$ 573.3
United States	**839.7**	846.8	861.5
Other	**153.0**	98.2	141.5
Adjustments and eliminations	**(91.2)**	(66.0)	(66.5)
Identifiable assets	**1,716.8**	1,542.1	1,509.8
Investment in non-consolidated subsidiaries and associated companies and other			
United States	**67.0**	70.2	47.8
Other	**292.5**	301.6	254.0
Total Investment	**359.5**	371.8	301.8
Corporate assets	**71.0**	71.7	72.9
Total assets as at December 31	**$2,147.3**	$1,985.6	$1,884.5

*Revenues from customers include sales to Bell Canada, its telephone subsidiary and associated companies.

**Includes equity in net earnings of associated companies.

Transfers between business segments and geographic areas are made at prices based on total cost of the product to the supplying segment.

The point of origin (the location of the selling organization) of revenues and the location of the assets determine the geographic areas.

Of the total customer revenues, including research and development, Bell Canada, its telephone subsidiary and associated companies accounted for $911.7 in 1981, $722.2 in 1980, and $695.9 in 1979. Total revenues also include rental and service revenue of $163.8 in 1981, $150.1 in 1980, and $158.4 in 1979.

Operating earnings represent total revenues less operating expenses. Research and development costs cannot be allocated on a geographic basis. In computing operating earnings, none of the following items has been added or deducted: investment and other income (net), interest charges, currency gains (losses), general corporate expenses, income taxes, and extraordinary items.

Identifiable assets are those assets of the corporation that are identified with the operations in each business segment or geographic area. Corporate assets are principally cash, investments, and corporate plant and equipment.

Finance subsidiaries are not consolidated (see notes 1 and 9).

Quarterly financial data (unaudited)

Summarized consolidated quarterly financial data for 1981 and 1980 are as follows:

	4th quarter		3rd quarter		2nd quarter		1st quarter	
	1981	1980	**1981**	1980	**1981**	1980	**1981**	1980
Revenues	**$708.4**	$ 533.1	**$637.1**	$475.5	**$641.6**	$560.6	**$583.8**	$485.5
Gross profit	**$218.6**	$ 105.3	**$173.8**	$126.6	**$177.0**	$130.7	**$159.1**	$141.5
Earnings (loss) before extraordinary items	**$ 36.3**	$ (51.2)	**$ 25.7**	$ 4.8	**$ 35.3**	$ 0.7	**$ 23.4**	$ 24.3
Net earnings (loss)	**$ 36.3**	$(214.9)	**$ 25.7**	$ 4.8	**$ 35.3**	$ 0.7	**$ 39.4**	$ 24.3
Earnings (loss) per share*								
– before extraordinary items	**$ 1.04**	$ (1.50)	**$ 0.74**	$ 0.14	**$ 1.02**	$ 0.02	**$ 0.68**	$ 0.72
– after extraordinary items	**$ 1.04**	$ (6.32)	**$ 0.74**	$ 0.14	**$ 1.02**	$ 0.02	**$ 1.15**	$ 0.72
Weighted average number of common shares outstanding (thousands)	**34,819**	34,001	**34,682**	33,856	**34,574**	33,726	**34,445**	33,594
*If U.S. generally accepted accounting principles had been used (see note 2 to Notes to Consolidated Financial Statements), earnings (loss) per share before and after extraordinary items would have been:								
Earnings (loss) per share								
– before extraordinary items	**$ 1.12**	$ (6.32)	**$ 0.68**	$ 0.09	**$ 0.93**	$ 0.20	**$ 1.20**	$ 0.65
– after extraordinary items	**$ 1.12**	$ (6.32)	**$ 0.68**	$ 0.09	**$ 0.93**	$ 0.20	**$ 1.20**	$ 0.65

Auditors' Report

The Shareholders
Northern Telecom Limited

We have examined the consolidated balance sheets of Northern Telecom Limited as at December 31, 1981 and 1980 and the consolidated statements of operations, retained earnings and changes in financial position for each of the three years in the period ended December 31, 1981. Our examinations were made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as we considered necessary in the circumstances.

In our opinion, these consolidated financial statements present fairly the financial position of the corporation as at December 31, 1981 and 1980 and the results of its operations and the changes in its financial position for each of the three years in the period ended December 31, 1981 in accordance with Canadian generally accepted accounting principles applied on a consistent basis.

Touche Ross & Co.

Chartered Accountants

Toronto, Ontario, Canada
February 4, 1982

Northern Telecom's new 63,000-square-foot semiconductor manufacturing plant, near San Diego, California, started production in June 1981. This facility has a planned capacity of about one-half million chips per month.

Principal products

Business communications
Data packet switching networks
Basic and featured electronic key telephone systems
Electronic and digital PBX systems (combined voice and data)
Private and carrier network switching systems

Electronic office equipment
On-line terminal systems
Data entry terminal systems
Distributed data processing systems
Remote batch terminal systems
Integrated voice and data terminals

Subscriber apparatus
Rotary dial, push-button and key telephones
Electronic and featured telephones
Style, decorator, and novelty telephones
Coin telephones
Handsfree speaker units
Repertory dialers
Modular hardware
Headsets
Specialty and accessory terminals

Cable
Telephone wires
Composite coaxial cables
Switchboard wires and cables
Pulp and paper ribbon insulated telephone cables
Polyolefin insulated telephone cables
Frame wires
PVC insulated inside wiring cables

Outside plant
Customer premises distribution systems
Central office protectors and connectors
Subscriber protection devices
Terminals and closures
Splicing connectors
Loading devices
Outdoor cross connect systems

Test equipment
Transmission test equipment
Signaling and supervision test equipment
Service observation test equipment
Service analysis equipment
PCM carrier test equipment
Loop test equipment
Trunk test equipment
Data communications diagnostic test equipment
Data communications patching and switching equipment
Data communications remote access switching and patching equipment

Central office switching
Step-by-step systems
Crossbar switching systems
Electronic switching systems
Digital switching systems
Traffic Operator Position Systems
Centralized Automated Loop Reporting Systems
Peripheral systems

Power equipment
Power plants
Ringing and tone equipment

Transmission
Analog and digital carrier systems
Analog and digital multiplex systems
Analog and digital microwave radio systems
Voice frequency equipment and systems
Digital line transmission systems
Optical fiber transmission systems
Private network transmission systems
Special subscriber services

Corporate offices

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Telex: 826-151

Northern Telecom France S.A.
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France
Telephone: 758-1414
Telex: 611819

Northern Telecom (Ireland) Limited
49 St. Stephen's Green
Dublin 2, Eire
Telephone: 91 76-71
Telex: 28 343

Northern Telecom (Malaysia) S.B.
c/o Jayaraman Ong & Company
39 Beach Street
Penang, Malaysia
Telephone: 897-5081 376
Telex: 40-056

Northern Telecom (U.K.) Limited
Langton House
Market Street
Maidenhead, Berkshire
England SL6 8BE
Telephone: 628 72921
Telex: 849 725

Listing of stock

Montreal Stock Exchange
New York Stock Exchange
The Toronto Stock Exchange
Vancouver Stock Exchange
Stock symbols
NT on NYSE
NTL on Montreal, Toronto and Vancouver exchanges

Dividend Reinvestment and Stock Purchase Plan

Shareholders wanting to purchase additional shares of Northern Telecom Limited can take advantage of a convenient and cost-free investment plan. Quarterly dividends may be invested automatically to purchase additional shares at a discount from the average market price (calculated during a fixed period each quarter). Shares may also be purchased by voluntary cash payments of as little as $50 to a maximum of $5,000 during a quarter. In either case, there are no brokerage fees or other service charges. Additional information may be obtained from:
The Treasurer
Northern Telecom Limited
P.O. Box 6121, Station A
Montreal, Quebec
Canada H3C 3A7

Transfer offices

Company offices
1050 Beaver Hall Hill
Montreal
393 University Avenue
Toronto
Montreal Trust Company
Halifax, Winnipeg, Regina, Calgary, Vancouver
Manufacturers Hanover Trust Company
New York, New York
Continental Illinois National Bank and Trust Company of Chicago
Chicago, Illinois

Registrars

Montreal Trust Company
Halifax, Montreal, Toronto, Winnipeg, Regina, Calgary, Vancouver
Manufacturers Hanover Trust Company
New York, New York
Continental Illinois National Bank and Trust Company of Chicago
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