

Canada Weekly

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Probing the problems of power transmission

Street lights are extinguished, darkness prevails, the houses are dead; in the factory, machines slow to a halt and a conveyor-belt stops. Is it a power cut, a generator break-down or the failure of an electrical cable?

A short circuit in a power-cable results not only in economic loss to electrical companies but inconvenience and expense to industry and the general public. The laying of these cables is a costly business involving street excavations and disruption to offices and factories. Once laid, the cable is expected to convey electrical power without maintenance for the next 40 years. This life-time may have been established for a particular line of power-cables, but what is the supplier to do if he wishes to introduce a new manufacturing process or employ new materials? Is he to test his product over

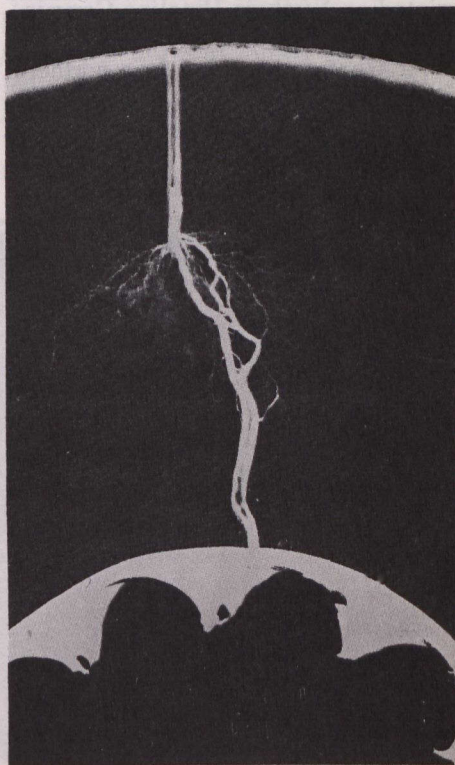
a 40-year period before venturing on the market with the confidence that it will perform as the industry demands? Clearly this would be impracticable. Instead, the manufacturer seeks an authoritative test of the life-time of his cable that can be performed in months rather than years.

Accelerated testing methods for power-cable insulation are being developed at the National Research Council of Canada's Division of Electrical Engineering by Dr. John Densley, who has made an extensive study of the properties of solid insulations used in electrical-power transmission with the object of designing a series of accelerated tests to measure the life-time of the insulation in a power-cable.

A modern power-cable consists of a central conductor that carries the high-voltage current, covered by insulating material, which, in turn, is surrounded by a second conductor responsible for returning the current at low voltage. In cable manufacture, the insulating material (generally composed of cross-linked polyethylene) is extruded in a molten form onto the central copper conductor, and it is at this point that defects may develop which can lead to failure several years later.

Causes of breakdown

Any insulation breaks down under sufficiently high electrical stress. Electrical stress occurs when a voltage is applied over a thickness of insulation and increases as the voltage is raised or the thickness of insulation decreased. Each insulating material has a characteristic breaking-point at which the electrical stress is so great that the insulation fails and permits the current to short-circuit between the central and outer conductor. Modern power-cables are capable of withstanding high stresses of many orders of magnitude greater than their normal loadings, up to millions of volts, for short periods of time. But the same cable under normal stresses may break down after only a few years



Insulation breakdown, the result of many hours of electrical stress under test conditions. Partial discharges form at the tip of a metallic needle which has been placed in the insulating material.

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of service. This problem of weakening with aging which occurs in cable insulation has been traced by Dr.

Densley to causes that range from defects introduced during manufacture to the effects of the cable's environment.

For example, during the extrusion of the insulation on the central conductor, small voids of gas form. Under normal electrical stresses, sparks can occur within these voids and eat away at the surrounding material. The sparks, or partial discharges, burrow through the insulation at each peak of the 60-hertz (cycles per second) voltage. Total breakdown occurs after several years service. The voids, which can be controlled by careful manufacturing processes, continue to be of interest to Dr. Densley. "With the shortage of materials becoming acute in the future, we must look to the day when cable insulation is much thinner," Dr. Densley says. "Thinner insulation will give rise to increased electrical stress and we believe that, at some critical value, failure due to microvoids will occur. Microvoids are extremely small cavities which are always present in polymers but up to now have not caused electrical problems since normal electrical stresses are insufficient to cause partial discharge. With the possibility of thinner insulations and higher electrical stresses in the future, we are bound to run into problems. Partial discharges in microvoids are very difficult to detect and measure, so we are investigating the characteristics of partial discharge in thin insulations in which we have created artificially a known number of microvoids."

Dr. Densley has investigated the effect of different factors, such as temperature, voltage, frequency and mechanical stress, the processes that lead to insulation breakdown and, with the aid of these data, he is developing reliable accelerated aging tests. As an example, electrical discharge within a void occurs at each peak of a voltage cycle. Normal power-transmission takes place at 60 hertz but if a cable is tested at 600 hertz it will age ten times faster as a result of this destructive mechanism. Additional factors are also considered in such a test, such as application of elevated temperatures and mechanical stresses. In this fashion, a particular cable in-

sulation could be comprehensively tested in six to ten months.

Low-temperature testing

The economics of power-transmission indicate that in the future cables will operate at extremely low temperatures using superconducting or cryoresistive conductors. These cables are capable of carrying exceptionally high power since the conductors exhibit little or virtually no electrical resistance. Such cables, at present in their developmental infancy, present new problems since they must incorporate insulations capable of functioning for many years at temperatures more than 200°C below freezing-point. Dr. Densley's laboratory is preparing to study this new region of extremely low temperatures, a study which will acquaint him with the problems of power-transmission of the twenty-first century.

Pipeline Commissioner new role for External Affairs deputy head

Basil Robinson, Under-Secretary of State for External Affairs, has been appointed as Northern Pipeline Commissioner, to co-ordinate all advice to the Government on the need for a northern gas pipeline, the choices open to the Government and the advantages and disadvantages of each.

Mr. Robinson, who will leave his

position to spend full time in his new role, has been previously Deputy Minister of Indian Affairs and Northern Development. He will assist the Government in assimilating the existing analyses carried out by departments, the reports of the Berger Commission, the United States Federal Power Commission, the National Energy Board and two panels operating in the Yukon. Mr. Robinson's role will be to ensure the Cabinet has before it all the analysis and advice required to take a decision which is in accord with the broad national interest.

Mr. Robinson will not replace the ongoing work in the many government departments concerned with this issue, and these departments will continue to be the primary point of contact for outside groups to make their point of view known to the Government.

During Prime Minister Trudeau's recent visit to Washington, President Carter announced that James Schlesinger, Assistant to the President, would co-ordinate the U.S. position on the northern gas pipeline; Mr. Robinson will consult closely with Mr. Schlesinger and his officials.

Companies have filed applications with the National Energy Board in Canada and with the Federal Power Commission in the U.S. proposing either a joint pipeline to move Alaskan and Mackenzie Valley natural gas, or separate lines from the two areas.



Basil Robinson, new Northern Pipeline Commissioner

Health-care costs and the economy

William Haviland, Secretary of the Economic Council of Canada, warned on March 31 that further rapid increases in health-care spending had become politically untenable and could occur only at the expense of other important government programs.

In a speech to the Canadian Nurses' Association Annual Meeting in Ottawa, he observed that, after the Second World War, health-care expenditures became one of the most rapidly expanding areas of public spending. Total health-care expenditures have been rising at an annual rate of over 11 per cent, and have now reached about \$12 billion a year, or about \$520 *per capita*. Much of the increase has occurred in hospital costs. Improved methods of treatment and more care, as well as inflation, have caused hospital costs to soar from \$20 per patient day in 1960 to about \$115 at present.

General trend

According to Dr. Haviland, this situation has reflected a general trend in western countries over the past two decades. These countries have relied increasingly on government intervention as a means of improving social welfare and justice. Health-care spending in Canada now accounts for 6.5 per cent of gross national product, which

is above the average of some 20 industrial countries, although it does not exceed some of the more advanced ones such as the United States. Moreover, total health-care expenditures have been rising faster in Canada than they have in the United States.

Dr. Haviland recalled that the Economic Council had voiced its concern about this trend six-and-a-half-years ago in its *Seventh Annual Review*. Pointing to the increasingly large proportion of national resources going into health-care activities, the Council cautioned that this situation was unsustainable and urged "that the wider economic and social aspects of health care...become a matter of growing public concern." However, he observed that it was only recently that there had been widespread questioning of social policies in general and of the concomitant government intervention and regulation.

Who pays who gains?

He said that, in light of these new doubts, the Council's forthcoming *Fourteenth Annual Review* would be devoted to the role of government in Canada. The *Review*, which will be published in about eight months, will study how well the Government's social policies had succeeded in distributing benefits fairly among Canadians. As well, it would investigate the degree to which those policies conflicted with

market forces. Among the programs to be studied, according to Dr. Haviland, is the system of medicare, which comprises roughly three-quarters of health-care spending. He noted that an important question to be answered was whether free health care really ensured equal access to health-care services, as was originally intended. Who pays and who gains?

Slowdown coming

Dr. Haviland foresees some slowing in health-care spending over the next ten years in so far as there is less scope for further extensions in medicare coverage and because much of the needed catchup in pay and work standards for lower income personnel has been accomplished. Working in the opposite direction, however, is the aging process of the population, since elderly people need relatively more health care.

Taking these trends into account, as well as public resistance, he advocated tying increases in health-care spending to the increase in the economy. Accordingly, he suggests that the provincial and federal governments agree to limit their expenditures on health care to the recent level of 6.5 per cent of gross national product. In Dr. Haviland's opinion, this is a target which consumers, taxpayers, and other main interest groups can and should learn to live with.

Niagara blossoms in May

Few natural spectacles can match the charm of blossom time. In Ontario's Niagara Peninsula, thousands of fruit trees — peach, cherry, apple, plum and pear — burst into glorious perfumed blooms along every highway and byway in mid-May.

The Niagara Peninsula, a narrow, 40-mile plain bordering Lake Ontario's shores under the protecting lee of the Niagara Escarpment, is the province's main fruit-growing area where, for two weeks or more, orchards remain magnificently decorated in pink and white, eye-catching and fragrant.

Blossom time brings Niagara Falls out of its winter hibernation with a variety of festival events from May 6 to 23 which include a grand parade, a festival dinner, a ball and the crowning of Miss Hospitality.



Canadian plan will guide satellite broadcasting in the Americas

A plan sponsored by Canada for guiding the development of direct broadcasting and other new satellite systems to serve the Americas was agreed to at a recently-concluded world administrative radio conference of the International Telecommunication Union, in Geneva, Switzerland.

Operating on new frequencies in the 12 Gigahertz band, such broadcasting satellites are expected to be ready to begin beaming television and other signals direct to homes equipped with small earth stations about the mid-1980s. In addition, for the Americas, this frequency band will permit the point-to-point communication of data, voice and other communications to very small earth stations, like those used by Canada's experimental HERMES satellite system. HERMES has demonstrated the feasibility of direct broadcasting from satellites.

Countries in Africa, Asia, Europe and the South Pacific – coping with current pressures to use the band for terrestrial microwave services, as well as to provide for potential requirements of the broadcasting satellite service – adopted detailed plans which have allocated specific frequencies and orbital positions to specific countries.

The countries of the Americas, not under the same pressures for terrestrial services, but having to share this band with the fixed satellite service (which involves relaying signals point-to-point between limited and specific ground stations), decided on a different, two-stage plan proposed by Canada.

Its first phase is the setting aside of two segments of the geostationary orbit arc (a circle, 22,300 miles above the equator, at which satellite orbits match the rate of the earth's rotation beneath them) for use by 12 GHz broadcasting satellites. Two other segments will be used by the fixed satellite service.

Broadcasting satellites serving the Americas will be located from 75 to 100 and from 140 to 170 degrees, west longitude. Fixed service satellites are to have positions just east of 75 degrees and between 100 and 140 degrees. For service to Canada, the U.S. and Mexico, the first arc for broadcasting satellites is restricted to 75 to 95 degrees west longitude.

Countries of the Americas will meet at a regional conference, to be held not later than 1982, to develop a detailed frequency and orbital plan of the type worked out by the rest of the world at the Geneva conference.

International development loans

The Canadian International Development Agency has provided Honduras with a \$12-million line of credit to help develop its forest sector, Secretary of State for External Affairs Don Jamieson announced in April. Repayable in 50 years with ten years' grace and no interest, it will enable the Government-owned Honduran Forest Development Corporation (COHDEFOR), to purchase Canadian equipment.

COHDEFOR will resell the equipment to small and medium-sized enterprises and co-operatives on credit, interest from which will go into a counterpart fund that will be used to finance reforestation and other rural community services.

The Government of Honduras expects to create 4,000 new jobs in the forestry sector and to develop a number of small rural villages. The Canadian loan will also help ease the country's balance-of-payments problems and diversify its economy.

Water system in El Salvador

Mr. Jamieson also announced that Canada would help El Salvador build a rural aqueduct system to bring clean water to 160 communities by providing the Latin American country with a \$1.2-million line of credit for purchase of equipment and material in Canada and a grant of \$920,000 to develop a potability-control system.

The Inter-American Development Bank is providing \$6 million and El Salvador is contributing \$1.8 million to the undertaking, which is expected to take five years.

The loan, for 50 years, at no interest and ten years' grace, is for the purchase of Canadian equipment and to pay Canadian consultants, who will train Salvadoreans to maintain the system.

A large number of El Salvador's population of four million have no access to quality-controlled water with the result that 18 per cent of deaths are caused by water-borne organisms.

Canada/Mali co-operation

Vice-President of the Military Committee for National Liberation of the Republic of Mali, Lieutenant-Colonel Amadou Baba Diarra, during a visit to Canada, April 20-22, signed with Secretary of State for External Affairs Don Jamieson, co-operation agreements for three projects in Mali.

One concerns the integrated rural development of Kaarta – an area including 350,000 people – at a cost of \$25 million over five years. Involved is the improvement of cereal crops, the digging of 50 wells to supply water, the construction or improvement of some 700 kilometres of dirt road, the rationalization of livestock breeding, the protection of forests and the supply of medical equipment, etc.

Another project is the construction of a high-tension electrical transmission line between the dam of Sélingué and the city of Bamako at the cost of \$9.2 million.

The third, to cost \$425,000, concerns the protection of crops from exclusive damage by animals and insects by establishing a system of defensive measures.

Canada and Mali agreed to consult annually on the subject of aid.

Stamps feature wildflowers

Six new stamps, depicting Canada's wildflowers, went on sale in denominations of from one to five cents and 10 cents on April 22.



The new issues, designed by Heather Cooper of Toronto, replace another series which depicted former Canadian prime ministers.

News of the arts

People of the Cedar

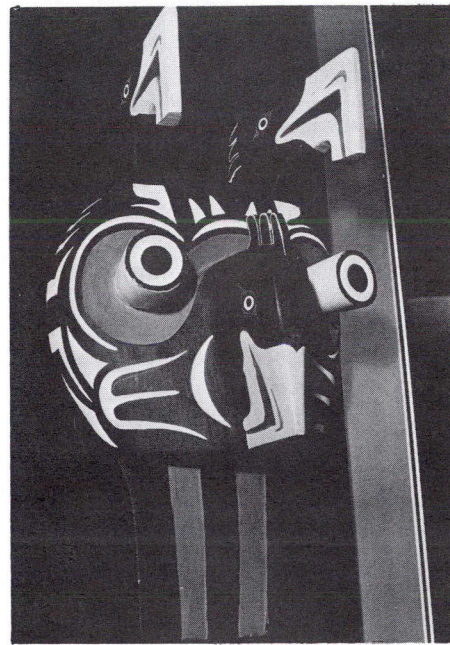
An exhibition mounted by the Department of External Affairs showing the arts of the West Coast native peoples, has been triplicated, with one display on an ongoing tour through France, one on a continuing tour through the United States and a third in Germany, which is destined for Japan in the autumn.

The 45-piece exhibits, which feature contemporary art based on the myths, legends and everyday life of the Pacific West Coast Indians, have been assembled for the Department by Dr. George MacDonald, Director of Archaeological Surveys, National Museums of Canada, in co-operation with the Canadian Indian Marketing Services.

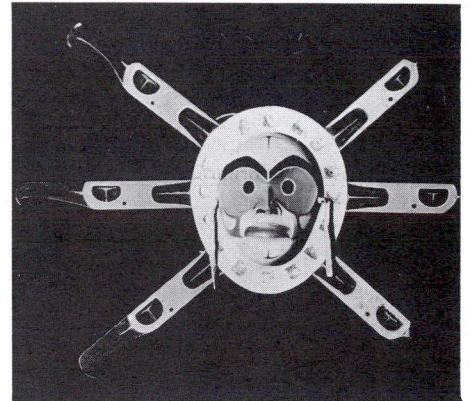
The cedar tree provided the raw material for clothing, housing and the arts of West Coast Indians, and could on occasion even provide a man's personal spirit power as in this representation of the "Yellow Cedar Spirit Helper" as revealed to an Opetchesaht man of Vancouver Island.



Chilkat dance blanket spirit mask



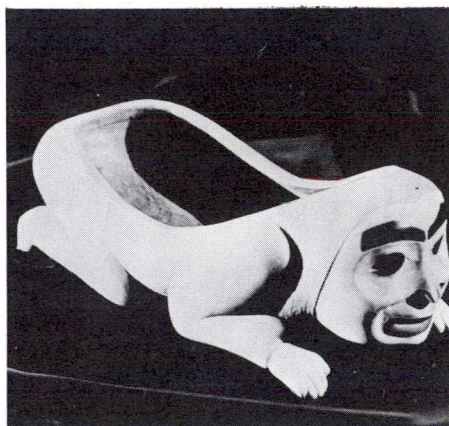
Swaixwe mask



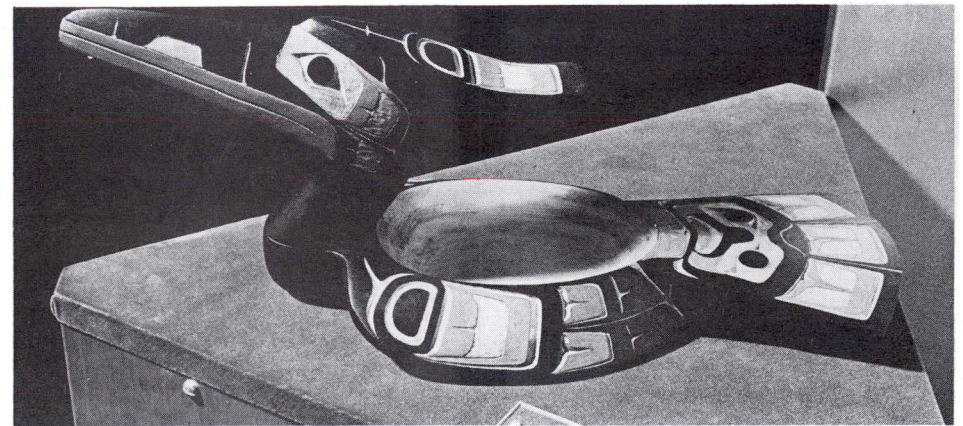
Sun mask



Wolf transformation mask



Human figure feast bowl



Loon feast dish

Canada at Paris Air Show

Twenty-nine Canadian companies will participate in the Paris International Air Show, June 2-12.

The 17 Canadian displays in Pavilion E will range from avionics, turbo prop engines and space equipment to examples of high technology in prime manufacturing.

There will be flying demonstrations of the Dash-7 STOL airliner and a full-scale mock-up of the new Lear 600 executive jet due to go into production shortly. Twelve other companies will have representatives on site.

Canada's pavilion will offer full facilities for on-the-spot conduct of business and a press room for the international media. In addition, a reception chalet overlooking the field and sponsored by the Air Industries Association of Canada will cater to the comfort of visitors and guests of Canada's aerospace industry.

Generous gesture

A regular parlour game on the night of a recent Atlantic Loto draw has brought a Scarborough train engineer a surprise package from his relatives in Nova Scotia.

Charles R. Potts of Stellarton, N.S., said he and his wife, Marion, usually jotted down names of relatives beside the ticket numbers they held on the bi-weekly lottery.

"We bought one book and put my wife's two sisters names on a piece of paper beside the number plus our own names. Well, last night, it was my brother-in-law who won."

Mr. Potts, who said his brother-in-law Thomas Kinnear was as "surprised" at winning as he was, picked up the \$25,000 grand prize in his own name.

"Don't get any idea we're splitting

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Ähnliche Ausgaben dieses Informationsblatts erscheinen auch in deutscher Sprache unter dem Titel Profil Kanada.

it. It's all his," said Mr. Potts. "He's a good guy, deserving of the money."

Even though the tickets were bought by them, Mr. and Mrs Potts don't feel their gesture toward their relatives was at all unusual.

"We're a close family," he said. "There are so many these days so greedy. I like to think we're not."

Retired and with no family of their own, he said they didn't really need the money that badly themselves.

News briefs

■ Premier William Davis of Ontario has called an election for June 9, after a vote on a rent-control amendment was defeated on April 28. The tax on tobacco, introduced in the Ontario budget on April 19 and implemented immediately, has been lifted until the bill enacting it is passed after the election.

■ The cost of living in March rose 1 per cent from February's figure and 7.4 per cent from that of a year earlier, the biggest increase since the middle of 1976.

■ The Quebec government brought down its first budget on April 14. The highlights are: licence fees for private cars are likely to go up by 30 per cent or \$12 for an average car; the tax exemption on children's clothing will be removed; small and medium-sized businesses involved in manufacturing can put half of what they owe in Quebec corporate income taxes into a new "fund for industrial recovery." The money can be used by the firms for capital investment and must be spent within five years.

■ Trade prospects for Canada should improve this year because of economic recovery internationally, John MacDonald, chairman of the Export Development Corporation, says in the federal agency's 1976 annual report. The corporation, which provides loans, insurance and foreign investment guarantees to help finance sales of Canadian goods abroad, supported sales of about \$2 billion in 1976. Canada has a trade deficit of \$4.3 billion and little change is expected this year.

■ The Atomic Energy Board has announced details of a \$5.7-million investigation and decontamination program for communities afflicted with radioactive waste from nuclear installations and uranium mines. The program will be financed through cost-sharing agreements with the Federal Government, the provinces and industry.

■ The chief executive officers of about 90 corporations and a handful of associations have formed an organization

to discuss general economic matters with labour and government and to sponsor research on various national issues. The organization, the Business Council on National Issues, has grown out of informal gatherings of a nucleus of the executives over the past four or five years and more formal meetings in the past year, according to its executive director and president, W.D. Archbold. The co-chairmen of BCNI are W.O. Twaits, who retired as chief executive officer of Imperial Oil Ltd. of Toronto in 1974, and Alfred Powis, president of Noranda Mines Ltd. of Toronto.

■ A top-level meeting on April 22 between representatives of government, business and labour was described as a good start toward three-way consultation on major economic problems facing the country. Prime Minister Trudeau said the meeting was "extremely positive" and he found "a great deal of assistance and help" from business and labour leaders in discussing methods to end the wage-and-price controls program.

■ Unemployment was the main concern expressed by Manitoba's Finance Minister Saul Miller when he introduced the province's \$1.158-billion budget on April 22. The budget included some tax reductions and no tax increases.

■ A convicted murderer at a federal prison in Matsqui, British Columbia, was the first person in Canada to gain a university degree while in jail.

Bill MacKey, 37, serving a life sentence and with no chance of parole for at least five years, received his degree in sociology and psychology through a special University of Victoria program that has been in operation in Matsqui and at a prison at New Westminster, B.C., since 1972.

■ The Montreal Canadiens and the Boston Bruins play in the best-of-seven-game finals of the National Hockey League Stanley Cup. In the semi-finals, Montreal beat New York Islanders four games to two and Boston defeated Philadelphia in four straight games.