

# Canada Reports

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External Affairs  
Canada

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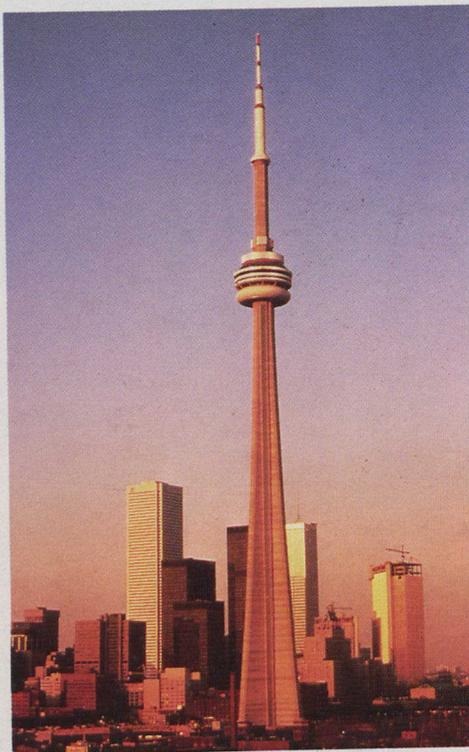
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## Cover page

*Spacotel is a satellite communications system that transmits and receives voice and data communication from virtually any location.*

MICROTEL LIMITED, VANCOUVER



*Toronto's CN communications tower, the tallest free-standing structure in the world, houses microwave antennas and equipment for radio and television broadcasting.*

## The realization of a dream

In the 19th century, many dreamed of uniting Canada and its people from the Atlantic to the Pacific and into the far reaches of the north.

It was a dream that seemed impossible to attain. The land was vast, stretching some 5 500 kilometres from coast to coast, and almost 5 000 kilometres from its southernmost tip to the North Pole. Settlements were scattered, and often a journey to the next community or even a visit to a neighbour, was long and difficult.

Through the efforts of people like Canada's first prime minister, Sir John A. Macdonald, railway and telegraph lines soon linked central Canada with the Maritimes. And by 1885, the Canadian Pacific Railway had been completed across the prairies and through the Rocky Mountains to Craigellachie, British Columbia, where eastern and western railway lines joined to form

Canada's first transcontinental railway. With the completion of the CP railway, the first all-Canadian telegraph service was established from the Atlantic to the Pacific oceans.

The first part of the dream had come true. Canada was united from coast to coast and its people could now travel and communicate more easily over the long distances across the country. But the challenge of providing the opportunity for all, even those living in the remotest areas, to communicate with each other and the rest of the world, still remained.

Over the past century Canadians have met this challenge and developed communications systems which are second to none. By expanding such services as the telephone, radio and television, even to the most remote areas of the country, Canada has also helped contribute to the development of international telecommunications technology.

In this issue of *Canada Reports* we look at some of Canada's achievements. Broadcasting, satellite communications, fibre optics, videotex, digital transmission and the creation of international standards are reviewed. We also look at some of the projections and programs that will carry Canada into the 21st century as a recognized world-class leader in communications.

# Communications in Canada

## From dots and dashes to digital data

A century ago, railways and telegraph wires linked Canada from east to west. Today, a variety of modern technologies provide the country's vital links, serving the communication needs of business and industry, delivering radio and television programs, helping to protect life and property, and keeping friends and families in touch across the second largest country in the world.

Imagine a float plane touching down on a lonely lake in Northern Canada. It taxis to shore, two geologists climb out and unload their gear. The plane takes off, leaving the geologists for a month of exploration work. As they make camp, one of their first activities is to set up a satellite dish and establish voice contact with their oil company's head office. Soon they will start sending back information on their findings in the form of digital computer data.

A farmer on the western prairies dials a telephone number and checks out the latest prices on crops and livestock displayed on his video terminal. This is Telidon, Canadian videotex, bringing interactive television to thousands of users.

From Toronto, a major Canadian daily newspaper sends its text by satellite to printing plants in five other cities, instead of printing hundreds and thousands of copies and shipping them across the country. Telecommunications substitutes for transportation.

In Ottawa, the nation's capital, a taxi driver nearing the passenger's destination quietly pushes a button on a small mobile data terminal. It automatically notifies the dispatch office of the taxi's location, then displays the address of the next fare. This fast and efficient Canadian mobile data system was originally developed for use by police forces.

A small plane crashes in a mountain forest far from the nearest town. Jolted into action by the impact, the plane's emergency locator transmitter automatically starts sending a distress signal. Picked up by satellite in minutes, it pinpoints the location of the downed plane to within a radius of 10 kilometres. As search and rescue operations begin, the Canadian-developed concept of satellite-assisted search and rescue has once again proved its worth.



*Messages received via satellite at a control station can be relayed directly to a Coast Guard vessel on the ocean.*

North of the Arctic circle, an Inuit production crew starts videotaping a new Inuktitut-language television program. Later it will be distributed by satellite to more than 30 communities in Northern Quebec, Labrador and the Northwest Territories by the Inuit Broadcasting Corporation.

These examples illustrate a few of the ways Canada uses advanced communications to overcome the problems of vast size and a small, scattered population of some 25 million people. The task is formidable. Eighty per cent of Canadians live within 200 kilometres of the Canada-US border. Beyond this narrow corridor stretch rural areas where there are four people per square kilometre, and beyond this again lie the remote areas — more than 80 per cent of the land mass — where only one per cent of Canadians live.

To meet the challenge, Canada has developed one of the most advanced communications systems in the world today. Service is almost universally available: 99 per cent of households have telephones and radios and 98 per cent have television sets. The average Canadian makes more than two dozen phone calls a week and, during the fall and winter months, listens to 17 hours of radio and watches 24 hours of television every week.

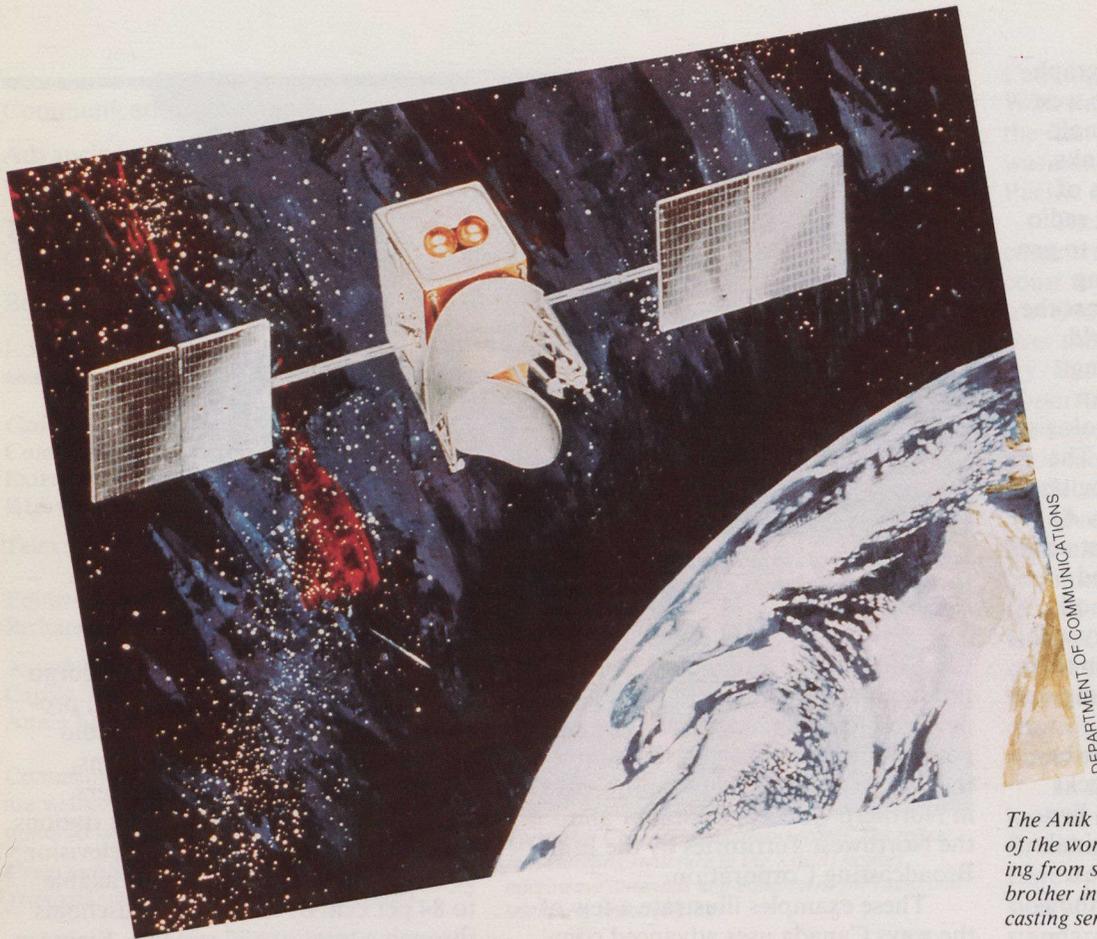
Services are provided by a mixture of private enterprise and government

agencies operated as commercial corporations. On the broadcasting side, programming is originated by 670 radio stations and 121 television stations, including educational broadcasters. More than 2 000 rebroadcasting stations extend the range of radio and television coverage. Cable television is available to 84 per cent of Canadian households through a total of 827 systems. Eighteen major companies and numerous small enterprises offer telecommunications services, from traditional telephone to the latest high-speed digital data transmission. In addition, some 200 companies provide public mobile radio service.

But statistics do not tell the whole story. Canada's goal is to make communications available to 100 per cent of the population. The difficulty and cost of reaching that last one per cent of the population is enormous.

In Canada's North, for example, microwave has extended basic service throughout the Yukon and the Mackenzie Valley. In the eastern Arctic, where distance is measured not in kilometres but by the frequency of plane service, satellites have brought a dramatic improvement in communications over the past decade and a half. In the Yukon and the Northwest Territories, telephone service and radio and television reception are now available in all but a handful of tiny settlements with fewer than a hundred people.

# Advancing telecommunications technology



*The Anik B, launched in 1978, ushered in the era of the world's first direct commercial broadcasting from satellite to earth. The Anik (which means brother in Inuit) satellites extended direct broadcasting service to remote areas.*

## Satellite spectrum

It was largely because of a desire to improve the level of communications services that Canada launched the first of its Anik satellites in 1972 and so became the first nation in the world to have its own domestic commercial communications satellite system. Since then, eight more commercial satellites have been launched. All have worked perfectly and to date all have exceeded their expected lifetime. Four are currently in service.

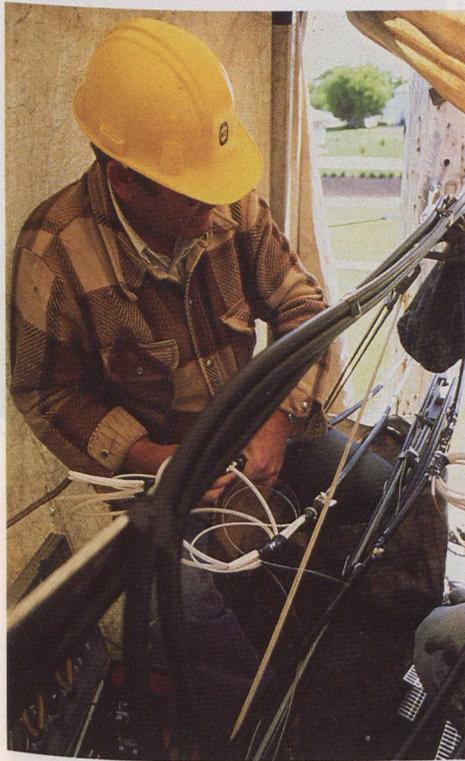
One of Anik's missions was to deliver national network television programs to local stations from coast to coast and to supplement microwave and cable systems carrying the high volume of east-west long-distance calls. But the fact that it could "see" the entire country from its position in orbit 35 800 kilometres above the equator meant that for the first time basic communications service could be made available to virtually all Canadians.

By 1975, two more commercial satellites had been put into orbit, and in 1976 a communications technology satellite was launched. Named Hermes, its purpose was to advance the state of the art in satellite communications and develop new types of services.

Hermes pioneered the use of higher frequency radio bands which had previously been tried by commercial satellites and have since become the workhorses of satellite communications throughout the world. It transmitted a powerful signal that could be received by umbrella-sized dish antennas even in city centres. Hermes gave the world's first demonstration of satellite-to-home broadcasting and led to many innovative services, such as long-distance audio-visual consultation between doctors in remote towns and medical specialists at major city hospitals.

The current Anik C series of Canadian satellites operates in the bands pioneered with Hermes. Working with small antennas and featuring regional coverage patterns, these satellites have extended choice in radio and television programming to more than 800 small communities through satellite-to-cable networks. They have also made possible private satellite business networks transmitting an integrated stream of digital voice, data and video between branch offices across the country.

Further improvements can be expected when the planned mobile satellite (MSAT) service goes into operation in the 1990s. MSAT will extend commercial two-way voice and data communications to mobile and portable units anywhere in Canada, meeting the growing demand for mobile voice and data service in non-urban areas. It will benefit farmers and fishermen, serve the transportation and shipping industries, collect data for environmental sensing



Laying fibre optic cable.

At the network control centre of Teleglobe Canada, the country's international telecommunications carrier, a complete range of telecommunications services is monitored.



TELEGLOBE CANADA

and remote monitoring applications, provide emergency communications at disaster sites, and extend telephone service to some 150 000 households beyond the economic reach of today's systems.

### Fibre optics provide highways of light

Another advanced technology, fibre optics, promises to further improve service to hundreds of thousands of households in rural Canada which receive only two or three television channels and now share party-line telephone service with up to three neighbours.

In fibre optic communications, information is transmitted through glass fibres in the form of rapid pulses of light. Very pure glass is heated to high temperatures, then stretched into hair thin strands that bend like plastic yet are strong as steel. Each fibre can handle thousands of telephone calls and still have room left over for television, FM radio and computer data.

Canadian firms are at the leading edge of this new technology. Following intensive research and development starting in 1972, a number of companies began manufacturing commercial volumes of optical fibre and optical communications hardware. By 1983, optical fibre was replacing coaxial cable in major communication arteries.

The province of Saskatchewan in western Canada has an optical fibre network carrying voice, data and video between 12 cities and 40 of its largest towns. Completed in 1985, the network stretches a distance of 3 200 kilometres.

Meanwhile, a small-scale service to 150 households in two farming communities in Manitoba, another western Canadian province, is proving that optical fibre can withstand the Prairie climate including winter frost to a depth of two metres and temperatures ranging from 40°C in summer to -40°C in winter.

It is also demonstrating that fibre optics can bring rural residents the same high level of communications available in urban areas.

Started in 1981, the Manitoba project was the world's first multimedia test of fibre optics in a rural setting, delivering single-party digital telephone service, FM radio and several television channels, and offering videotex access to various data banks.

### Setting a standard with Telidon

A major achievement of Canadian research is the sophisticated videotex system, Telidon. Essentially a high-quality computer graphics communication scheme, Telidon was developed by government scientists in 1978. It formed the basis for the North American videotex standard, which has been officially endorsed as one of three recognized international standards.

Artist's conception of MSAT (mobile satellite) which will bring reliable voice and data communications to people, places and machines everywhere.



DEPARTMENT OF COMMUNICATIONS

In industry, Telidon has many applications from answering tourist inquiries to analyzing the stock market and providing weather briefings for pilots. In the home, it can turn a television set into a powerful but easy to operate information tool. The user can do a variety of things from paying bills or making business transactions to shopping or playing games.

By 1983, more than 300 Canadian organizations were active in the videotex market, and more than 4 000 videotex terminals were in use. Today, Telidon systems have been sold to companies in Australia, Britain, Japan, the United States, Switzerland and Venezuela.

#### **Towards computer compatibility**

Today, computers serve not only traditional data processing needs but an ever-broadening range of applications including word processing, computer-assisted learning and computer-aided

design and manufacturing. At the same time, there are increasing requirements for communication between computers. Unfortunately, when computers are made in different countries by different manufacturers, communication is often impossible.

Overcoming the problem of incompatibility has been a high priority for Canadians. For more than ten years, they have been playing an important part in the development of international standards for open systems interconnection (OSI) to allow unrestricted communication between computers and computer-based office systems regardless of manufacturer or country of origin.

National standards are also being developed. Within Canada, librarians are now testing OSI standards for communication of bibliographic information, and banks are drafting standards tailored to their special environment.

The development of such standards is crucial to the future of office communications systems. In Canada, as in other nations, typewriters and calculators are being replaced by communicating word processors and personal computers. Disks, tapes and other forms of computer memory are taking over from filing cabinets. Information processing and communications are merging into a new field of tele-information known as informatics.

New electronic office equipment is being designed to serve multiple functions, including communications. From a single multifunctional station, workers in the office of the future will be able to communicate both orally and visually, either individually or in groups, with other stations anywhere in the world. At the same time, they will be able to perform word processing or financial analysis; consult remote databases; store and retrieve information; and share numbers, text or high-quality graphics.



*Telidon offers numerous text and graphics capabilities and can be used for such functions as teleshopping, telebanking and reservation services.*



BELL NORTHERN RESEARCH

*More and more Canadians are using computers for essential services.*

### Increased information flow from digital services

One of the most important recent developments in telecommunications has been digital technology in which speech, characters and images are coded in streams of off/on pulses. Based essentially on computer technology, digital systems offer many benefits and advantages over analog systems which send and receive telecommunications in electrical waves that vary in strength and frequency.

Digital systems also allow new features to be added to basic services. Instead of accessing one network for telephone, another for high-speed data and yet another for video, the office of the future will have an integrated system carrying all types of information in digital form — the integrated services digital network (ISDN).

ISDN is not a separate, new network, but will evolve from the gradual transformation of existing networks in accordance with international standards, including those developed for OSI. The first set of ISDN standards were adopted in 1984 by the International Telegraph and Telephone Consultative Committee (CCITT), an international planning body, to simplify communications in an information-oriented society.

Canada is well positioned to move into the world of ISDN since so much of its communications system is already digital. The telephone companies started on the road to digitization in the mid-1960s. Today approximately 80 per cent of telephone traffic is handled by digital switching and transmission facilities. National public data networks introduced in the 1970s were the first in the world. They are used by many small- and medium-sized businesses.

The installation of digital microwave systems began in 1977. Canada's Anik C satellites, launched between 1982 and 1985, were designed for full high-speed digital transmission. Because of their enormous information-carrying capacity, fibre optics systems are well suited to ISDN. Finally, Canadian manufacturers of computers and other telecommunications products are quickly evolving their product lines to meet the next generation of ISDN standards now being developed within the CCITT.

# The Canadian Broadcasting Corporation

## Proven excellence through national broadcasting

For more than 50 years, the Canadian Broadcasting Corporation (CBC) has been the familiar voice of Canada's public broadcasting service.

Today, the CBC, a Crown corporation, broadcasts across the length and breadth of the country, from the Atlantic to the Pacific and from the American border to the far reaches of the Arctic. It has achieved a reputation for quality in programming and is considered one of the world's major public broadcasting organizations.

For over 40 years, the CBC has also operated an international shortwave service, Radio Canada International (RCI). Hundreds of programs presented to some 12 million listeners by RCI have been nominated for or have received international awards.

## Services and programming

The mandate of the CBC is extensive. The Broadcasting Act of 1968 requires CBC to provide a service that is mainly Canadian in content and character; to offer information, enlightenment and entertainment for people of different ages, interests and tastes; to extend to all parts of Canada; to be available in English and French; and to express Canada's identity.

To fulfil this mandate, the CBC operates two television and four radio networks with 31 and 68 stations respectively, in English and French. There are also 48 affiliated radio and television stations.

CBC's Northern Service reaches over 98 per cent of the people living in the Yukon, Northwest Territories, Northern Quebec and Labrador. In addition to the regular French and English programs, radio and television programs are presented in six and seven native languages, respectively. Native communications societies also produce their own programs which are distributed through CBC's facilities.

Programming on the CBC networks is varied in form and content. AM radio provides a balance of programming



CBC's Northern Service provides radio broadcasts in a number of native languages.

with a concentration on information and news, while FM stereo radio, with its superior audio quality, offers mainly performance and arts programming.

Some of the cornerstone programs on the English radio network are the popular current affairs phone-out program *As It Happens* and *Sunday Morning* with its comprehensive news analysis and award-winning documentaries. Music offerings range from *The Canadian Top 20*, a program of popular music for younger listeners, to *A Joyful Sound*, a program that presents a new perspective on religious music.

The AM French network is aired in six cities. Aimed at a general audience, programming includes news, current affairs, sports, popular music and regional magazine programs.

English stereo network programs range from the very popular *Off the Record*, which celebrated its twenty-fifth anniversary in 1986, to the drama series *Sunday Matinee* featuring Canadian playwrights, and *Cranks*, a portrait gallery of Canadian eccentrics. The

French network also promotes the creation and broadcast of Canadian works, especially from French-speaking Canada.

CBC television offers programming in many categories from drama and variety to news and public affairs, sports, youth and the arts. Many Canadian regularly scheduled programs like *The Journal*, a news and public affairs program, and *Seeing Things*, a light-hearted mystery, have not only drawn a large Canadian following but have also won international acclaim.

A number of specials produced for both English and French audiences have been especially successful. In 1986, the Canadian classic, *Anne of Green Gables*, was a colossal hit and after attracting the largest audiences ever in Canada, it went on to further acclaim with its showing in the United States.

## Radio Canada International

The most widely known of the CBC's many international activities is RCI, its shortwave service. Created in 1945, RCI has its head office in Montreal, its main transmitters in Sackville, New Brunswick, and relay transmitters in England,

# Beyond our borders

From its headquarters in Montreal, RCI reflects Canadian life to its shortwave audience.



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Portugal, Montserrat Island in the West Indies, Japan and Hong Kong. It uses satellite facilities to reach the Pacific Rim countries.

RCI broadcasts daily in 11 languages to Eastern and Western Europe, Latin America, the Caribbean, Africa, the Middle East and the United States. It broadcasts weekly in Japanese and English to Japan and Hong Kong. Projections for the future include expansion in the Asia-Pacific area.

RCI is Canada's radio voice to the world. On shortwave, information programming presents Canada's economic, political, social and cultural spectrum. In addition, non-shortwave programs are produced for leading broadcasters in major international radio markets.

Specialized non-shortwave programs sent on tape or via international satellite for rebroadcast abroad include *Parallèle 49 Nord*, a program in French for US audiences, *Mosaic Kanada*, a program in German for West Germany, and *Canadian Journal*, an English program heard in Hong Kong.

### Contributing to TV-5

In the age of satellites, international cooperation between broadcasters is growing. One example is TV-5, a European French-language television network distributed by satellite to over 4.5 million homes in Europe and North Africa. Since January 1986, Canada has contributed one evening a week to the programming of this network through the Quebec-Canada Television Consortium. CBC programs represent a third of Canada's contribution.

In January 1987, France, Canada and Quebec signed a joint declaration to expand the TV-5 network throughout North America by late 1987 or early 1988. More co-operation in television programming by the three participants is also involved.

The France-Canada-Quebec declaration is based on agreement by representatives at the first Francophone Summit, held in Paris in February 1986.

They maintained that to ensure a vital and energetic international francophone community, it is necessary to extend and enhance the francophone audio-visual field.

### Working with international broadcasters

The CBC participates in a number of international organizations as one of the world's leading broadcasters. Some important ones are the North American National Broadcasters' Association (NANBA), the Commonwealth Broadcasting Association (CBA), the European Broadcasting Union (EBU), the Communauté des radios publiques de langue française (CRPLF) and the Conseil international des radios-télévisions d'expression française (CIRTEF).

Developing countries receive CBC's assistance in broadcast engineering and specialized training. Through a number of international development groups like the Canadian International Development Agency, Canadian management and engineering consultants have provided expertise for recent projects in the Bahamas, Algeria and Malaysia. Since March 1986, the CBC has marketed radio and television engineering consulting services abroad in association with private Canadian companies.

CBC Enterprises, a new marketing venture, is concerned with international program and home video sales, and program syndication. It already is successful having achieved sales of several million dollars to over 70 countries.



Each year RCI receives some 50 000 letters from its listeners.

# Beyond our borders

Canadian LANDSAT ground station built in Australia.



## Assisting international projects

More than 100 other countries are now benefitting from the diversity of Canadian communications expertise. Brazil's two communications satellites and ground control system were supplied by Canadian industry. Switzerland and Liberia both purchased ground stations from Canada. A Canadian-supplied telephone system is operating in Saudi Arabia. India is buying office communications systems from Canada. A Canadian tele-education system is being installed in universities in Indonesia. And Canadian know-how in managing use of the radio frequency spectrum is helping the People's Republic of China.

Canada is considered an important donor country in helping to advance communications systems in developing countries. Through many Canadian and international organizations like the Canadian International Development Agency (CIDA), Canada has helped plan, design and construct reliable telecommunications systems in various parts of the world. CIDA's bilateral telecommunications program now comprises some 30 projects in 23 countries. Most of these projects are in Africa, the Americas and in Asia.

CIDA is active in a number of important communications projects in Africa. A major one is the 2 800-kilometre PANAFTTEL microwave telecommunications system linking Senegal, Mali, Burkina Faso, Niger and Benin in the Sahel region of West Africa. CIDA will be involved in an ongoing maintenance, development and training program for PANAFTTEL until 1989. In a more recent project, CIDA is providing technical assistance to the Southern Africa Development Co-ordination Conference (SADCC), which is developing a communications system to strengthen regional ties among the nine member countries — Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, Tanzania, Zambia and Zimbabwe. Other African projects include a microwave system to communities in Rwanda and a new earth station and associated equipment for Zambia.

In the Americas, comprising Central America, South America and the Caribbean, CIDA contributes to a number of varied programs. Communications projects range from rebuilding the telephone system in Grenada to providing technical assistance, including training and management, in Brazil for the operation of their Canadian commercial satellites and ground control system.

CIDA's largest program is in Asia where it has several important telecommunications projects. A technical assistance project will help China operate its own satellite system and the major rehabilitation of the satellite earth station in Bangladesh will improve communications to rural areas. In the Philippines, where Canada is mounting a major initiative, CIDA is contributing to the development of a rural telecommunications system to help unite many of the islands.

Many of CIDA's telecommunications projects are sub-components of other assistance efforts. They include telecommunications systems for forestry, fishing, air transportation, railway and agriculture. In a major project to upgrade safety and physical maintenance at airports in 13 Commonwealth Caribbean countries, for example, a

telecommunications aspect is of prime importance. The project will provide new state-of-the-art communications equipment such as very high frequency transmitters and receivers and control-tower consoles. These components are essential to airport safety.

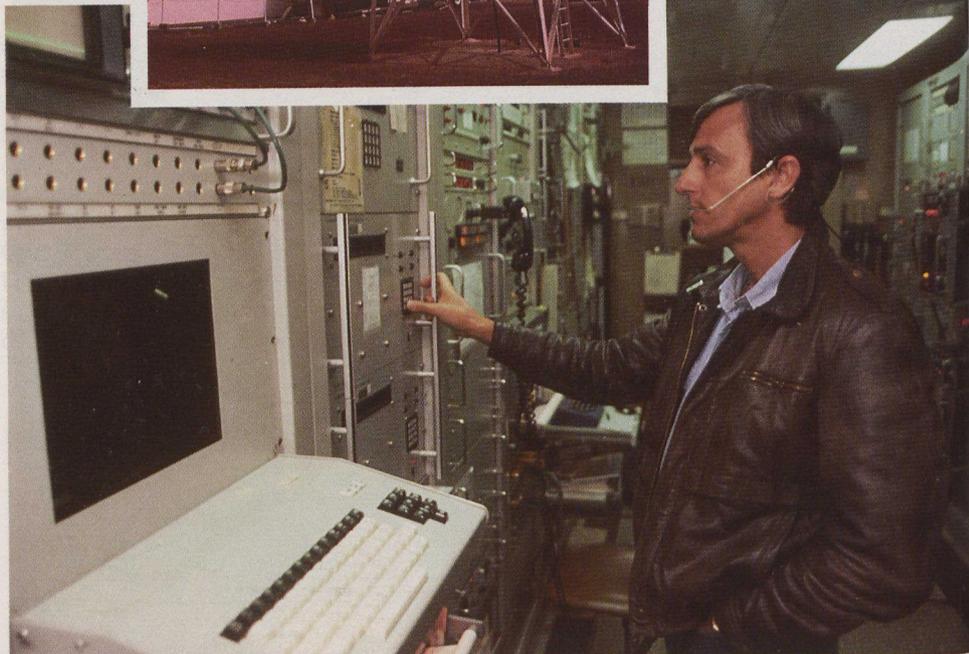
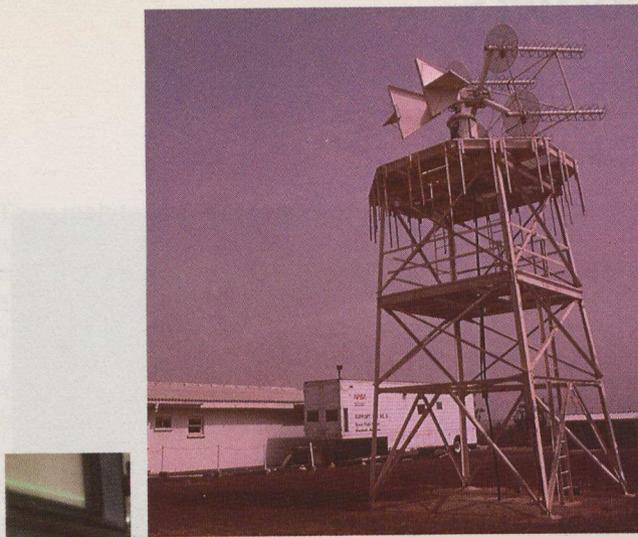
It is a major international challenge to expand communications in all parts of the world. Canadians have proved in their own country that advanced telecommunications networks help conquer distance and isolation and, as a result, enhance the quality of life. Improved health care, education and transportation systems are only a few of the benefits. Today, as a telecommunications pioneer, Canada is committed to helping other countries achieve their communications goals and thus contribute to improved global socio-economic structures.

#### Participating in world organizations

Canada's active participation in a number of influential international organizations helps promote Canadian interests in the international telecommunications environment and ensures that the country will maintain its position as a world leader in communications.

Most of the world's nations belong to the International Telecommunications Union (ITU), a specialized agency of the United Nations. One of its functions is to co-ordinate the shortwave broadcast spectrum. Since radio waves do not recognize international boundaries, bilateral and multilateral cooperation is essential. The most pressing problem is the excessive number of broadcast requirements from all countries that must be fitted into a very limited amount of spectrum. It has been compared to putting a size ten foot into a size four shoe.

Canada's international short wave needs are relatively small compared with a number of other countries. Radio Canada International broadcasts about 162 program hours weekly while countries like the United States and the Soviet Union each have more than 2 000 hours of programming. However,



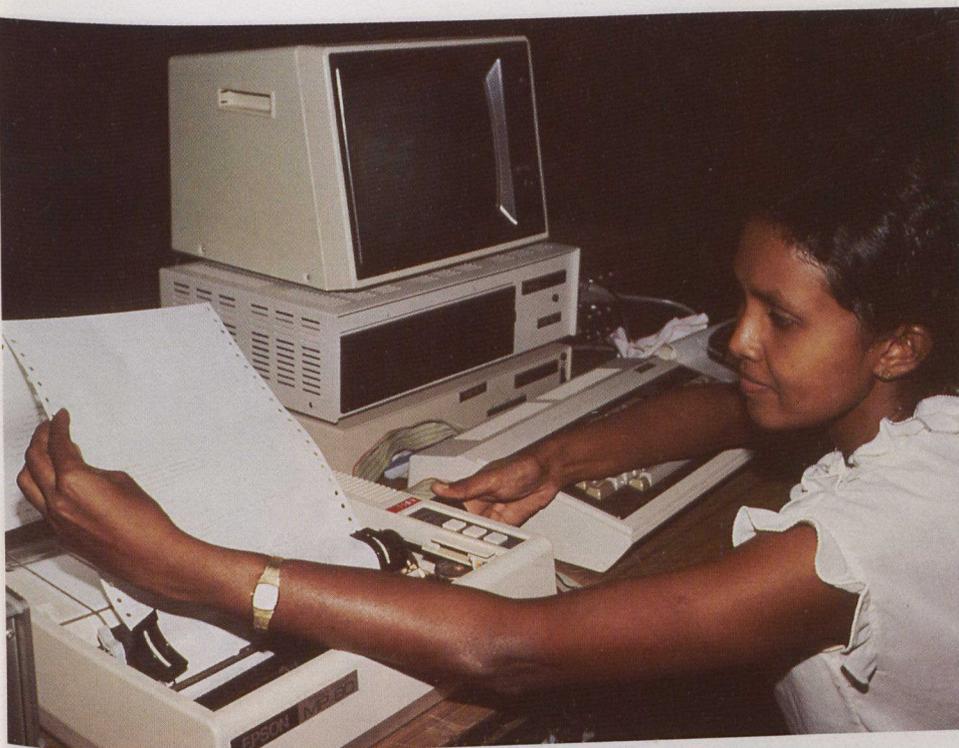
*Microwave towers and equipment for CIDA's program to advance communications in Senegal.*

RCI's small budget means good relations with the other major international broadcasters is essential if Canada's shortwave service is to meet its international commitments. With more and more frequency congestion and the rising costs of competing for high frequency bands, it is becoming increasingly important for Canada that rules be established to manage the spectrum.

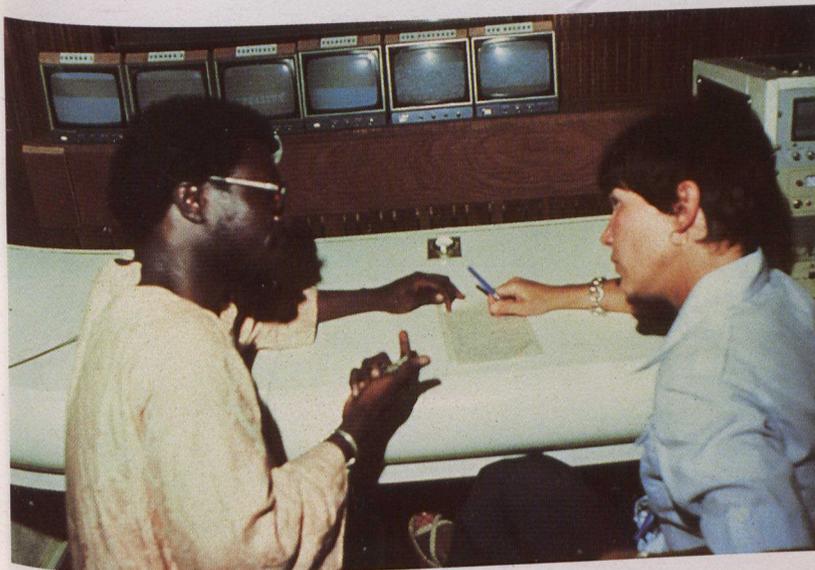
ITU member countries addressed the question of planning the use of shortwave broadcasting bands at two sessions of a World Administrative Radio Conference (WARC), held in 1984 and 1987. At the First Session, the concept of equitable sharing of the shortwave spectrum was recognized, and the parameters of a planning

method were developed. Canada vigorously supported work at the Second Session to introduce an effective and universally acceptable planning method.

Another area of major importance to Canada is the increased flow of information across international boundaries. With the development of automatic data processing, vast quantities of data can be quickly transferred anywhere in the world. This has led to concern about privacy and security of personal data in both the private and public sectors.



Operating a new computer system in Thailand.



MICHEL FAUGERE, CIDA

Training is an important element of all CIDA's telecommunications projects.

Canada is committed to the protection of personal property and has been an active participant at numerous Organization for Economic Co-operation and Development (OECD) conferences on the international flow of information. As a member of the Group of Experts on Transborder Data Barriers and Privacy Protection, Canada helped formulate the OECD's "Guidelines on the Protection of Privacy and Transborder Flows of Personal Data". These guidelines establish minimum standards for handling personal information by member countries. The standards relate to the collection, quality, use, disclosure, registration and security of personal information and provide that individuals should have a right of access to stored information about themselves.

All OECD member countries including Canada and its largest trading partners, the United States, Japan, the United Kingdom and the Federal Republic of Germany, have formally adhered to the guidelines. It is not necessary for member states to pass specific legislation incorporating the principles of the guidelines but private sector corporations have been encouraged to develop and implement voluntary privacy protection codes. Although there are no exact figures indicating how many private companies in OECD countries have voluntarily adopted the guidelines, some 200 leading American and almost 40 Canadian firms have indicated their support.

# Looking to the future

Forward-looking research and development is one of the secrets behind Canada's position as a world leader in telecommunications. Research in fibre optics, for example, led to the early development of optical hardware and enabled Canada to be among the first entrants into the market for optical communications systems.

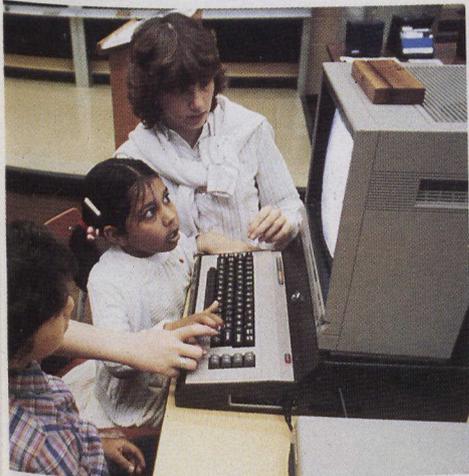
In the next decade, fibre optics are expected to take over from microwave as the backbone of Canada's telecommunications network. Industry is now constructing two major trans-Canada fibre-optic systems. Slated for completion in 1990, they will cross 7 000 kilometres from Vancouver on the Pacific coast to St. John's on the Atlantic.

In the area of satellite communications, Canada continues to build on its solid foundation of knowledge. Participation in trials of the European Space Agency's Olympus satellite will extend the range of radio frequencies used by satellite communications into the extremely high frequency bands. Olympus-type satellites will be able to carry vast quantities of information for reception by tiny rooftop antennas, serving important sectors of the economy, such as banking, where there is a need for two-way data communications with large numbers of terminals.

To ensure a leading position in the development of the office of the future, Canada has scheduled a program to test the integrated services network (ISDN). The first ISDN customer trials begin in 1987. A two-year trial in Ontario and Quebec will evaluate the performance of existing hardware and software in an ISDN environment. The Canadian government as a large user will assess a variety of applications including high-speed digital telecopying, networking of personal computers and enhanced audio-visual conferencing combining high-quality voice links with the possibility of exchanging graphics.



*Fibre optic cable has more than three times the message-carrying capacity of the much larger copper cable.*



Children have "hands on" experience with today's computers to prepare them for the technology of the future.

### CBC reviews its role

The CBC too, will be greatly affected by the advances of technology. In the 1950s, Canadians were talking about FM radio as something for the future, and today it is nearly as widespread as AM radio. Twenty-five years ago, Canadians could receive only a few television channels. Today, thanks to cable, they have a choice of five or even ten times as many, especially in major cities.

Broadcasting legislation is quickly outdated by technological change and by the growing internationalism in communications. New broadcasting legislation is expected in the near future. It will provide Canada with the basis for its broadcasting system in the 21st century.

It is clear that the communication of information will not diminish in significance in the future. An estimated one out of two workers in Canada's labour force are engaged in producing, processing and distributing information. In fact, Canada already has an information-intensive economy and both the public and private sectors are working actively to extend Canadian developments throughout the world.

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## Major milestones in telecommunications technology

- 1874** Invention of the telephone by Alexander Graham Bell in Brantford, Ontario.
  - 1876** First long-distance telephone call, from Brantford to Paris, Ontario.
  - 1901** The first transatlantic radio signal from England was received at Signal Hill in Newfoundland by Guglielmo Marconi.
  - 1948** First commercial microwave relay system was installed bridging the Northumberland Strait between Nova Scotia and Prince Edward Island.
  - 1958** Completion of the world's longest microwave relay system stretching 5 400 kilometres from Halifax to Vancouver.
  - 1962** Third country with its own satellite in space — Alouette I.
  - 1969** First domestic communications satellite company — Telesat Canada.
  - 1971** First digital microwave transmission system.
  - 1972** First geostationary domestic satellite communications system — Anik A1.
  - 1973** First public digital transmission network — Data Route.
  - 1976** First demonstration of direct broadcasting by satellite to small earth stations located on or near homes — Hermes.
  - 1977** First packet-switched network.
  - 1978** Most advanced videotex system, Telidon, adopted as a world standard.
  - 1978** First dual-bank commercial communications satellite — Anik B.
  - 1981** First rural fibre-optic broadband subscriber-loop network.
  - 1981** First remote manipulator system for use in space — the Canadarm.
  - 1985** First national cellular radio telephone service initiated in 23 Canadian cities.
  - 1986** Initiation of a nationwide 7 000 kilometre fibre-optics digital network. When completed in 1990, it will be the longest national fibre-optics system in the world.
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Canada