



Canadian National/Canadian Pacific Telecommunications introduced its Broadband Exchange Service in 1967. The broadband computer communications network can send signals at high-speed over a wider portion of the electromagnetic spectrum than the telephone network.

### The digital revolution

"Energy and information are basic to organic and social systems," says the Science Council of Canada. "A new technology that alters the terms on which one or the other is available can lead to profound changes in the operation of the system. The electronics revolution could spur creative drive and thus reshape society in new directions."

The Science Council — adviser to the Canadian government — was referring to the marriage of computer and communications technologies which could set in motion a social and economic transformation comparable to the Industrial Revolution of the late eighteenth and early nineteenth centuries.

Despite soaring inflation, the price of executing an instruction on a computer has declined by a factor of about one million since the early 1950s, while the cost of most major computer components has been falling at a rate of about 30 per cent a year. In 1971, the first computer on a single silicon chip measuring about 12.3 square millimetres in area was produced. In the ensuing years, hundreds of thousands of these micro-computers have been made, and they have continued to diminish dramatically in size, price and energy consumption. One of these shrinking computers can perform almost the same functions as one of its room-sized ancestors 25 years ago.

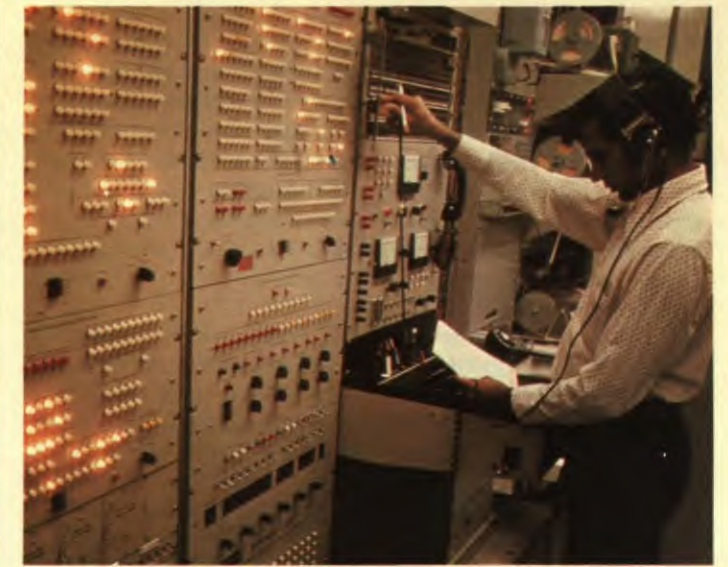
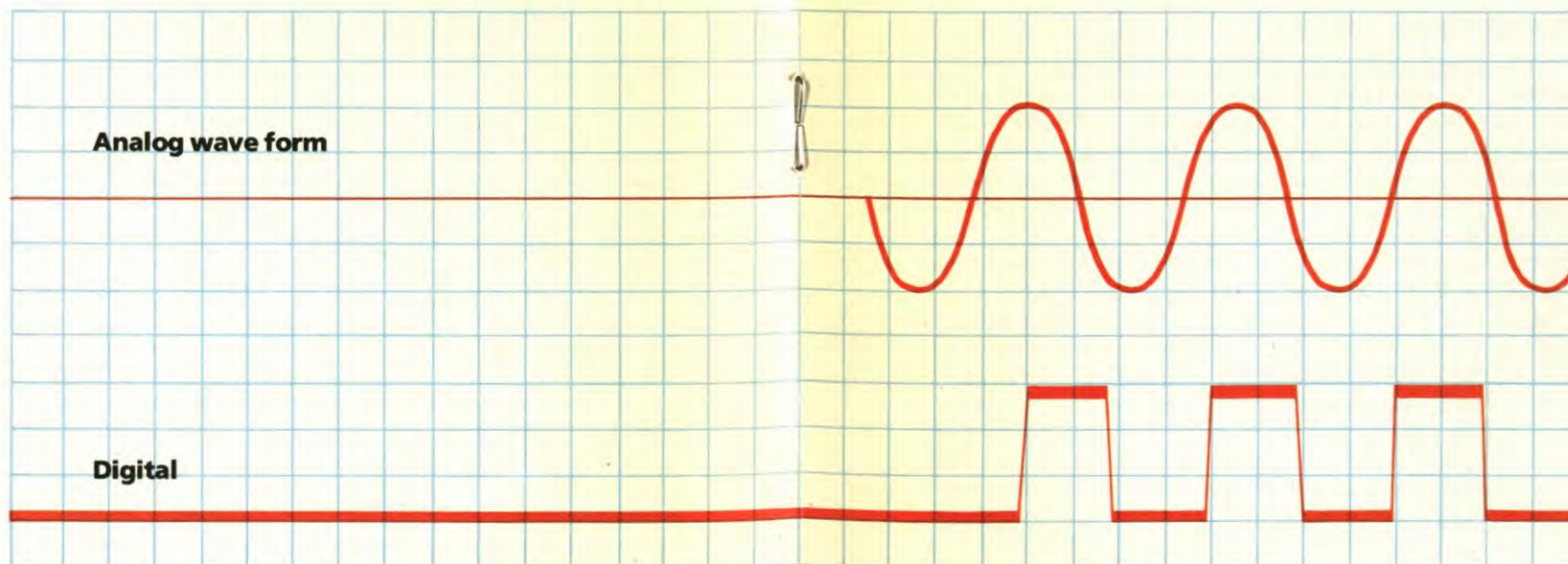
The significance of this revolution in computer technology does not lie just in the emergence of digital watches, electronic calculators, computer games for consumers, or even in the contented smiles of statisticians with new and ever more powerful number crunchers. The marriage of the computer with new telecommunications technologies will open an era of unprecedented information exchange which may transform not only the Canadian workplace but also the Canadian home.

Canada has been in a unique position to take advantage of this convergence of technologies. The trick has been to ensure that telecommunications links are able efficiently and effectively to handle the high rates with which computers generate data.



The Canadian telecommunications industry employs well over 100,000 people and has a capital investment of over \$17 billion. Telecommunications networks, be they telephone, telex, telegraph,

broadcasting or computer, span six time zones and blanket some 10 million square kilometres. The control centre of one such network is pictured above.



The Infodat network is a digital transmission service of Canadian National/Canadian Pacific Telecommunications and has over 30 servicing locations from St. John's, Newfoundland to Vancouver, British Columbia.

### Networks: analog to packet-switched

In 1967, Canadian National/Canadian Pacific (CNCP) Telecommunications introduced its Broadband Exchange Service (BES) — a high-speed, high-capacity network in Canada designed specifically to meet the exacting demands of computer communications. Because the broadband network could send signals over a wider portion of the electromagnetic spectrum than the telephone network, the former had a significantly greater information-carrying capacity. Subscribers could exchange computer data, monitor the performance of a distant operation or set up conference calls.

Signals travelled over the broadband network in analog form or in continuous waves. These signals were subject to damaging distortion or interference when they came at high speeds from computers. In addition, computers generate their data in digital form: their switches are either "on" or "off". The result is not a continuous wave pattern but a series of discrete pulses. Why not have a telecommunications network which sends its signals like a computer?

In 1973, a nation-wide digital system available on a commercial basis was introduced by the TransCanada Telephone System (TCTS), a consortium of Canada's major telephone companies. Still recognized as one of the most advanced systems in the world, Dataroute sends its signals in the same digital form employed by computers and, as a result, experienced up to 10 times fewer errors than analog systems.

In the same year, CNCP Telecommunications introduced Infodat, a Canada-wide network which uses digital transmission and time-division multiplexing to increase speeds and improve reliability. Time-division multiplexing, also a feature of Dataroute, is a technique for permitting several users to employ the same transmission line by allotting each a unit of time on that channel. Each user at a given point controlled his own private network. Because CNCP could make more efficient use of bandwidth than with the old Broadband Exchange Service, it was able to cut some of its tariffs by as much as