



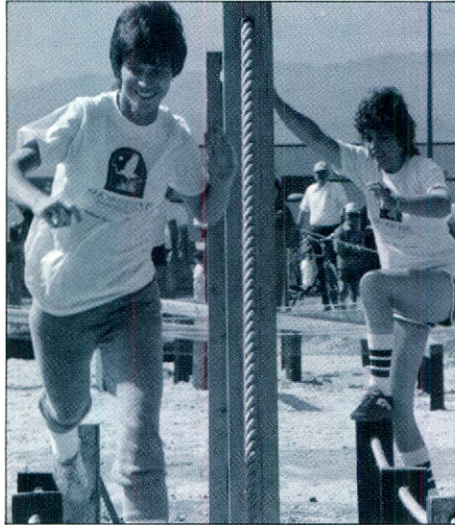
Annual report  
to employees

1983



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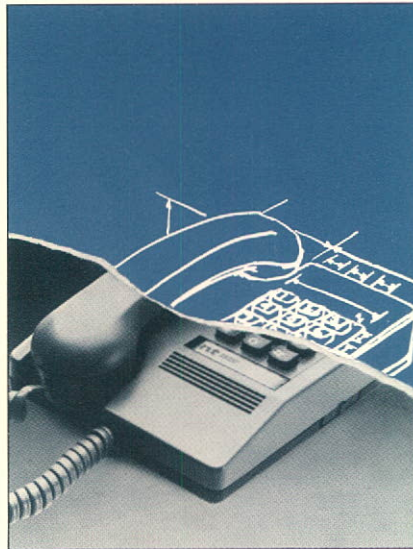
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## C O N T E N T S

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The Harmony telephone, introduced in late 1983, is an example of increased productivity in action.

Through the use of three BNR-designed microchips, the Harmony requires 169 fewer components than the previous model, and reduces the number of raw materials needed from 108 to 48. It is one of several examples highlighted in the feature article on productivity, *Building on our competitive edge*.

ON PEUT OBTENIR LA VERSION  
FRANÇAISE DE CE  
RAPPORT EN ÉCRIVANT À  
Northern Telecom Limitée  
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Mississauga (Ontario) Canada  
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Details of Northern Telecom's financial performance are outlined in the *1983 Annual Report*, available from local public relations and corporate relations offices, or from:

Northern Telecom Limited  
Corporate Relations  
33 City Centre Drive  
Mississauga, Ontario, Canada  
L5B 3A2



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# RODUCTIVITY: A

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By any standard, Northern Telecom and its employees are winners. Our 1983 financial results prove the point. Record revenues of over \$3.3 billion and a net profit of \$268 million are exceptional results, especially coming off of tough economic times.

The "secret" behind this success is a simple one: technological innovation; and productivity. Of the two, productivity is sometimes the less understood and appreciated.

There are many formal definitions of productivity, yet all mean the same: doing things better. This includes constantly improving manufacturing processes; eliminating unnecessary costs in all parts of the organization; improving the speed at which we introduce new products; boosting the already high quality of existing telecommunications systems; finding ways to provide even better service to customers; and creating marketing and communications programs that are as innovative as our products.

### **Competition is fierce, unrelenting**

The ability to be more productive – as individuals, and as an organization – is the key to our continuing success. If our efforts fail, we can go from winners to losers almost overnight.

Everywhere Northern Telecom sells, with every product we market, the competition is fierce and unrelenting.

In 1983, Northern Telecom invested a record \$325 million, nearly 10 percent of our total revenues, in research and development. Yet, some of our competitors can afford R&D budgets as much as six-times greater in dollar terms.

We compete with firms that receive export-financing assistance from their home governments that goes beyond what North American governments offer domestic firms such as Northern Telecom. We also face competitors based in countries where salaries and wages are much lower. This helps such companies hold down the cost (and price) of the products they offer to the customers we compete for.

So far, we have met these challenges and succeeded. In turn, one result of our growth in revenues and earnings has been Northern Telecom's ability to





# KEY TO OUR FUTURE



Inez Arend, of BNR-Mountain View, California, receives her value analysis seminar diploma from Barry Mack, director of operations at the Rancho Bernardo plant.

add nearly 4,900 employees in 1983.

One reason for our success has been the ability of Bell-Northern Research designers to develop the industry-leading, fully digital telecommunications systems that best meet user needs.

R&D capability, however, does not by itself guarantee success and growth. If our products are too costly, customers can turn to less expensive systems even though they do not, perhaps, perform as well.

This is why anything that eliminates unnecessary business costs and improves efficiency and quality *anywhere* in the corporation is so vital. It enables Northern Telecom to sell our fully digital systems at competitive prices.

One measure of productivity is the direct cost (the investment in plant facilities, labor, and materials) of manufacturing the systems and products we sell. Over the last three years, we have reduced these costs, compared to what they could have

been, by an average of more than 14 percent annually – \$280 million in 1983 alone.

This does not mean total manufacturing costs have been cut 14 percent. These are affected by inflation: jumps in the price of raw materials, parts, and services we buy; and combined increases in our own wages, salaries, and benefits. In 1983, for example, these combined costs were \$2.67 billion, an increase of \$166 million over the year before.

## **Cost-saving record is one that few companies can match**

These figures show why improved productivity is the key to staying competitive. Our cost-improvement achievements have helped Northern Telecom hold down its general level of price increases *below* the annual rate of inflation for many years. This is a record that few companies anywhere can match.

This achievement is a credit to the

skills, insights, and dedication of managers and employees at all levels.

Despite the battles we have won, however, we must do even better in future, because the competition is becoming even tougher. To meet our goal requires not only continuing commitment by each of us, but also new tools and approaches to productivity. This is why Northern Telecom last year created a Productivity Development Center.

No productivity technique or tool, however, will truly succeed without the cooperation and involvement of Northern Telecom's most valuable resource – its people. Some of our most significant improvements in manufacturing costs and quality are the result of employees working in specially trained groups to identify and solve problems. By the end of 1983, more than 1,400 of our people at all levels were involved in such activity; a number that will grow dramatically in the coming years.

Improving productivity is a key corporate strategy. Without it, we cannot continue to succeed. Without the growth and profitability that make up this success, Northern Telecom cannot continue to create the jobs and offer the benefits we all enjoy.

Finding ways to increase productivity is the surest guarantee any of us has for a prosperous future. Given the track record of this corporation and its people, I am confident our future will be an exciting one.

W.F. Light  
CHAIRMAN OF THE BOARD AND  
CHIEF EXECUTIVE OFFICER



The January 1 reorganization of the 22 AT&T Bell operating companies into 7 independent regional holding companies affects every Northern

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# HE AT&T DIVESTITURE:

Telecom employee - as private citizens and as employees of a world-class telecommunications manufacturer.

the United States, it also encourages the development of new technology, and its implementation. In turn, this new technology will create demands in presently closed markets that they will not be able to meet, unless they reduce their barriers and become open markets similar to those in the U.S. and Canada.

## **Northern Telecom the leader in technological change**

As the leading supplier of fully digital telecommunications systems in the world, we stand in the forefront of technological change. As deregulation favors competition, we look forward to expanded opportunities both here in North America and abroad.

Competition has been leading to this moment for more than 15 years. It has produced an explosion in the residential telephone business. Direct sales of telephone equipment to residential subscribers in the U.S. are predicted to exceed \$1 billion this year.

The impact extends far beyond the residential subscriber. The new-found ability of the individual to buy his own phone is matched by the freedom of business users to purchase and connect private branch exchanges (PBXs) from suppliers other than the telephone company.

Deregulation has opened the door for new suppliers with new technology, such as Northern Telecom, to compete aggressively in North America's large and rapidly changing business telephony markets.

In the U.S. it has also created other new markets, such as markets for specialized common carriers like MCI. Northern Telecom, and other suppliers of networks for private



Those of you in the United States will probably see your local telephone bills go up, and long-distance charges go down. That will be one of the more personal impacts of divestiture and deregulation.

The impact on global telecommunications, while perhaps less personal, will be profound.

We can expect divestiture and deregulation in the United States to have a wide impact internationally. While it encourages competition in



# WHAT IT MEANS TO US

industry, find themselves supplying network systems and products to large private and public organizations which were totally inaccessible only a few years ago.

Northern Telecom's growth in the United States has been spectacular. We now employ nearly 16,000 employees in 14 plants, and 14 associated R&D centers. We are now the second-largest U.S. telecommunications manufacturer.

In 1982, our sales to the Bell operating companies (BOCs) exceeded US\$160 million. Last year, they were over US\$340 million. This year, they are expected to well exceed US\$500 million.

## Divestiture and deregulation spur new industry alliances

The AT&T divestiture cuts the last formal ties between AT&T

Technologies Inc. (formerly Western Electric) and the BOCs. This enlarges our opportunities for sales of central office switches, PBXs, and terminal equipment to the newly independent BOCs, and through them, to large communications user organizations.

The divestiture is also attracting other competitors to the U.S., and creating new industry alliances in the United States and in Europe. Last year, IBM entered the PBX business in North America when it joined forces first with Mitel and then with Rolm. AT&T has formed a partnership with N.V. Philips of the Netherlands, one of Europe's largest telecommunications-equipment suppliers. Another European giant, Sweden's L.M. Ericsson, has aligned itself with Honeywell. In France, the telecommunications division of Thomson CSF was folded into CIT Alcatel, creating what is now either the fifth- or sixth-largest telecommunications manufac-

turer in the world.

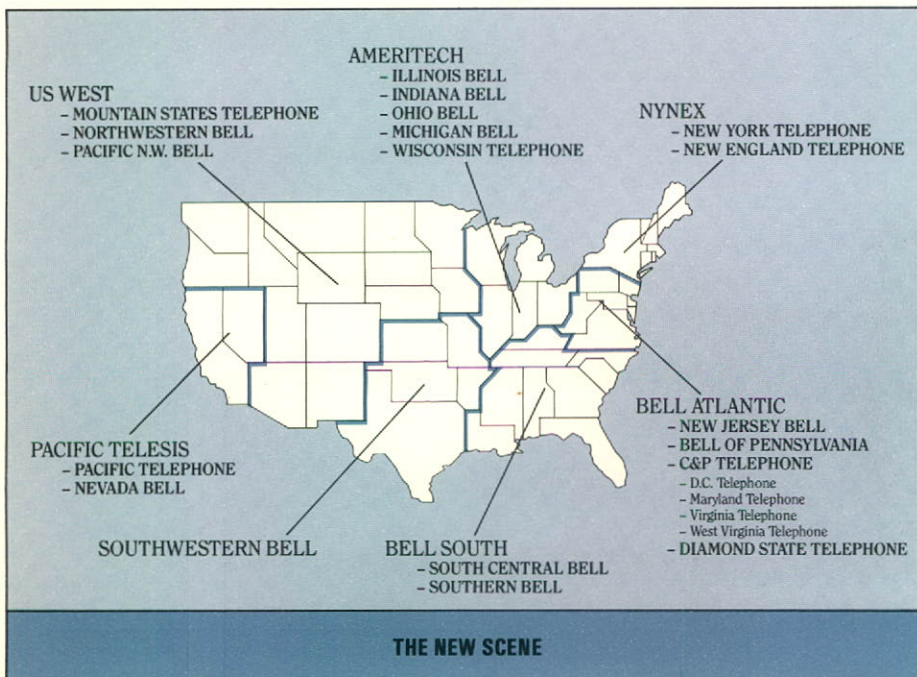
Divestiture has also freed AT&T to move into markets for information-management technology at home and abroad. The most immediate consequence of that has been the creation of AT&T Canada Inc., which opened its doors in Toronto last September. It raises the prospect of AT&T Technologies Inc. competing more aggressively than it has in the past for the Canadian telephone company and interconnect business.

As divestiture and deregulation encourage new competitors to enter the North American market, we will face new challenges. Because of our digital leadership, and because of our spectacular growth in the United States, many will see us as the corporation to beat.

For Northern Telecom, divestiture and deregulation mean the challenge of new competitors, maintaining our technological edge, and pursuing an aggressive marketing policy at home and abroad. It also means new opportunities for growth and expansion - in North America and internationally. Divestiture and deregulation have irretrievably destroyed the status quo. Our industry will never be the same. Nor would we want it to be.

*Edmund B. Fitzgerald*

E.B. Fitzgerald  
PRESIDENT





# A

## SUBSIDIARY JUST

The oven, nearly twice the height of a man, dominates a section of Northern Telecom Electronics' plant in West Palm Beach, Florida. Eric Thomson, plant manager, points to it and says, "That wasn't here six months ago." He pauses, then adds, "And it could be gone by this summer."

The oven bakes protective covering onto printed circuit boards, an important part of the hardware in Northern Telecom's digital telecommunications systems. Last year, the corporation manufactured some 1.75 million board assemblies of different types, valued at \$60 million.

Installed last August as part of a \$2.5-million renovation of the West Palm Beach plant, the oven replaced a larger, less-efficient process that used conveyor belts passing under infrared lamps to "cure" the protective coating on the circuit boards. By the middle of 1984, however, it too could be replaced by a new process now being tested, where a machine not much larger than an office duplicator will use ultraviolet light to treat the boards.

The rapidly changing circuit board process is just one example of how Northern Telecom constantly applies new technology to improve its manufacturing operations. The West Palm Beach renovation, however, reflects more than technological advance. It is also the result of changes in the structure and organization of Northern Telecom that are equally part of maintaining the corporation's competitive edge.

### **One of the youngest, fastest-growing subsidiaries**

The West Palm Beach plant is one of nine facilities in the U.S., Canada, and Malaysia now managed by Northern Telecom Electronics Limited (NTE), one of the youngest and fastest growing of the corporation's subsidiary companies.

Established late in 1982, NTE employs 3,000 people and consolidates a number of formerly separate operations.

Unlike other Northern Telecom subsidiaries, few of its products are sold to outside customers. NTE is responsible for designing and manufacturing vital microelectronic and electronic components used by the corporation's manufacturing divisions throughout the world.

One element of NTE is the Semiconductor Components Group (SCG). With facilities in San Diego (Rancho Bernardo) and Santa Clara, California, and in Corkstown, Ottawa, the group manufactures the advanced microchips designed by the corporation's Bell-Northern Research subsidiary. These reduce the size and cost, and increase the capabilities, of the corporation's products. Through SCG, the corporation is believed to be the fifth-largest manufacturer of custom-designed chips in the world.

NTE also manages an Electronic Components Group (ECG). Its facilities include two plants in West Palm Beach, one in Belleville, Ontario, and two plants in Penang, Malaysia.

The circuit boards, hybrid substrates, and other electronic components these plants produce are devices that work with the microchips, and make up much of the physical hardware inside the corporation's systems and products. Here again, the scale of operation is world class. The value of the circuit board assemblies produced by NTE in 1983, for example, would rank it as one of the top 10 independent producers in North America.

Despite such volume, only about half the components used in the Northern Telecom DMS and SL Families of fully digital switching and transmission systems are produced by the corporation itself. The rest are purchased from outside suppliers.



# FOR COMPONENTS

## **Consolidation delivers strategic advantage**

These "outside" components are mostly common, "me-too" devices available to any company. It is the proprietary components designed by BNR and made by NTE that help give Northern Telecom products a vital technological and cost advantage in the marketplace. The decision to bring together the component operations into a single company was based on the need to maintain and extend this strategic competitive advantage.

"Traditionally, we've focused on the work of designing world-leading telecommunications systems," explains C.G. (Charlie) Millar, president of NTE. "However, we have come to realize that, because of digital technology, each of our products is actually the sum of its components. This means that how we manage components is becoming as crucial to our success as our ability to design the systems for which these components are used."

Historically, Northern Telecom's component facilities were established by the subsidiaries and product divisions that first needed those particular devices. As the corporation introduced the world's first complete range of fully digital telecommunications systems, many of these components became common to, and essential to, products produced by other divisions.

"With rapidly increasing sales and the need to bring new products to market more quickly than ever, the component organization that worked for us in the past was no longer good enough," says Mr. Millar, who is also executive vice-president, operations,

for Northern Telecom Limited.

The component plants were finding it increasingly difficult to deliver the quantity and quality of devices needed by their own and other divisions. The plants' parent divisions, because of other, competing priorities, were not always in the best position to invest money, and acquire the manufacturing process expertise needed to upgrade the operations.

## **Group's job is to apply the latest in technology**

To upgrade its expertise in producing electronic components, NTE has established a 55-member Manufacturing Process Technology Development group, based in West Palm Beach. Its mission is to help NTE apply the latest manufacturing concepts and technology - such as computer-automated processes, robotics, and lasers - to provide Northern Telecom divisions with the secure supply of cost-efficient, high-

quality components they need.

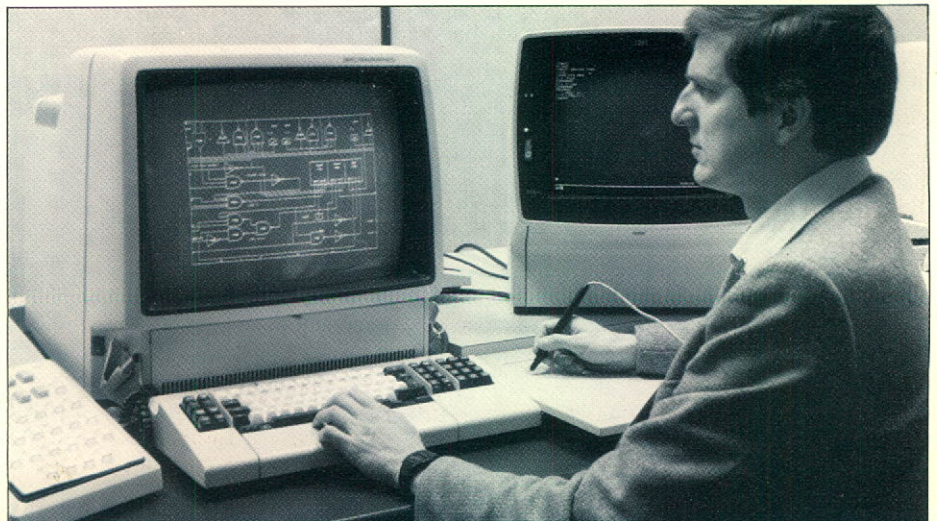
The group was active in assisting manufacturing engineers in the 1983 modernization of the West Palm Beach circuit board plant. As a result of this combined effort, the plant's production increased in a single year from 800 panels to 2,000 panels daily.

The decision to create NTE was fueled by more than the need to increase and improve component production capability. According to Mr. Millar, NTE works with the product divisions and Bell-Northern Research to create new forms and types of components common to a wide range of products.

## **Commonality spreads manufacturing R&D costs**

This thrust towards commonality will reduce the total number of separate microchips and electronic components used in products. This will help keep Northern Telecom cost-competitive.

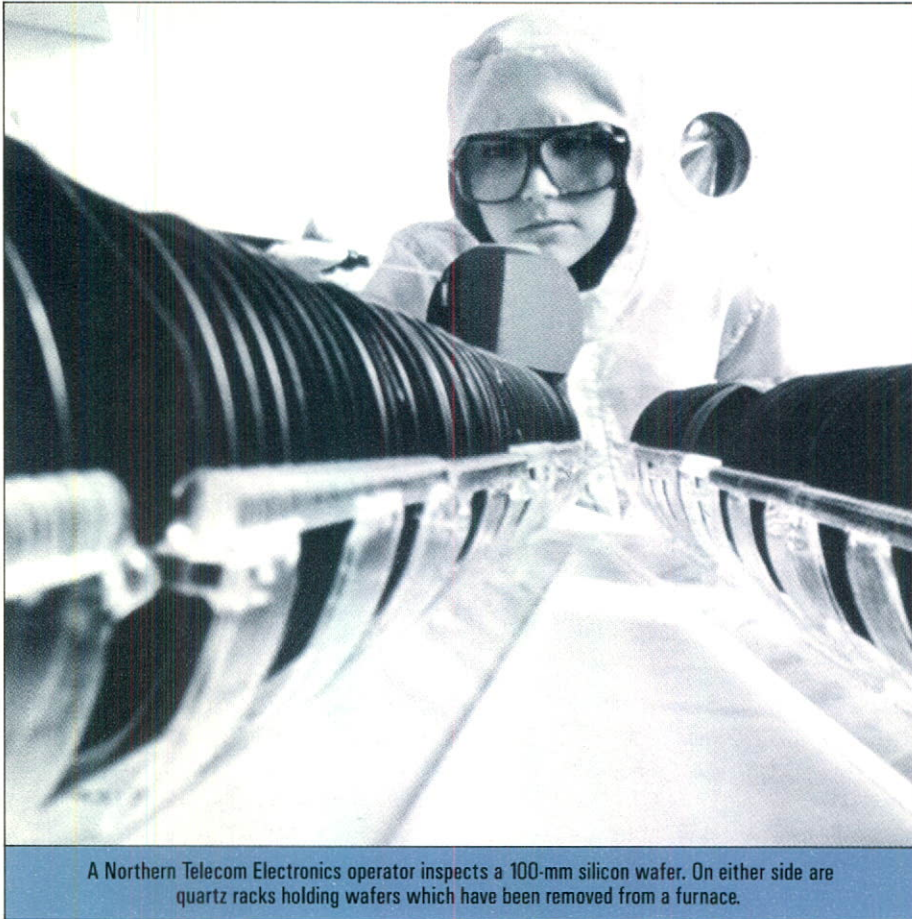
"The cost of developing and



BNR's Eric Hall uses a computer-automated design (CAD) system to design an integrated circuit, or microchip, for manufacture by Northern Telecom Electronics in Ottawa.



*The NTE challenge is to prove to the divisions that the best supplier is us.*



A Northern Telecom Electronics operator inspects a 100-mm silicon wafer. On either side are quartz racks holding wafers which have been removed from a furnace.

manufacturing components is climbing. This means that R&D and manufacturing costs must be spread across as many products as possible." Moreover, adds Mr. Millar, "In today's highly competitive environment, the corporation can't afford to have separate divisions, each making different components, when the function of these components is essentially the same."

NTE's close link with Bell-Northern Research is important to the drive for commonality. Tony Stansby, NTE vice-president, business development, and Cesar Cesaratto, head of NTE's component design group, are based in BNR's Corkstown facility. They answer to both NTE President Charlie Millar and to BNR President John Roth.

Cooperation between NTE and

BNR on component design is being extended in 1984 with the creation of a new BNR laboratory in West Palm Beach. There, researchers will focus on designing new forms of the hybrid substrates (ceramic panels with electronic circuits printed onto them) which NTE manufactures.

**The designer's requirements not always the best thing**

NTE also helps guide Northern Telecom and BNR systems designers to select different types or forms of microchips and other component assemblies to create their products.

"A systems designer can take many approaches to structuring a central office switch, or any product," explains

Mr. Millar. "However, what might meet the designer's requirements is not always the best thing from a manufacturing point of view, or it may not take into account new and more cost-effective manufacturing technologies just being developed."

To help systems designers apply the latest component technology, NTE engineers and computer experts are working with BNR to develop extensive electronic files of component specifications and manufacturing requirements, which are then fed into computerized-design programs used to create new products. These specifications and manufacturing "rules" will also make it possible to integrate computerized design with computer-automated manufacturing processes, to achieve even greater quality and efficiency.

"Everything we do is aimed at helping Northern Telecom keep its position as the world leader in fully digital telecommunications systems. This means providing the divisions with strategic, high-quality components and service, at a lower cost than outside suppliers," Mr. Millar summarizes.

"Remember, none of our divisions is obliged to buy NTE components if they can get the same quality and secure supplies they need at a better price elsewhere. That is our daily mission: we have to try harder and perform better than anyone else."

To Mr. Millar, a life-long manufacturing engineer, this is just plain, hard-nosed business sense. If the divisions are to compete, they *must* be free to select components that do the job at the best price, no matter where they come from.

Charlie Millar wouldn't have it any other way. He points out, "The NTE challenge is to prove to the divisions that the best supplier, with the best technology, is us. We have no doubt we will succeed."



# RIDING THE DIGITAL WAVE

Since Northern Telecom announced Digital World in 1976, we have installed or on order the equivalent of more than 16 million lines of fully digital DMS and SL Family systems in 60 countries. Northern Telecom is by far the world's leading supplier of fully digital systems.

Every major telecommunications manufacturer is trying – so far, unsuccessfully – to overtake Northern Telecom's digital leadership.

In 1983, we shipped 3.7 million equivalent lines of DMS switching, including about 375 switches, or more than one every working day.

This year, we expect to ship globally about 600 DMS central office switches, or the equivalent of about 5 million lines. We will ship more than two DMS switches every working day during the first half of the year, and three switches per working day in the latter part of 1984.

The SL-1 is the top-selling fully digital PBX in the world with nearly 3 million lines in service in 42 countries. Each of the nearly 9,000 SL-1s, installed or on order, can be upgraded to offer the latest features and capabilities. Currently, these features, such as call-forwarding, voice-messaging, and various data-handling features, number more than 350.

SL-1 can integrate voice and data to act as the hub of an integrated business communications system. Northern Telecom's OPEN World proposes to use the SL Family of fully digital PBXs to connect voice, data, graphics, and images, for simultaneous transmission over conventional twisted-pair wiring.

Software has become the key to our digital leadership. It is a major object of the Northern Telecom research and development effort. For example, the DMS-100 Family now comprises some 4,000 modules of software. The 4,000 modules contain about 3 million computer instructions.

**DMS-100 Family offers more than 1,300 different features**

More significant, however, is the rate

at which enhancements are made to the software to provide new features and services. The volume of change now taking place annually equals the amount of change that took place every five-to-ten years for earlier switches. More than 250 programmers at three geographic locations and organized into 30 development teams are involved. The DMS-100 Family now offers more than 1,300 different features, more than any other digital switching system in the world.

The corporation has become the largest supplier of digital central office switching to virtually all of the major telephone companies in North America. In 1979, following an extensive evaluation of digital switches from the principal international manufacturers of such systems, American Telephone & Telegraph (AT&T) recommended Northern Telecom's DMS-10 for use by its operating companies. This was the first time AT&T had recommended a switch designed and built by an outside supplier.

Northern Telecom is also the largest supplier of digital switching systems to the U.S. military. The DMS-100 Scope Dial, for example, was developed to meet the specialized needs of the U.S. Air Force and is being installed in major bases around the world.

The corporation is also the principal supplier of digital switching systems to the U.S. resale common carriers – among them, MCI and SBS.

These achievements have helped expand global operations and sales. In 1983, our DMS central office switching and SL PBX revenues totalled some \$1.6 billion, up from a total of \$1.2 billion in 1982. The corporation's digital leadership made this feat possible.



# BUILDING ON OUR

A new electronic telephone with 156 components, less than half the number used in its predecessor. A computerized circuit board design system that's \$5-million-a-year better than previous methods.

Stationary work-chairs rather than roll-around chairs, to reduce the chance of mishaps in a soldering department. New business forms and mailroom guidelines that reduce paperwork and speed deliveries.

As leaders in the highly competitive telecommunications industry, change has long been a fact of life for Northern Telecom's products, plants, and people. Some changes reflect years of planning and research. Others are the result of suggestions by individuals or groups of employees. The common denominator linking them all can be often summed up in two words: improved productivity.

According to Walter F. Light, Northern Telecom's chairman and chief executive officer, productivity is the most important word in the corporation. "Our ability to be more productive, as individuals and as an organization, is the key to our continuing success," he says bluntly.

The term "productivity" is often associated only with manufacturing activity, and an assembly-line approach of "working harder to produce more." That's an old-fashioned, and basically mistaken, description. Productivity concerns every aspect of Northern Telecom's activity. It involves working together to better use the talents of all employees: in other words, working *smarter*, rather than harder, to be more competitive.

Robert M. (Bob) Cuddy, Northern Telecom Canada's vice-president, manufacturing, says: "I see productivity as the overall efficiency of a

group of people in combining ideas and materials for complete customer satisfaction. The key ingredient for achieving this efficiency is to encourage, through training and communication, the positive attitude of, and involvement by, employees."

Adds William C. (Bill) Cawthon, vice-president, operations, Northern Telecom Inc.: "Improving the *quality* of all our operations and products is an essential part of productivity and our ability to compete with other firms. If the customer isn't satisfied with the product, with the service, in *any* dealing with the corporation, then we've blown it."

For Bell-Northern Research, says John Roth, president of the R&D subsidiary, increased productivity involves reducing the time it takes to design a system or feature, and more. "We also have to be aware of the corporation's manufacturing needs and costs.

## **Common technology means bigger 'bang for the buck'**

"This means working closely with the divisions to design products that can be put into production with as little hassle as possible. Another way we can help keep Northern Telecom a competitive leader is by developing common technology and components for a wide range of systems. This makes for easier manufacturing, and for better use - a bigger 'bang for the buck' - of our investment in R&D."

These points are summed up by Northern Telecom's definition of productivity: "The quality, timeliness, and cost-effectiveness with which an organization achieves its mission."

That's a sweeping statement, admits Bill Delroy, Northern Telecom Limited's assistant vice-president,



# COMPETITIVE EDGE

productivity development. It indicates that every part of Northern Telecom's operations – research and all support and office functions, as well as manufacturing – can contribute to reducing the corporation's cost of doing business and increasing its ability to compete.

## **Center's task is making sure the best ideas are communicated**

Productivity is Mr. Delroy's daily concern. He heads Northern Telecom's Productivity Development Center, formed early in 1983.

The center is a team of managers who study, plan, and coordinate new methods to enhance productivity throughout Northern Telecom. The center's staff work with the subsidiaries and their own productivity specialists to identify and implement programs that best fit the needs of individual operating divisions.

Productivity improvement has always been a major concern for Northern Telecom. Opening of the new center, however, emphasizes the fact that working smarter and improving quality and all the other elements of an effective productivity program are vital to the corporation's

future. The center is a resource to help ensure that the best ideas and approaches, from in-house and outside sources, can be communicated, understood, and used throughout the corporation.

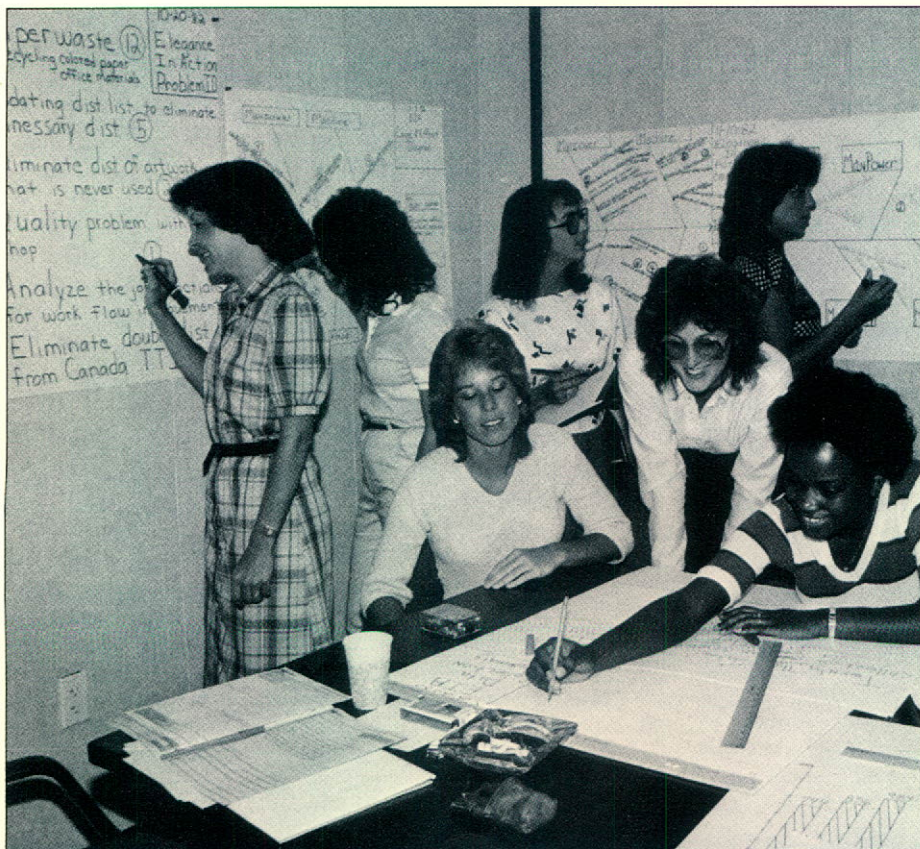
One of the center's projects is to identify ways of evaluating the nature of work and productivity in hard-to-measure activities, such as office and managerial tasks. It's an aspect of productivity that applies throughout the organization.

Through the center, Northern Telecom is participating in a research project sponsored by the American Productivity Center, based in Houston, Texas. This project will see a group of major organizations – including NASA (the U.S. space agency), Johnson & Johnson, Warner-Lambert, and TRW – establish pilot programs in office work design and automation. These programs will be monitored to see how well they operate. Results will be shared among all the participants.

Such research is necessary because office work – clerical and managerial – represents a rapidly increasing share of business costs. One study has estimated it accounts for as much as 50 percent of the cost of doing business for the average North American company.

Manufacturing activity, however, still remains basic to an organization like Northern Telecom. Here, there are ways to assess productivity, such as manufacturing costs – basically, what it costs in materials, labor, and plant facilities to make each product. In this area, the corporation's subsidiaries and their employees are winners.

Between 1980 and 1982, for example, managers and employees across the corporation found ways to reduce these costs an average of 14



These members of a Research Triangle Park, North Carolina, productivity circle – called "Elegance in Action" – have been meeting regularly for 13 months.



*Productivity is the most important word  
in the corporation.*



Northern Telecom and BNR employees discuss how to apply value analysis techniques to manufacturing and operating costs in a Rancho Bernardo, California, training session.



percent a year from what they could have been. In 1983, cost-reduction efforts achieved a 16 percent saving.

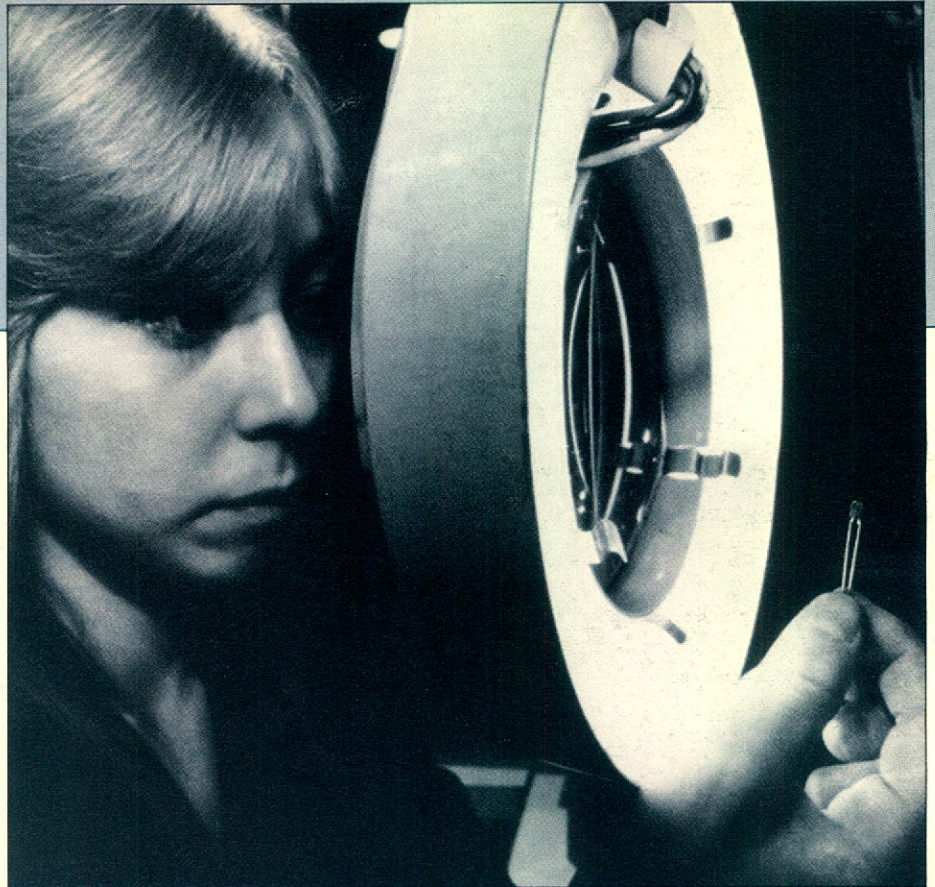
### **Cost-reduction helps corporation control inflation**

These annual savings are essential to help offset and control the effect of inflation – the constantly increasing cost of raw materials, parts, outside services, and compensation – without increasing the price of its systems and products to uncompetitive levels. Last year, these combined costs increased by \$166 million over 1982, to reach a total of \$2.67 billion.

Cost reduction also enables the corporation to invest more in developing the new products that bring in the sales. Last year, R&D spending was \$325 million, up 35 percent from 1982.

The record of manufacturing-cost improvement in recent years is significant. But the corporation can't rest on its laurels. John D. MacDonald, NTL's vice-president, manufacturing, points out that "Telecommunications firms all over the world are aiming at our markets. We should have cost-improvements of 20 percent a year for the corporation to remain successful, and we want to reach this target by the end of 1986."

Finding ways to reduce manufacturing costs and improve quality are important priorities for Northern Telecom managers and engineers. This includes all sorts of activities: new methods of ordering and storing raw materials and parts so that they are available just when needed without excessive inventory cost; easier ways of transporting material to and from assembly; improvements in the way plants and distribution centers are arranged and work is scheduled; and changes in products themselves, and their packaging, to reduce the number of parts, and the cost or amount



Shelly Deakin, of the Business Products Division Plant in Calgary, Alberta, checks a LED (light-emitting diode) lamp used in the Vantage electronic key telephone set.

of materials used.

### **Circle groups a valuable source of better ideas**

Improving quality and reducing costs may be the prime responsibility of manufacturing managers and engineers, but employees at all levels are a vital source of ideas for better ways of doing things. Valuable suggestions come not only from individuals but also, increasingly, from groups of employees who participate in specially-trained, problem-solving teams.

The value analysis workshop, described in an accompanying article, is one such problem-solving team activity. Another sort of team activity – often called quality circles, suggestion circles, or productivity circles – involves volunteers drawn from an operating group or department who meet weekly. Working with a team facilitator and leader, the groups are trained to identify, analyze, and propose solutions to work-related problems in their areas.

By the end of 1983, nearly 50 quality circles, involving 600 employees, were in operation. While

the cost of employees' time and the training represents thousands of dollars, it's a good investment. Last year, these teams developed ideas representing more than \$1 million in potential savings.

In the Kingston, Ontario, cable plant, employee teams contributed 78 different ideas on how to reduce wire breaks during manufacture. The result is a 60 percent drop in the break level, for annual savings exceeding \$100,000.

In Morrisville, North Carolina, a circle of nine Digital Switching Systems plant employees and their supervisor identified a shortage of material-handling equipment. For an investment of \$8,000 in equipment, plant efficiency has improved with an annual saving of more than \$80,000.

Circle-group proposals sometimes deal with improving employee working conditions. A circle in the Research Triangle Park, North Carolina, post-soldering department improved safety by suggesting the purchase of stationary work-chairs to replace older, roll-around seats that had been causing accidents.

Such circles are not limited to



# *M*anufacturing still remains basic to Northern Telecom.

manufacturing plants and activities. Office work can be made more efficient and effective through the circle technique. Another group in Research Triangle Park suggested that the mailroom coordinator, rather than the sender, decide the routing of telecopies and copies of COCOS electronic mail. Annual savings are estimated at \$10,000.

## **Designer's job must include taking account of manufacturing**

"Employee participation in productivity problem-solving is a way of encouraging our people to make the best use of their talents," says Ed Van Neste, director, participative programs, for the NTL Productivity Development Center. "These programs are based on the simple premise that people know more about their own jobs than anyone else."

While the circles boost efficiency and quality in the plants and offices, Northern Telecom and Bell-Northern Research (BNR) systems designers also play a major role. They develop new systems, products, and features that use fewer materials and that can be manufactured with greater efficiency and quality. Cost-avoidance is the term that describes the process. It saves time, money, and effort by designing for maximum productivity right from the start.

The Harmony electronic telephone is an example of honing a competitive edge through design. Introduced late in 1983, Harmony is the first of the 8000 series that replaces the conventional 500/2500 series telephones that have been the standard in North America for 35 years.

Harmony, uses three BNR-designed microchips. It requires only 156 components, compared with 325 components in the old model. The number of raw materials it uses has been reduced from 108 to 48.



Shirley Rutherford uses computer-assisted test (CAT) equipment to check a new Harmony electronic telephone at the Northern Telecom Canada plant in London, Ontario.



It cost \$13 million to introduce Harmony. This investment included product research and development, market research, and new, automated manufacturing equipment for the London, Ontario, plant, where Harmony is produced.

Such automated manufacturing processes, controlled by computers, are an increasingly important tool in the battle for productivity. When properly developed and applied – which includes re-designing products so they can be handled by the automated system – they make possible certain types of manufacturing at a rate and quality not previously possible.

Computer-automated manufacturing (CAM) follows on the use of computer-automated design (CAD) technology. BNR designers use special CAD systems to create and test the designs of products. CAD/CAM processes are essential if the corporation is to continue to develop new products and manufacture and bring them to market faster than our tough, agile competitors.

#### **Circuit boards designed by computer in half the time**

One example of how CAD technology helps maintain a competitive edge is the computerized circuit board design system (CBDS) developed at BNR.

Printed circuit boards are an important part of the hardware that goes into many Northern Telecom digital telecommunications systems. The boards comprise thousands of electronic circuits and components, which often change for each product in which they are used.

CBDS is a sophisticated design, layout, and documentation tool which helps designers “draft” their complex designs, informs them when they violate certain design requirements, and allows them to test how their

designs will actually function through computer simulation. The designs can then be transmitted electronically to the board manufacturing plants speedily and without error.

Thanks to CBDS, the time needed to go from a basic schematic to the finished design has been cut from eight weeks to four. Even this figure doesn't tell the full story: the design period has been reduced despite the fact that the board designs have actually become much more complex. The system has also significantly reduced the number and cost of board-design changes that must often take place.

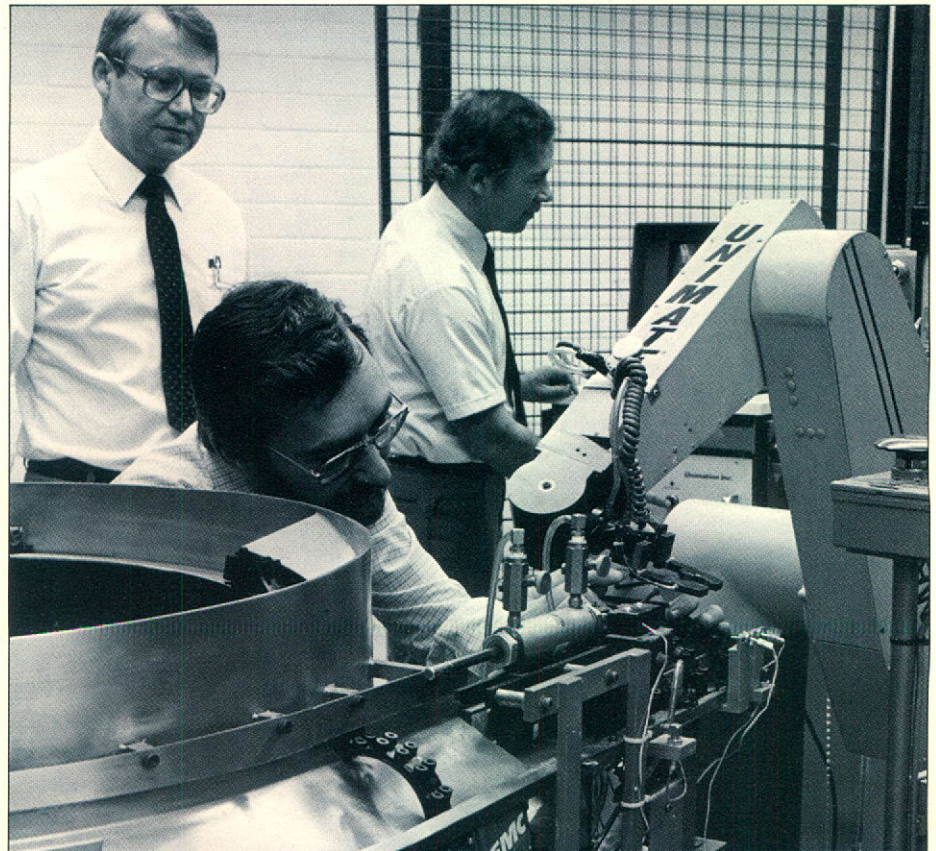
Direct savings from CBDS amount to some \$5 million a year, and could reach \$24 million annually by 1986.

The system is so successful, that IBM has licensed it from BNR to market to other companies.

#### **CAM tools help boost speed, accuracy**

New computer tools, plus changes in the way work is organized, have helped BNR dramatically improve production of software. For example, the time needed to develop software for the SL-10 data packet switch has been cut by more than a year.

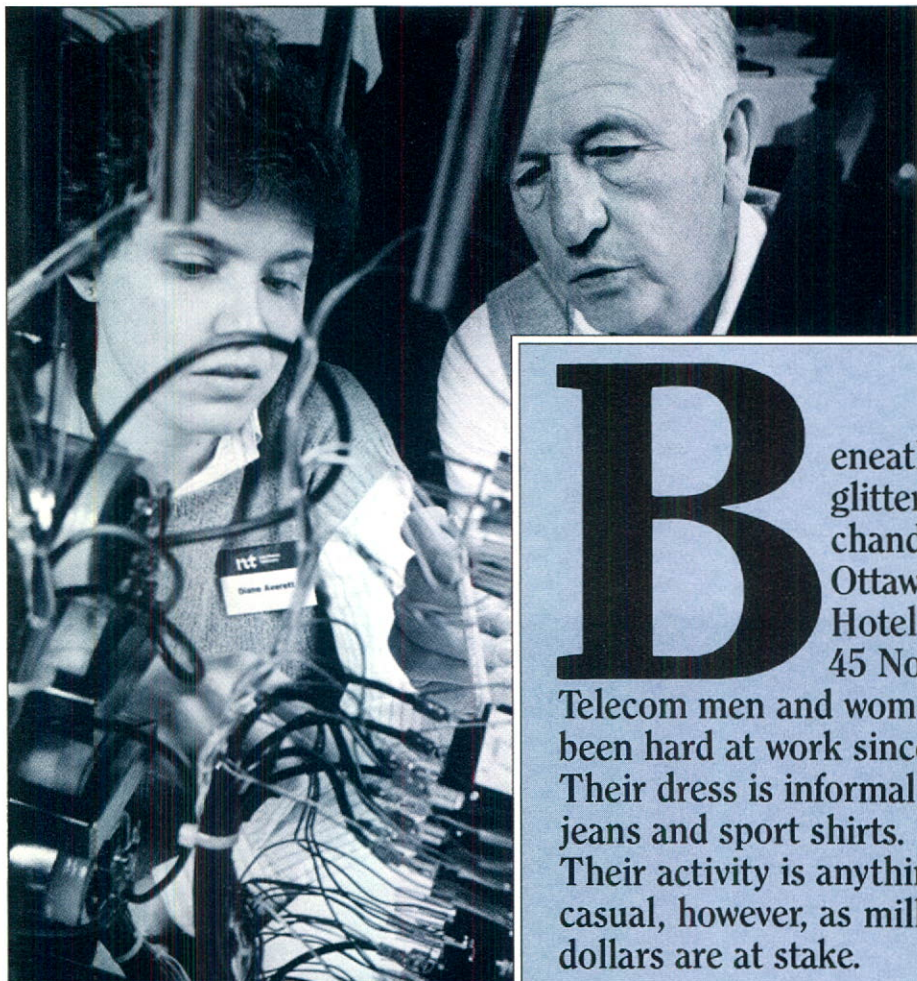
Just as CAD systems are increasing designers' productivity, so computer-automated manufacturing systems improve production efficiency and quality in certain areas of plant operations. These CAM tools can handle repetitive, highly detailed tasks



A robot device assembles terminal blocks at the Outside Plant Division facility in St. Laurent, Quebec. The blocks are used on aerial and buried cable terminals.



**P**articipative programs... are based on the simple premise that people know more about their own jobs than anyone else.



Diane Averett and Dave Luquire evaluate the frame supervisory panel for a DMS-100 central office switch in a value analysis seminar at Research Triangle Park, North Carolina.

with speed and accuracy.

To help select and apply the computerized tools that best meet particular needs, the corporation has established groups such as the Flexible Manufacturing Center in Bramalea, Ontario, and the Manufacturing Process Technology Development Center in West Palm Beach, Florida. One of their tasks is to develop methods of combining CAD and CAM into what is known as CIM – Computer-Integrated Manufacturing. Eventually, this will make it possible for new designs and product changes to be transmitted

directly from the designer to the plant, and then be put into production almost automatically.

“Northern Telecom’s efforts to boost productivity may appear threatening to some employees,” says Mr. MacDonald. “But I think they’re way off base. Activity by the corporation and its people to improve performance is the best way to

**B**eneath the glittering chandeliers of Ottawa’s Skyline Hotel ballroom, 45 Northern Telecom men and women have been hard at work since 7:30 a.m. Their dress is informal, mostly jeans and sport shirts. Their activity is anything but casual, however, as millions of dollars are at stake.

Drawn from the Semiconductor Components Group of Northern Telecom Electronics Limited, the group is taking part in a 4-day, 40-hour workshop, training them in value analysis. This is a technique where teams of employees, drawn from different functions, work together to find ways to reduce product-manufacturing costs and improve the efficiency of Northern Telecom and Bell-Northern Research operations.

Value analysis is a major tool for increasing the corporation’s productivity and thus its ability to compete. Over the last two

years, employees of Northern Telecom Canada used the technique to develop proposals with the potential to hold down costs as much as \$50 million.

In value analysis – also referred to as value management – the groups of engineers, managers, and technical specialists draw on their different backgrounds to analyze the function of a product or process, and judge its “value.” The team then tries to develop alternative approaches which deliver the same results but at a reduced cost, or in a more efficient manner, while maintaining or improving quality.

One example of value analysis at work saw a team from Northern Telecom Inc. determine that a single piece of structural foam could replace 53 separate sheet-metal parts needed to make the line drawers in the DMS switching systems. These foam drawers now hold the line cards for the switches, with an annual cost-saving of \$3.9 million.

During training sessions such as the one in Ottawa, the teams are reminded of basic lessons in human behavior. “There’s a Golden Rule to asking someone for information,” J.K. (Dusty) Fowlkes, a California-based consultant specializing in value-analysis training, tells the workshop in a folksy drawl. “It sounds like a very juvenile statement, but you should always ask for help in the way you would want someone to ask you if you had the answers.”



preserve jobs, and help create new ones."

### **Programs help win sales and new markets**

Changes in products, and in design and manufacturing processes, can sometimes reduce the need for certain traditional types of work. More often, productivity tools and programs save

jobs by helping the corporation to win sales and new markets in North America and, increasingly, internationally.

Advanced production and design technologies bring with them new sorts of skilled, knowledge-work jobs. These are jobs North America needs to compete internationally and achieve long-term prosperity.

Concludes Mr. MacDonald: "Without our constantly improving productivity, and our technological leadership, Northern Telecom simply would not be as successful as it is today. We would not have been able to add nearly 4,900 employees in 1983, especially at a time when sales to some markets declined because of the still-difficult economy."

### **Teams taught not to mock strange ideas**

The advice may seem simple, but it reflects the fact that cooperation – not confrontation – is a basic part of team problem-solving. Also as part of value-analysis training, Northern Telecom teams are taught not to mock or reject any ideas, no matter how absurd they sound at first. Even the most outlandish proposal, when examined positively, may contain an important insight.

Lessons in human dynamics and creative thinking are only part of the value workshops. The Northern Telecom groups are guided through an entire problem-solving "technology": methods of identifying and charting the nature and function of the project they are working on; how to focus on the particular aspect of a problem where the greatest benefits can be obtained; and ways to test the team's conclusions.

The Ottawa training seminar was one of five organized by NTL's Productivity Development Center for different divisions of Northern Telecom Inc. and Northern Telecom Electronics in 1983. Two were held in Ottawa, with others in Nashville, Tennessee; West Palm Beach, Florida; and Santa Clara, California.

Value-analysis training is not new to the corporation. Northern Telecom Canada has made selective use of the

approach for nearly 20 years. As the competitive pressure on Northern Telecom grows, however, the corporation is expanding its use of the value analysis approach.

For example, NTC now has on staff its own certified value specialist, Ed Mitchell, and has organized pilot workshops to apply value analysis to such non-manufacturing areas as quality control, overhead, and scrap. The company is also holding value-analysis sessions to educate its outside suppliers in the technique. This can produce major savings for both the supplier and its customer, Northern Telecom.

Value-analysis programs are now being undertaken by all Northern Telecom's major subsidiaries. Across the continent, nearly 700 managers, engineers, technicians, administrative and other employees were involved in some aspect of the program in 1983.

Over the last two years, such programs have meant an investment of nearly \$1 million by the corporation in direct costs and employees' time. By 1988, the figure could reach \$5 million annually.

### **Even training sessions produce valuable ideas**

"Our goal is to have virtually every employee in the corporation trained in, or at least introduced to, value analysis," says Norm Gillon, director, value programs, at the

Northern Telecom Limited Productivity Development Center. "It's one of the best investments this corporation can make."

The training sessions alone produce suggestions representing millions of dollars in possible savings and improved efficiency, points out Ray Guertin. Based in Research Triangle Park, North Carolina, he is manager, value engineering, for the NTL Productivity Development Center, and works with the divisions to expand use of the value technique.

Not every idea developed by the groups in training actually can, or will be, put into practice. The average is closer to 35 percent, says Mr. Guertin.

"Value-analysis training doesn't just benefit the corporation," adds Gord Stinson, director, manufacturing resource development, for NTC. "It's an opportunity for our people to improve their skills in group dynamics, creative thinking, and problem-solving. Also, through working with people drawn from different areas, they get a better understanding of the total corporation."

Value-analysis skills also can be applied outside of business life. For example, says Mr. Stinson, someone involved with church or community groups could show them how to apply value analysis to solve problems for the groups.

Mr. Guertin points out that

value analysis techniques can be applied effectively to office and administrative operations, as well as to physical products and manufacturing processes. During the training sessions last year, teams examined such activities as accounts payable, and work-order systems.

### **Training sessions backed by months of activity**

While basic training in value analysis takes about 40 hours, Mr. Guertin says, it is part of a wider process that involves months of activity both before and after the workshop. Extensive meetings are held with divisional management to explain how the sessions work, and to select projects for the groups to examine. After the training session, follow-through activity helps the teams finalize their suggestions and present them to senior management.

"One of our jobs is to be salesmen," says Mr. Gillon of the productivity center. Some managers and employees initially regard the value-analysis approach – with its sessions on creativity and group dynamics – as not very businesslike. "But once they experience what value analysis can do, almost everybody is a convert.

"And that's no surprise. The results can be seen right at the bottom line – greater efficiency, cost savings, improved quality, and more employee involvement – everything that helps the divisions beat the competition."



# WHERE THE MONEY WENT

While consolidated revenues reached a record \$3.3 billion in 1983, they were matched by record expenditures in employee compensation, taxes, capital investment, and R&D spending.

While Canada's economy remained sluggish, there were strong signs of an economic recovery in the United States. Expanding sales and increased production led Northern Telecom to hire 4,869 additional employees. This raises the total of Northern Telecom employees to a new record of approximately 39,318 compared with 34,449 in 1982.

Salaries, wages, and benefits for these employees totalled \$1.375 billion in 1983, an increase of 12 percent over 1982. Employee benefits were equal to 15.9 percent of the total compensation. Employee compensation represented 41.6 cents of every dollar of revenue, compared to 40.4 cents in 1982.

After salaries, wages, and benefits, the next largest expenditure was the record \$1.301 billion spent on materials, goods, and services necessary to manufacture products and keep our business running. It represents 39.4 cents out of every revenue dollar. This money buys production machinery, laboratory and office equipment, buildings, and raw materials. Included in this figure are capital expenditures of about \$377 million, which are expected to increase to \$500 million in 1984.

Major projects include the new laboratory building for BNR in Ottawa, which is now well advanced; expanded manufacturing capacity

for DMS systems in Raleigh, North Carolina, SL business communications systems in Santa Clara, California, and for fiber optics in Saskatoon, Saskatchewan; and manufacturing start-up for such new products as the 8000 series telephones in London, Ontario, Vantage 48 in Calgary, Alberta; and the RD-4A digital radio in St. Laurent, Quebec.

Wear and obsolescence diminish the worth of existing plants and buildings. Over the last year, this lost value, or depreciation, amounted to \$162 million.

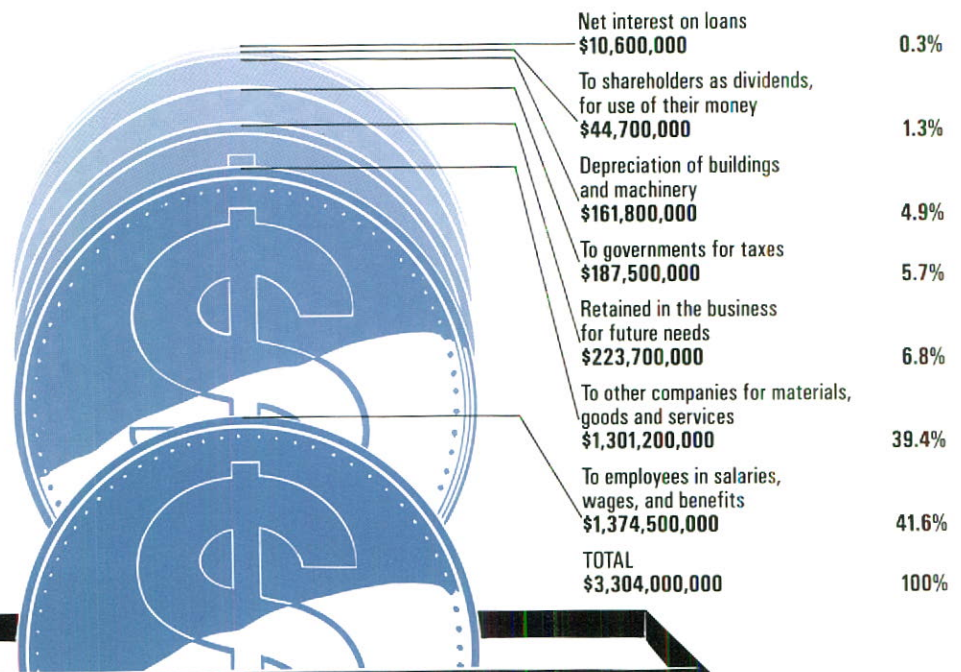
Corporate taxes paid to federal, provincial, state, and local governments totalled \$187.5 million, an increase of \$33.6 million over 1982's \$153.9 million.

At the end of 1983, our total debt as a percentage of total capital

was just 11 percent, down from 23.8 percent at year-end 1982, and 28.5 percent at mid-1982. Long-term debt was \$163 million and short-term debt was \$29.4 million. Our interest charges fell to just under \$11 million, compared with about \$40 million in 1982.

Shareholders of Northern Telecom's 114.6 million outstanding shares received about \$44.7 million in dividends, or about 1.4 cents of each dollar of revenues.

The remaining \$223.7 million was retained by the corporation to help finance its future development. This represents \$119.4 million more than last year, or about 3.6 cents out of every dollar of revenues.





# WHERE THE MONEY CAME FROM

After the worst global recession in 50 years, the United States and Canada finally showed signs of recovery in 1983. For Northern Telecom, this produced record consolidated revenues of \$3.304 billion, up 8.8 percent from \$3.036 billion in 1982.

Most of these gains were made in the United States, where the recovery was strongest. In Canada, unfortunately, poor business conditions continued throughout most of last year.

Capital spending by Canadian telephone companies and private business declined, causing Canadian revenues to fall by 14.1 percent, to \$1.072 billion (32.4 percent of our total revenues). This compared to 1982 revenues of \$1.248 billion (41.1 percent of the total). Despite this fall in revenues, however, Canadian earnings actually increased due to good management, cost-efficiencies, and productivity improvements.

In the United States, increased market share enabled us to achieve a 26.9 percent gain in revenues to \$1.856 billion, or about 56.2 percent of our total revenues. In 1982, revenues from the U.S., amounting to \$1.462 billion, represented 48.2 percent of our total revenues.

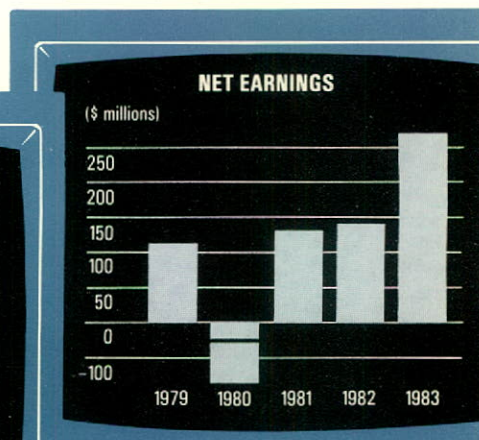
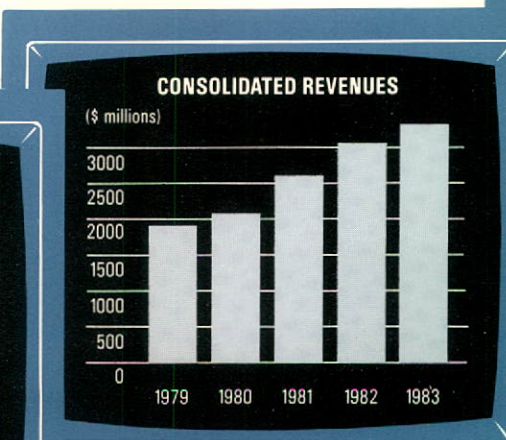
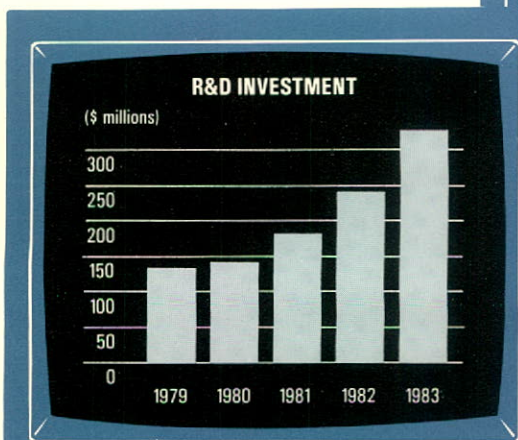
Several product areas made strong gains in the U.S. in 1983. These include DMS central office switching revenues, which were up 73.8 percent, to \$654.7 million; tandem switching systems, for resale and other common carriers, up 34.1 percent, to \$138 million; SL-1 and SL-100 PBX revenues, up 15.5 percent, to \$471.4 million; and transmission equipment revenues, up 67.9 percent, to \$218.5 million, due to the success of such products as fiber optics systems and digital microwave radio.

After a very strong performance in 1982, international revenues also improved by nearly 15.7 percent, to \$376.3 million (11.4 percent of the Northern Telecom total).

In addition to increased earnings in

Canada, gross and operating profit margins dramatically improved corporate-wide. This can be attributed to the increasing profitability of DMS central office switches, as well as improvements in productivity and reduced operating costs. Integrated Office Systems (IOS) can also be credited as a major contributor to this improved performance.

Net earnings (the difference between revenues and expenses, after taxes), before extraordinary items, were \$2.05 per share, a 71.5 percent increase from the 1982 level of \$1.26 per share. Earnings per share reflect a three-for-one split of the corporation's common shares, approved by the shareholders at the April 29 annual meeting and effective May 11, 1983.





# A

## YEAR'S WORTH

1983 was a year of change, of movement, of old records broken, and new landmarks set. The AT&T divestiture will reverberate for some time, but its immediate impact was to make markets more open and encourage new competition. The economic recovery – more apparent in the United States than in Canada – led to declining inflation and interest rates, which benefited both the consumer and industry.

For Northern Telecom, 1983 was a record year. Our gross revenues topped the \$3.3 billion mark. Our U.S. revenues were up 26.9 percent to \$1.856 billion from \$1.462 billion in 1982, making this the first time that U.S. revenues accounted for more than half, 56.2 percent, of the corporation's consolidated revenues.

We also signed our largest single contract for DMS switching when, last August, an agreement was reached with the Post, Telegraph and Telephone (PTT) Administration of the Republic of Turkey to supply more than \$300 million worth of DMS switches and components over five years, beginning in 1984.

We exceeded last year's investment in research and development, reaching \$324.8 million, an increase of 34.5 percent over the 1982 level of \$241.4 million. We invested at a rate of 9.8 percent of consolidated revenues, up from 8 percent in 1982.

Our capital investment for plant and equipment also increased, reaching \$376.9 million, up 49.2 percent from \$252.6 million in 1982. While much of this was for new buildings and expanded manufacturing capacity, in Canada, more than one-third of capital expenditures in 1983 related to productivity improvement.

As a result of expected 1984 growth to \$4 billion consolidated revenues, and a larger-than-ever backlog, we've grown in other ways. There are now more of us than ever before – about 39,318 altogether, up about 4,869 people over the 1982 level of employment. Employment in Canadian operations rose almost 12.3 percent to 21,303. International operations increased employment by about 9.6 percent to 2,311, while in the U.S., employment rose about 17.4 percent to 15,704 people.

1983 was a break-through year for Northern Telecom International. We signed major new contracts with Turkey, received product approvals and a distribution deal in Japan, opened new markets in China and the Caribbean, and unveiled a new organization in London, England, Northern Telecom plc (public limited company), which consolidates our existing U.K. operations, while expanding our European manufacturing and R&D facilities.

### **International share of revenues reached 11.4 percent**

The international share of Northern Telecom's revenues in 1983 amounted to \$376.3 million, or 11.4 percent of our total revenues, compared with \$325.2 million (10.7 percent of the total) in 1982. International sales are expected to account for at least 10 to 15 percent of Northern Telecom's consolidated revenues in 1984.

Through 1988, we expect to see our international business achieve the fastest rate of growth in the corporation. It should exceed the \$1.2 billion revenues level in 1988 and account for about 15 percent of the total revenues of the corporation. By that time, U.S. revenues should represent more than 60 percent of our gross revenues, and revenues in Canada about 25 percent.

Last winter, Nippon Telephone and Telegraph (NTT), the Japanese government telecommunications authority, granted type approval to Northern Telecom's SL-1 for use in Japan. NTT also granted type approval for the proprietary SL-1 electronic telephone set and the Add-on Data Module, which permits data to be sent and switched through the SL-1.



# OF GOOD NEWS

The late-August signing of the contract between Northern Telecom International Limited and the Post, Telegraph and Telephone (PTT) Administration of Turkey, will enable the PTT to modernize and expand the Turkish telecommunications network. The five initial switches to be supplied will serve 70,000 telephone lines and 44,000 long-distance circuits.

In addition to the supply contract, Northern Telecom Limited signed a license with Northern Electric Telekomünikasyon A.S. (NETAS), a Turkish manufacturing company headquartered near Istanbul. Northern Telecom established NETAS in 1967 and now owns 31 percent. The remaining 69 percent is owned by the PTT and other Turkish interests. The license will enable NETAS to manufacture and market DMS switching systems for Turkey and other markets.

Northern Telecom is particularly proud of its relationship with Turkey. Both parties have benefited over the past 16 years, as the joint venture has grown to employ more than 2,000 people, of whom just 3 are Canadian. In addition, NETAS now operates one of the largest R&D facilities in the country.

The new contract calls for Northern Telecom, beginning in 1984, to supply from Canada three complete DMS-100 large local switching systems, and two DMS-200 large long-distance switches to the Turkish PTT. Subsequently, Northern Telecom will supply components for the manufacture of two million equivalent lines of DMS-100, DMS-200, and DMS-100/200 local and long-distance switching systems. It will also supply components for TOPS (Traffic Operator Positions Systems), telephone sets, and power equipment for NETAS's manufac-

turing operations.

Northern Telecom's first sale to the People's Republic of China was a \$400,000 SL-1, installed in the 718-room Bai Yuen Hotel, operated by the Chinese government in Guangzhou, formerly known as Canton. It went into operation in October.

The Caribbean may advertise its resort image, but for Northern Telecom, the Caribbean is a vital, progressive region, open to new technology, and a key part of Northern Telecom's international marketing strategy.

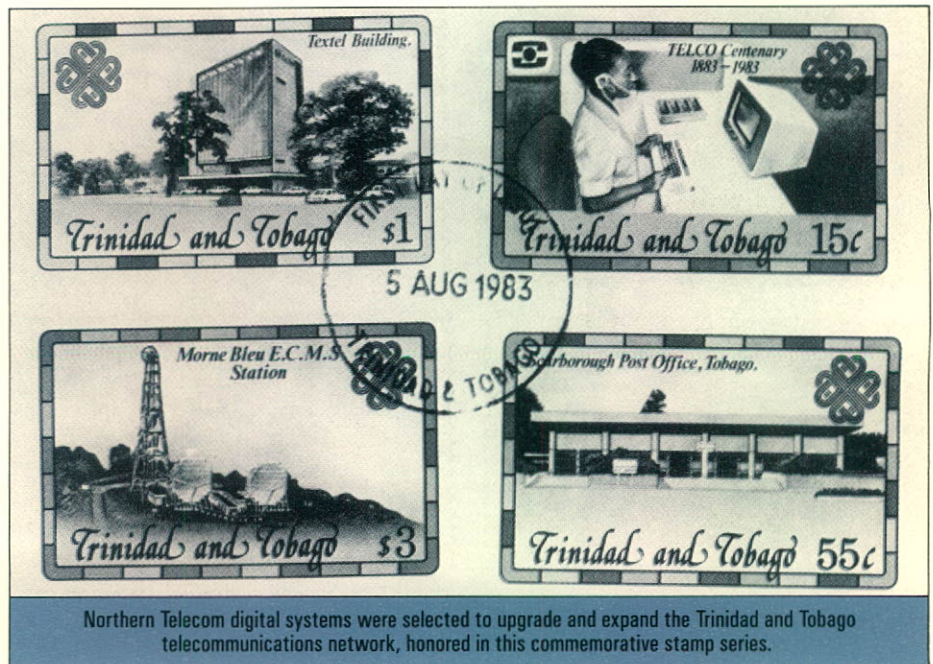
In August, Walter Light officiated at the cutover by the Barbados Telephone Company Limited of the first fiber optics system installed outside continental North America. The newly installed fiber optics network extends 15 miles between Grazzettes, Windsor Lodge, and St. James. It comprises an 18-fiber 3.7-mile link between Windsor Lodge,

and 12-fiber links between Windsor Lodge and St. James, and between St. James and Grazzettes. The link between St. James and Windsor Lodge was the first section of a fiber optics network to go into operation in the Caribbean.

Basil A. Beneteau, chairman of Northern Telecom International Limited, was present at the cutover of an NTIL TOPS for the Trinidad and Tobago Telephone Company in February. It was part of a modernization program, starting with the Port of Spain area, valued at \$60 million.

## **U.K. consolidation means new plant, development center**

In the United Kingdom, Northern Telecom will be investing \$12.9 million as part of its consolidation of existing U.K. telecommunications and data-systems operations. The facilities include a new 100,000-square-foot plant in Hemel Hempstead, which is





## Northern Telecom's first sale to the People's Republic of China was an SL-1.

also the location of a new product-development center. The center will be responsible for creating new terminal-systems products and tailoring Northern Telecom's computer systems to meet the special needs of its European customers. There will also be a new BNR lab, located near Maidenhead, England.

One of the key events in Northern Telecom's international calendar was Telecom 83, the telecommunications industry's largest trade show, held every four years in Geneva, Switzerland. Northern Telecom's exhibit was unique. It used a backdrop of graphic panels of 12 children of different races playing with elements of high technology.

During Telecom 83, Northern Telecom introduced several important

new products. A valuable addition to the SL Family was the SL-10 RAPID integrated access device, a protocol converter/concentrator for SL-10 packet switch data networks. RAPID economically extends SL-10 network capabilities to remote areas.

Telecom 83 was also the site of the introduction of the first member of Northern Telecom's new series 8000 line of electronic telephones. The result of an initial investment of \$13 million, the first set in the line is called Harmony. Compared with its predecessors, the 500 series telephones and the 2500 electronic push-button desk sets, the Harmony will require half as many component parts and different materials. It also uses three custom LSIs developed by BNR. Its economics of manufacturing,

due to productivity improvements, will make it more competitive.

OPEN World was introduced in November 1982. It proposed a planning framework of new products and services that would feature the SL and DMS Families of digital switches as the hub of an integrated business communications system.

Phase two of OPEN World was marked by a new advertising campaign, launched in October. Advertisements appeared in such major publications as the *Wall Street Journal* and *Business Week*. In addition, a series of new products were announced in San Diego, California, at the TeleCommunications Association (TCA) show.

These new products and enhancements expand the extensive data-handling capabilities of the SL-1 business communications system. These include IBM 3270-related capabilities, options designed to permit direct digital communications with other compatible switching systems or computers, and a voice store-and-forward messaging system, which is integrated with the SL-1 system.

### **New interface links PBX and computers**

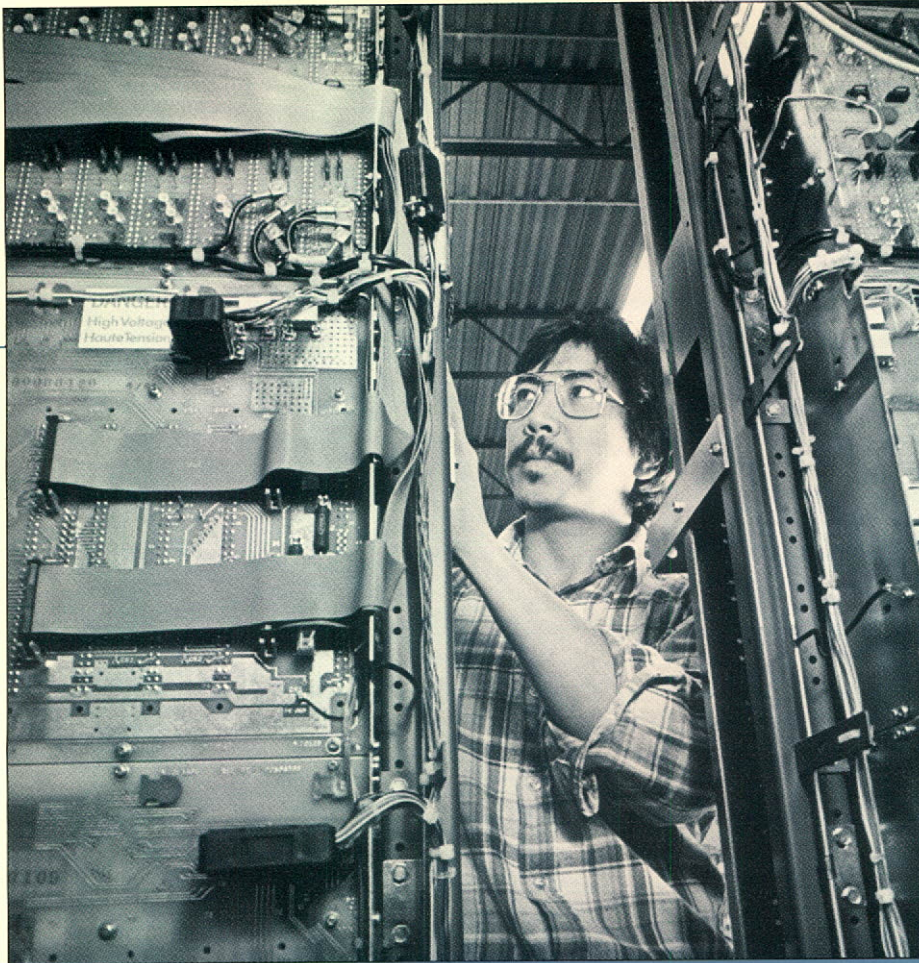
A key device is the Computer-to-PBX Interface (CPI), which will be built into the SL-1. Based on a concept recently designed and offered for license by Northern Telecom and Digital Equipment Corporation, the CPI permits economical data communications from a compatible computer through the SL-1 to computer terminals, over standard telephone wiring.

One of the principal goals of OPEN World is to establish unimpeded communication between different brands of office products. To that end, other new products were introduced in 1983. These included the PC



The futuristic structure in the center is one of two Northern Telecom display areas at Telecom 83, the major trade show held every four years in Geneva, Switzerland.





NTC's Optical Systems Division last year opened a new, 35,000 square-foot plant in Saskatoon, Saskatchewan, where Tony Dato tests a fiber optics transmission system.

interface card that allows the IBM Personal Computer to connect directly to Northern Telecom's SL-1, using standard twisted pair telephone wiring. And in June, we introduced a coaxial adapter which enables a Displayphone terminal to be connected to a coaxial port on the IBM 3270 series of office systems, and to emulate IBM's 3278-2 terminal.

Part of the initial OPEN World announcements included the licensing of the asynchronous interface specifications for the SL-1. The asynchronous interface commonly connects low-speed terminals, such as the Displayphone and most microcomputers. We have negotiated various cooperative agreements with data processing manufacturers, such as Digital Equipment Corporation, Data General, Sperry Inc., and Wang Laboratories, either to license these specifications, or to work together to develop methods of improving communications between their equipment and Northern Telecom's.

The SL-Family of digital business

communications systems is vital to OPEN World. The Family was extended in 1983 with the announcement of the SL-1S. That expansion means that the SL-1 product line will now include the SL-1S, serving from 30 to 160 lines; the SL-1M, serving as many as 400 lines; the SL-1N, to 1,200 lines; and the SL-1XN, to 5,000 lines. The SL-100, a 30,000-line capacity digital PBX, rounds out the SL Family.

#### **Increased earnings from Canada were a special triumph**

Economic recovery in 1983 was slower in Canada. Lower capital expenditures by Canadian telephone companies and conservative spending by business contributed to a drop in Northern Telecom Canada's revenues. Canadian revenues fell to \$1.072 billion, from \$1.248 billion in 1982. As a percentage of overall revenues, they represented 32.4 percent, down from 41.1 percent in 1982.

Even so, the increased earnings picture represents a special triumph. It is always easier to increase profits

during a period of economic growth. Northern Telecom increased profits in Canada during a recession. Employees did it through a combination of good management, cutting costs, measures taken to improve productivity, and better use of the available manufacturing capacity to meet increasing international demand.

Major capital expenditures included a new \$40 million, 185,000-square-foot plant to produce the Vantage 12 and 48. It opened in Calgary in November. The new plant employs 580 people.

Northern Telecom's Optical Systems Division opened a second plant in Saskatoon, Saskatchewan. Saskatoon is world headquarters for the company's fiber optic business. OSD signed a four-year agreement with MCI Communications Corporation, of Washington, D.C., for delivery of 62,000 miles of fiber optic cable.

Other important Canadian contracts included a five-year supply agreement with Teleglobe Canada signed in June. Under the agreement DMS-300 (digital multiplex system) telephone exchanges will be installed and expanded in Vancouver, Toronto, and Montreal. These special international gateway switches will connect all of Canada's international switching centers to fully digital technology. The agreement is for an initial period of five years, and is renewable annually when the term expires. It is expected, over the five years, to represent purchases of \$70 million or more of digital switching systems and components.

In February, Northern Telecom signed an agreement with Sun Life Assurance Company of Canada for a distributed data processing (DDP) network to serve Sun Life locations across Canada. The contract involves 67 DDP units, as well as field engineering services at the Sun Life locations. The computer equipment



## **N**orthern Telecom increased profits in Canada during a recession.

consists of Northern Telecom's Models 585 and 503 systems. The Model 585 is a stand-alone DDP system that supports up to 16 data stations and printers. The model 503 is a single-station desk-top DDP system.

Northern Telecom enjoyed a banner year in the U.S. Consolidated revenues were \$1.856 billion for 1983, compared with \$1.462 billion in 1982, for an increase of 26.9 percent.

### **A key supplier to U.S. Bell operating companies**

Part of that achievement can be credited to a blossoming of sales to the Bell operating companies, to whom we have become the key supplier, after AT&T Technologies Inc. In June, we signed supply contracts, each worth an estimated US\$60 million to more than US\$200 million over the first two years, with the New

England Telephone, Southwestern Bell, Southern Bell, and South Central Bell operating companies, and U.S. West, one of the seven Bell System regional holding companies that came into being in January 1984. These contracts are for the DMS-100 Family of digital switching systems.

In August, we signed a four-year supply contract for the DMS-100 Family of digital switches with South Central Bell Telephone Company. The value of the agreement will exceed US\$60 million in 1983-84. Also in August, we signed a four-year supply contract for DMS-100 Family systems with Southern Bell. The value of the contract will exceed US\$140 million in 1983-84 alone.

And in October, we signed a four-year general procurement agreement to supply digital switching systems to the Bell operating companies owned

by U.S. West. The agreement covers Northern Telecom's DMS-100 local switch, serving up to 100,000 lines, the DMS-200 toll switch, and the DMS-100/200 combined local/toll switch. U.S. West manages Mountain Bell, Northwestern Bell, and Pacific Northwest Bell Telephone.

Further major sales agreements included United Telephone System, Inc.; Contel Network, Inc.; MCI Communications Corp. (for 12 DMS-250s); and three more DMS-250s to ARGO Communications Corp. Bankers Trust Company signed a US\$2.7 million contract for an SL-10 packet switching system. And the Bank of Boston signed a US\$6.5 million contract for an SL-100 digital business communications system that can provide integrated voice and data service to some 6,400 telephone lines.

On the heels of good news about these sales and others, Northern Telecom Inc. announced, in September, plans for a new US\$25-million headquarters building in Nashville. The new eight-story, 180,000 square-foot building reflects the growth of the U.S. company and its stature as the second-largest resident telecommunications manufacturer in the U.S.

Located at Nashville's MetroCenter office park, the building will be sheathed in granite and glass, with a central glass-enclosed tower. Features of the structure include a major computer installation, a three-story atrium rising from the inside angle of the L-shaped structure, and an employee recreation area.

Another major capital investment by NTI was announced in July with plans to spend US\$16 million to expand the manufacturing capacity for digital central office switching equipment at Research Triangle Park in North Carolina. This development will create approximately 1,000 new jobs.



NTI President Desmond Hudson, right, shows Tennessee Gov. Lamar Alexander, left, and Nashville Mayor Richard Fulton a model of the company's proposed new headquarters.



The expansion will add 234,000 square feet of manufacturing and office space to Northern Telecom's existing 328,000-square-foot structure, a 70 percent increase in size. The company has also purchased an additional 27 acres of land, increasing its total in Research Triangle Park to 100 acres.

### **BNR strengthens its position as an R&D leader**

In 1983, Bell-Northern Research strengthened its position as the largest private research and development organization in Canada, and one of the most respected in the world.

BNR's 1983 budget was \$314.3 million, an increase of \$34 million, or 12.1 percent, over 1982. BNR's budget represents \$246.8 million from Northern Telecom, \$55.7 million from Bell Canada, and \$11.8 from outside research-contract activities.

BNR's population grew to 3,892 from 3,388 in 1982. In addition to the planned new BNR lab in Maidenhead, England, BNR is expanding its facility in Research Triangle Park near Raleigh, North Carolina, in 1984.

In 1983, it also established a new laboratory in Richardson (Dallas), Texas. The Richardson lab serves the needs of the resale and other common carrier markets and the private network market.

Northern Telecom's Integrated Office Systems group and Carrier Networks unit are headquartered in Richardson. The new BNR laboratory started operations with a staff of some 150. This number is expected to more than double within two years. The current Northern Telecom network systems development organization will provide its nucleus.

On June 2, Alberta Premier Peter Lougheed opened the new \$5 million BNR Edmonton laboratory. At the opening, David Vice, president of



BNR's Ron Foerster, left, at the opening of the new laboratory in Richardson, Texas, chats with (left to right) Ken Lauffenberger, Mike Crotty, and Zye-kong Cheng.

Northern Telecom Canada, called the new lab "the most significant research and development center in electronics in western Canada."

Seventy-eight people are currently employed in the Edmonton laboratory, which occupies 46,000 square feet. The building plan allows for an 80,000 square-foot addition, with a staff of 250 anticipated within five years.

BNR Edmonton will undertake applications-oriented research and development in three areas: fiber optics communications systems, telecommunications test systems, and software for key telephone systems. The labs provide Northern Telecom with R&D support for its manufacturing plants in western Canada, especially in the area of transmission systems and development.

### **BNR innovators are honored at special dinner**

BNR's innovations have helped make Northern Telecom the world's largest manufacturer of fully digital switching

systems. Sixty-four of BNR's innovators were honored in May at the company's annual patent awards dinner in Ottawa. These scientists and technologists were awarded a total of 96 Canadian and U.S. patents in 1982.

At the dinner, John Elliott, BNR vice-president, corporate development, said, "We've been able to attract some of the best people in their fields to BNR. As a result, approximately 80 percent of all Northern Telecom's revenues come from products designed by BNR."

Those people also compose a unique talent pool, one whose collective knowledge and experience have made them a critical resource both in the laboratory, as well as trouble-shooting in the field. Those achievements – the solutions to problems that make a product easier to manufacture, or allow it to do something that was not possible before – are an essential foundation for Northern Telecom's success, and the economic well-being of all its employees.



# UNITED WAY '83:

Business and its employees make up the economic heart of any community, through the year-round jobs and purchases they represent. Each fall, however, companies and workers across North America face a special challenge: to use their economic muscle in support of the United Way campaign.

The United Way funds the health and social service agencies that aid us all in times of need or misfortune, and contribute to community and national well-being. In 1983, the people of Northern Telecom and Bell-Northern Research met the United Way challenge by setting new records for total contributions and the number of participants.

The number of Northern Telecom and BNR employees participating across Canada and the U.S. increased by a third — from 12,803 to 17,093. This is more than half (55 percent) of all employees at locations where United Way campaigns were held.

Not only did more Northern Telecom people contribute, but their generosity increased even more dramatically. Total employee donations (in a combination of Canadian and U.S. dollars) topped the million-dollar mark, for a total of \$1,029,998. This is a 70-percent gain over the 1982 donations of \$604,478.

A geographic breakdown shows that in the U.S. employee giving totalled US\$521,169, a gain of 76.2 percent. For Canada, donations reached C\$508,829, an increase of 64.8 percent.

The average donation from each participating employee in Canada increased 36.5 percent, to \$51.36. Northern Telecom's U.S. employees donated an average of \$72.54 each, up by 12.8 percent.

The corporation itself also makes United Way donations. These are based generally on the number of employees in the communities where Northern Telecom has facilities. Last year, this funding (in combined U.S.-Canadian dollars) was \$456,000.

"Our people who participated in the 1983 United Way effort, and especially

those who devoted extra time as campaign organizers and canvassers, have every reason to feel proud," says Edmund Fitzgerald, president of Northern Telecom Limited.

"This sense of responsibility and commitment to our neighbors and community is a cornerstone of a prosperous, independent society. The social leadership we show can be just as important to our future — both as individuals and as a corporation — as our leadership in telecommunications technology and manufacturing.

### **Three new prizes help recognize campaign performance**

"This is why last year Northern Telecom expanded its activities to encourage and support the United Way campaign. The enthusiastic response of employees meant that we vastly exceeded our two main goals: a 10-percent increase in the number of employees participating and in the level of donations."

To help encourage employees' United Way activity, Mr. Fitzgerald last year established three special prizes for the locations that excel in campaign contributions. These were:

The *President's Trophy*, for the plant or office employing 50 people or more that most improves its contribution record.

A *Bonus "Night on the Town" Prize*, for any plant or office employing 50 people or more achieving 95-percent employee participation in the campaign, with an average contribution of each employee equal to one day's salary or wages.

And the *President's Incentive Prize Program*, for sites with 5-to-49 employees, that increased both total contributions and the number of donors by more than 10 percent.



# EMPLOYEES SET RECORDS

## Amherst employees boost donations by 600 percent

The 1983 winner of the President's Trophy was Northern Telecom Canada's Subscriber Switching Division plant in Amherst, Nova Scotia. There, the number of employees donating increased by 146 percent (from 26 to 64), the total donation increased 600 percent (to \$6,515), and the average per-donor contribution was

up 208 percent.

According to Plant Manager Peter D. Sarbutt: "The day that the President's Trophy was announced, our United Way team decided we were going to be the winners. They met with employees in small groups, discussed the United Way appeal, and how we could demonstrate the special spirit of Amherst."

"There are two things I'm particularly proud of. Firstly, at least

40 percent of our people live outside the Amherst area — as much as 40 miles away. Yet they still saw fit to contribute to the community where they work.

"Secondly, the combination of employee giving and the donation from Northern Telecom generated 12 percent of the total Amherst United Way fund objective — just from a single company."

"As the winners of the President's Trophy, we've already set our goal for next year's campaign," Mr. Sarbutt adds with quiet confidence. "That's the year we'll win the Bonus Prize, by passing the 95-percent donor level."

The Amherst plant is not the only location demonstrating that special "down-home" community spirit of Canada's east coast. Of the four sites qualifying for the President's Incentive Prize, two are also in the Maritimes: the General Switching Division plant in Charlottetown, Prince Edward Island (92 percent employee participation); and the metals processing and reclamation facility in Halifax, Nova Scotia (total donation up 127 percent).

The remaining two incentive prize-winning sites are also part of Northern Telecom Canada: the transmission group headquarters in Edmonton, Alberta (where contributions soared from \$208 to more than \$4,000) and the communications cable division plant in Regina, Saskatchewan (where participation went up from 8 percent to 65 percent). At each of these four locations, the incentive prize meant that a raffle would select an employee who could choose gifts worth up to \$200 from the Northern Telecom premium catalog.

Winning the Bonus Prize for the major site with participation exceeding 95 percent was the Northern Telecom



Amherst plant employees Carolyn Seamen (left), Peter Sarbutt (plant manager), and Evelyn Bishop are congratulated by Group Vice-President Gedas Sakus for the plant's United Way campaign.



*Participation up by a third while donations top the million-dollar mark.*

Inc. headquarters group in Nashville, Tennessee. The percentage of employees making contributions more than doubled over the year before (from 41 percent to 96 percent), with the total amount donated also virtually doubling, to \$46,302 from \$23,862 in 1982.

Runner-up among the major sites was West Palm Beach, Florida, where Northern Telecom Electronics makes printed circuit boards and other components. The participation level there was 90 percent (from 52 percent the year before), as a total of 567 donors contributed \$34,500.

**Participation rate of 75 percent is 1984 target**

The site with the largest total donation was Northern Telecom Canada's Digital Switching Division facility in Brampton (Bramalea), Ontario, with \$97,000 contributed by 1,789 people. Running a close second was the NTI digital switching systems group in Research Triangle Park, North Carolina, where 1,882 employees donated \$95,828.

"These figures show the strong progress we have made as a group in supporting the United Way," Mr. Fitzgerald says. "However, it's also true that many companies have employee-involvement much higher than Northern Telecom's 55-percent level.

"For 1984, I hope to see participation reach 75 percent, and total contributions by our employees of \$1.5 million. By meeting these reasonable targets, Northern Telecom people will be adding to the standard of excellence and achievement with which they are already identified in so many areas."



Northern Telecom  
**PRESIDENT'S TROPHY**  
United Way  
North American Employee Campaign

1983  
AMHERST  
NOVA SCOTIA  
CANADA

The President's Trophy for the plant with the best United Way campaign performance is this Inuit sculpture by artist Caleb Sangoya, entitled "Father and Son."



