

Bulletin

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POSSIBLE CANADIAN PARTICIPATION IN SPACE PROGRAMS

Mr. C.M. Drury, the President of the Treasury Board, addressed the Canadian Aeronautics and Space Congress and Exposition in Montreal on November 17. Some of his remarks follow:

The Canadian Aeronautics and Space Congress and Exposition is an international gathering *par excellence*. Among the audience tonight are the representatives of French, British and United States aerospace transportation industry, government officials, as well as scientific and technological experts from many countries. This fact offers me a unique opportunity to explore with you the kind of options which Canada could pursue in the near future in the field of space activities. My purpose this evening is to place our space program within its international framework in relation to Canadian resources and Canadian objectives. Most of my remarks will be exploratory and even hypothetical but I think you will agree with me that much hypothetical and exploratory thinking is necessary before actual decision-making is to take place, particularly when large sums of taxpayers' money may be committed by governments to highly expensive programs.

The conduct of space programs is very much a "rich-man's" game. Only the United States and the

Soviet Union have sufficient resources to apply to a comprehensive program without unacceptable sacrifices of other objectives. Only a few other countries (Britain, China, France, Germany, Japan) have devoted resources to the development of a satellite-launcher capacity. India recently announced the intention to do so but it remains to be seen whether this is an over-ambitious aspiration. An additional small group of countries has engaged in space activities without embarking in the luxury of attempting launcher development and, among these, Canada's achievements have been recognized internationally as occupying a leading position.

PROBABLE ACTION

Now that man has actually gone out into space, several conclusions can be expressed as reasonable certainties:

- (1) that space activities will continue on an increasing scale;
- (2) that the overall expenditures will continue to rise;
- (3) that increased effort will be devoted to developing useful applications for space technology in parallel with scientific investigation;
- (4) that world space activities will continue to be dominated by the United States and the Soviet Union.

In the situation which I just described, those technologically-advanced countries desiring to pursue active space programs appear to have three practical options open to them in the short and medium term:

(1) individual countries could work out bilateral co-operative arrangements with one of the super powers (the Canadian *Alouette* program, the proposed earth resource satellite "read-out" arrangements and the proposed launch of a domestic communications satellite are typical of this kind of co-operative endeavour with the United States);

(2) a number of countries could join forces to

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provide the necessary resources for a full-fledged space program comparable to those of the super powers (there are proponents of this approach within the European Space Conference);

(3) a group of countries could work out a joint approach to provide a framework for co-operation with the United States....

POSSIBILITIES FOR CANADA

All these developments have relevance for Canada and for the future of Canadian aerospace programs. Canada could well be in the very fortunate position of being able, if so desired, to adopt several parallel and complementary courses of action at the same time.

There would appear to be no obstacles to continuing with bilateral arrangements of the kind now existing with the United States (launches for scientific satellites such as *Alouette*; ground stations for "reading-out" earth resource satellites, launches for communications).

Moreover, a relatively modest expenditure of federal research and development funds could enable Canadian industry to participate in contracts for the development and production of sub-systems in the post-*Apollo* system — in effect a space shuttle production-sharing program. A Canadian research and development effort of this kind would presumably entitle Canada to access to the post-*Apollo* facilities when they come into being.

Significantly, the draft Convention now being considered for the future European Space Organization makes provision for associate membership for non-European countries. There is good reason to believe that under such an arrangement it would be possible to elect to participate in only those programs in which Canada had a real interest and that financial obligations would only arise with respect to those particular programs.

ASSOCIATION WITH EUROPE

The propositions of continuing bilateral relations with the United States and of research and development sharing need little explanation here. However, the case for seeking an association with the future European Space Organization calls for greater amplification on several points.

It is strongly suggested in *Foreign Policy for Canadians* that to ensure a continuing independent existence Canada should seek to develop countervailing influences to offset the dominant bilateral relations with the United States. Continued Canadian co-operation with the United States in various space activities is undoubtedly desirable and probably inevitable. For this very reason there is a real political need to look beyond the continental relations. Association with Europe offers such an opportunity and could be achieved, it is hoped, at a tolerable cost.

Most discussion of future space programs has

focused on the short and medium term. I feel that it is necessary to look forward to the 1980s and beyond to a period when space activities will almost certainly have become much more international in scope than today. The European Space Organization will probably show signs of developing in the direction of a broad-based international space institution. This desirable objective would be fostered if Canada (and Australia and Japan as two other likely candidates) should be associated with the Organization from the outset. A Canadian voice, if it is raised now among the Europeans, would probably have more influence in the process of evolving an international institution, than if Canada should later try to influence the United States on the strength of what would necessarily be a relatively very modest contribution to the overall NASA program.

A space shuttle production-sharing program could have demonstrable benefits for Canadian industry and could materially advance Canadian technological competence but it would lack much public visibility. Association with the European Organization could perhaps open the possibility of working among countries more of our size on some identifiable project such as the so-called "space-Tug" to be designed for inter-orbital travel within the post-*Apollo* system. Associate membership would, however, carry no commitment to do so, since it would rest entirely with Canada whether or not to join such programs.

Association with Europe could provide Canada with an *entrée* to commercial opportunities in Europe to employ the technological capacity which should be developed through the post-*Apollo* research and development arrangements with the United States. This would reinforce efforts now in the active planning stage to foster more intensive scientific and technological relations with Germany, as well as what has been set in train in Belgium.

TRAFFIC-CONTROL SATELLITE

Under proposals advanced in ICAO, arrangements are going forward for the development of a traffic-control satellite. Canada has a large stake at present in the management of the transatlantic air-traffic control system. Association with the European Space Organization would give Canada an option to participate from the outset in the research and development phase of the traffic-control satellite project. This would give important advantages later on when tackling the production, organization and management phases of the development of the system. The history of INTELSAT suggests that we should enter the arena early.

To sum up, association with the European Space Organization would offer both present and future political benefits as well as the option to participate in interesting and useful practical programs, and would not preclude beneficial arrangements with the United States....

THE FEELING OF ALUMINUM

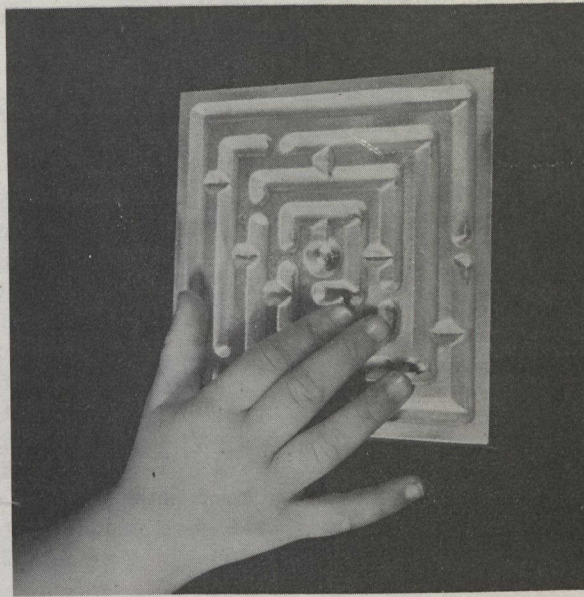
A cast aluminum maze designed by students of Sheridan College School of Design, near Toronto, is helping blind children increase their sensory awareness and expand their perception.

The maze, a five-by-five inch square of cast aluminum, half an inch thick, is one of a series of 15 objects designed by Sheridan students, and accepted and incorporated into a "Tactile Toy" package after testing by blind students at the Ontario School for the Blind in Brantford, Ontario.

Some 200 sets of these "tactile objects" will be distributed as a special issue of the magazine *The Dot* - a braille magazine for blind children aged nine to 14 - as well as to institutes and schools for the blind throughout North America and Europe.

The intense concentration of blind children on anything new, together with their ability to see by touch, is one of the major reasons the project got off the ground. It started with Mrs. Mary Francis Haws, editor of *The Dot*, Mrs. Sheila Lamb, information officer with the Office of the Design Adviser, Canada, and Stephen Hogbin, master, Furniture Studio, Sheridan College School of Design.

Originally conceived as a special issue of *The Dot*, the project, after preliminary discussions, changed direction. The three agreed to forego the usual magazine format in favour of a series of three-dimensional designs that could be packaged in a box. The aim was to develop objects that would not only



give tactile pleasure, but also stimulate awareness. The students of Sheridan College were then given the following instructions: design two items, one both visually and tactually hard, the other soft, in any material that will evoke a multiplicity of images in the recipient. The items must be capable of being reproduced to a minimum of 200 units.

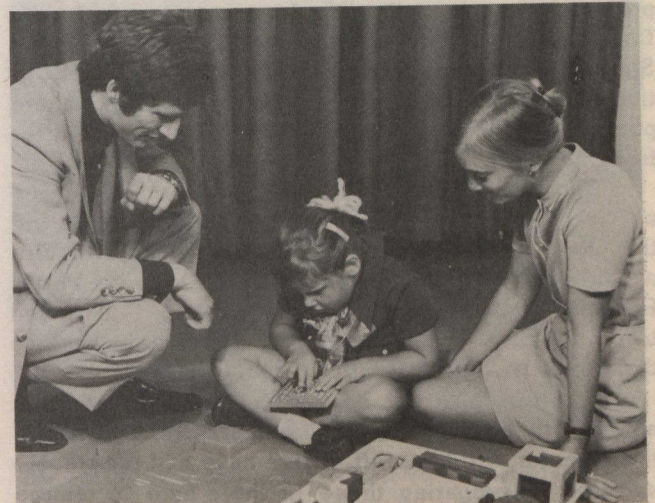
OVERSEAS ENTRIES

Sheridan also invited 30 other art colleges from 20 countries to participate, and three ultimately did. They were Werkkunstschule, Han-

over, West Germany, Rhode Island School of Design, U.S.A., and West Sussex College of Art, Britain.

Typical of the energy poured into the project is the creative talent devoted to it by Judith Almond, now in her third year at Sheridan. Judith, (shown in the photograph with Marcia Vinsky, age 6, and Stephen Hogbin, master, Furniture Studio, Sheridan College School of Design) was responsible for the design and manufacture of the maze, and spent some six weeks experimenting with various aluminum alloys to determine the best one to use.

Aluminum for the metal part of the project was donated by Alcan Canada Products, a division of Aluminum Company of Canada, Ltd., through Alcan Ingot Ltd., and supplied by Metals and Alloys Company Ltd., Toronto - the Canadian distributor of Alcan ingot products. Other industries contributed paper products, rubber and wood.



CANADA-ALGERIA RELATIONS

Two development-assistance agreements and a long term wheat agreement were signed by Canada and Algeria recently during a visit to Ottawa of senior Algerian officials.

The wheat agreement, which the Algerian delegation signed on behalf of their Government, is for the purchase of from 850,000 to one million tons of Canadian wheat during the period from August 1, 1971, to July 31, 1975. The development-assistance agreements involve Algerian fisheries and forestry projects.

Mr. I. Jazaïry, Director of Economic, Cultural and Social Affairs in the Algerian Ministry of Foreign Affairs, headed the delegation, which consisted of representatives from the Algerian ministries of Finance, Commerce, Industry and Energy, Agriculture and Agrarian Reform, Transport, Primary and Secondary Education and of the Permanent Committee for the Development of Algiers.

The delegation had been invited to Ottawa to discuss with senior Canadian officials a wide range of commercial, economic and development-assistance questions. The talks included increased sales of Canadian products to Algeria, the granting of Canadian credits to facilitate such sales, development-assistance projects already under negotiation and possible new projects.

The visit reflected a desire on the part of the Governments of Canada and Algeria to improve and strengthen economic and commercial ties between the two countries.

INDUSTRY AIDS MENTAL HEALTH

Canadian industry is helping in the rehabilitation of people recovering from mental illness. Contracts with companies from coast to coast enable the Canadian Mental Health Association's work centres to prepare patients for re-employment.

As an example, Richards-Wilcox of Canada Ltd., London, Ontario, which is taking an active part in the program, recently made 300 aluminum spent-fuel trays for Atomic Energy of Canada's Gentilly Nuclear Power Station. After being fabricated, the trays were sent to the Mental Health Work Centre in London, where patients cleaned loose weld deposits and spatter from the units.

Gene Lobb, Manufacturing Engineering Manager at Richards-Wilcox, who was responsible for initiating the program, is completely satisfied with the results and his opinion is shared by Cliff Woodhead, Power Projects Quality Control. Richards-Wilcox is believed to be the first AECL supplier to subcontract work to the Canadian Mental Health Association.

The London work centre was the first of three now operated by the Association. St. Claire Jackson, the Director, and his staff of five have had remarkable success in preparing those in their care to resume

happy, useful lives in business and industry.

There are from 40 to 50 patients in the work centre at all times, who live in boarding-houses in the immediate area. As one group completes the rehabilitation course, another takes its place.

TWO NATIONAL MUSEUMS BEING RENOVATED

Two of Canada's national museums, Man and Natural Sciences, will soon be back in business.

The Victoria Memorial Building, built in 1910 in what is now the heart of Ottawa, is undergoing a complete renovation. It is this building that houses exhibits of the National Museum of Man and the National Museum of Natural Sciences.

Old displays, some dating back to 1935, have been torn out and will be replaced by new exhibits that will be a mixture of entertainment and education.

The revamped auditorium opened in October to accommodate the Wednesday Night Lecture Series, held last year in the auditorium of the National Gallery of Canada. This new series, featuring internationally-renowned speakers, will be the most ambitious the National Museums of Canada has ever undertaken.

The Mammal Hall, the Bird Hall and a hall for temporary exhibits should be ready by next summer. Other halls - Mineral Sciences, Orientation (showing stages of man's educational and cultural evolution), Palaeontology, Canada Before Cartier, and the halls of Canadian Indians (West Coast, Iroquois, Plains, and Sub-Arctic) - will be ready for use a little later in the year.

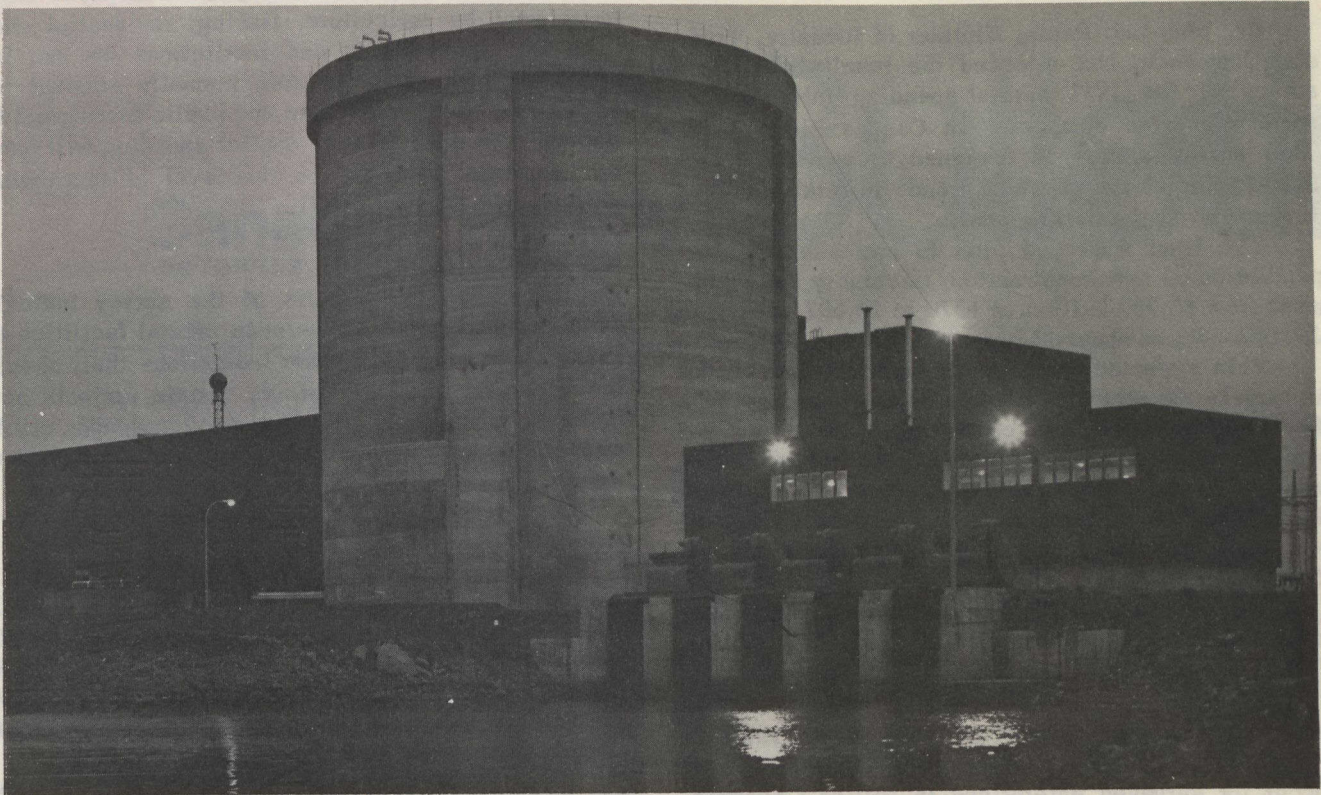
Two complete floors of displays will be open to the public by January 1972, with five or six new exhibit areas in addition to three refurbished halls. By August 1973, another seven halls will be finished.

TRAVELLING EXHIBITS

Plans are being made to send a program of exhibitions to other parts of Canada. The National Museum of Man, which had already begun its travelling-exhibit program, had to curtail it owing to the renovations. The travelling-exhibit project is expected to be developed further when renovations are completed.

Despite the great changes taking place, the museum will continue to strive for a balanced emphasis on research, preservation, education and exhibition. A new stress on exhibition, using the latest techniques, is now possible because of the increased display space resulting from the dispersal of staff and collections across the Ottawa area.

Four floors of the great stone building will be exploited, more than doubling the display area available in the past. With the stimulation of greater space and variety of exhibits, the museologists and scientists are looking forward to their museums playing a far greater cultural and educational role in the capital.



GENTILLY NUCLEAR REACTOR AT WORK

The reactor at the 250,000-kilowatt Gentilly Nuclear Power Station, on the St. Lawrence River, ten miles east of Trois-Rivières, Quebec, came into operation for the first time on November 12.

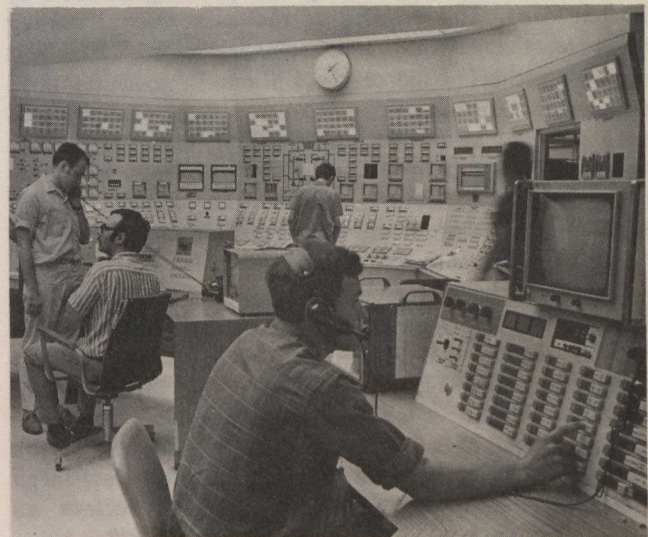
Gentilly, a prototype, is the world's first nuclear-power station to have a reactor fuelled with natural uranium and cooled by light (ordinary) water. The idea (known as CANDU-BLW, for Canada Deuterium Uranium-Boiling Light Water) is a development of the Canadian system of heavy-water-moderated reactors. Use of light rather than heavy water as a coolant offers the promise of lower capital and operating costs for future stations.

A FIRST FOR QUEBEC

Gentilly is the first nuclear-power station in Quebec. It was designed and built by Atomic Energy of Canada Limited in co-operation with Hydro-Québec. Situated on the south shore of the St. Lawrence between the villages of Gentilly and Bécancour, the station was built at a cost of \$120 million. It is owned by AECL and will be operated by Hydro-Québec, which will buy the electricity produced. The agreement on Gentilly provides for eventual purchase of that station by Hydro-Québec.

The start-up of the reactor is the first step in bringing the whole station into production. Once a chain reaction of atom splitting within the reactor has been achieved, its heat output is gradually in-

creased until enough heat is produced to generate steam for the turbine. Extensive tests have to be carried out at each stage of the approach to power production, and these will occupy several months. The first electricity is expected from the station early in 1971. The full power, of 250,000 kilowatts (enough to serve the electrical needs of a city of 200,000 people), will be reached later in the year.



The control of operations is conducted by computer in this room at the Gentilly Nuclear Power Station.

BUSINESS INVESTMENT OUTLOOK FOR 1971

Mr. Jean-Luc Pepin, Minister of Industry, Trade and Commerce, has released the results of a field survey of the 1971 capital-spending intentions of some 200 large companies in Canada during 1971. This annual survey is designed to provide a preliminary indication of likely trends in total business investment in the coming year.

The firms surveyed plan to increase their expenditures on new construction, machinery and equipment from \$5,960 million in 1970 to \$6,607 million in 1971, a gain of about 11 per cent.

This expected increase in business investment is largely the result of sharply higher spending on a few very large projects concentrated in mining, oil and gas pipeline and electric utilities. Only moderate changes in spending on capital projects are indicated for other major sectors, including manufacturing, oil and gas production, financial institutions and retailers.

The coverage of the survey varied considerably among the geographic regions of Canada. It is, therefore, not possible to provide any precise measure of the regional impact. The response from interviews suggests that the sharpest increase in the value of plant and equipment to be put in place in 1971 will occur for surveyed enterprises in British Columbia, the Yukon and the Northwest Territories. Somewhat lesser but still above Canada-average gains are expected in Quebec and Ontario, while in the Atlantic and the Prairie provinces indications are that somewhat less is likely to be installed in the coming year than in 1970. This pattern could change considerably if major projects are implemented by companies not surveyed.

1970 RESULTS

At the same time last year the firms surveyed expected to increase their capital spending in 1970 by 14 per cent. The results of the most recent survey indicate that actual accomplishment in 1970 fell somewhat short of the original plans. In some regions, the implementation of capital-investment projects has been delayed by work stoppages but, more important, programs have been affected by deferrals and cut-backs related to uncertainties in the long-run market outlook and the problems of lower-than-expected cash flows and high interest rates.

The 200 large companies account for about three-fifths of total non-agricultural business investment in Canada. In the past, the investment plans of these companies have reflected closely the intentions of Canadian business as a whole. However, owing to the fact that this year the changes shown by the survey are mainly attributable to relatively few large projects, the survey results may not reflect as closely as in the past investment plans in the business community as a whole.

Capital-spending plans as outlined relate to

major sectors of private business investment only. Investment by agriculture, fishing, residential construction, governments and institutions are not included. These latter sectors normally account for almost half the total private and public investment in Canada, and their level of capital spending will have an important influence on the level of investment activity as a whole in 1971.

SUSTAINED EXPANSION EXPECTED

On the whole, the results of the survey indicate sustained expansion of business capital facilities in 1971. There are also further indications that, should the economic climate improve, certain projects now being deferred could be reactivated and add further strength to capital-investment activity of the business sector.

MOTOR-VEHICLE STANDARDS

Canada's new federal motor-vehicle safety standards will come into effect on January 1, 1971. These standards, which are part of the Motor Vehicle Safety Regulations, were published in Part II of the *Canada Gazette* on November 25.

The regulations were first published as proposals in Part I of the *Canada Gazette* on August 22, those relating to snowmobiles being included in the issue of September 19. Manufacturers, distributors, importers and others were given the opportunity to make representations regarding the proposals. The submissions received as a result of this were considered and, in some cases, resulted in revisions to clarify the original proposals.

The safety regulations currently include 29 standards relating to the design and performance of passenger cars, trucks, buses, motor-cycles and trailers, five standards limiting motor-vehicle exhaust emissions and ten standards applying to snowmobiles. They will be subjected to continual review, and additions or revisions will be incorporated to keep pace with engineering or technical advances. Safety standards for tractors and associated vehicles also are under consideration.

NATIONAL SAFETY MARK

The regulations require all Canadian motor-vehicle manufacturers or distributors to apply the national safety mark to every classified vehicle produced after the date of proclamation. The national safety mark must also be accompanied by a label certifying compliance with all applicable federal motor-vehicle safety standards. Vehicles imported for commercial purposes must also bear the certification label.

Canadian residents importing vehicles for personal use must comply with the Act and Regulations, though only those vehicles manufactured after the date of proclamation need comply with all safety standards.