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The Space Shuttle's manipulator arm — at the edge of technology, 1

Old Canada/France trade treaty to be scrapped, 2

Algerian liquefied gas to run through Canadian pipeline, 2

Aircraft sales soar, 3

A dangerous aid project, 3

Canada supports protection of war victims — Geneva Convention, 4

Canadian heads international expositions agency, 4

Pensions, allowances rise, 4

Make-work program, 4

New wheelchair helps handicapped, 5

Safer pest control, 6

Canadians stand up to be counted, 6

Construction industry goes metric, 6

News of the arts — film, exhibition, 7

Radioactive waste disposal examined, 8

News briefs, 8

The Space Shuttle's manipulator arm — at the edge of technology

The Space Shuttle, a squat rocket-cum-glider capable of shuttling to and from near-earth orbit, is being developed by the U.S. National Aeronautics and Space Administration (NASA) with help from other nations. Canada is contributing the remote manipulator system — an arm which will be attached to the craft, enabling its crew to manipulate objects out in space. The challenging job of designing and building the arm is being carried out by a team led by Spar Aerospace Products Ltd. of Toronto, and directed by the National Research Council. It has now reached the stage at which hardware can be tested.

Science fiction becomes fact. In 1979, high above the earth's atmosphere, an astronaut will, for the first time, use a remote manipulator in space. From the flight deck of the Space Shuttle he will control the stately movement of an arm more than 15 m long, adroitly grasping and jockeying satellites as big and heavy as a bus.

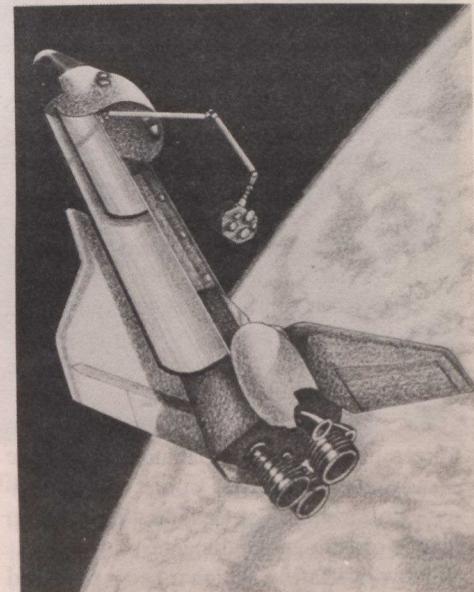
This futuristic device, now being built in Canada, will resemble the human arm and hand in form as well as in function. It will be hinged inside the spacecraft's cargo bay at a shoulder joint, divided into two sections at an elbow joint, each about the length of a telephone pole, and terminated by a "hand" moving in a wrist joint and capable of grasping.

Dissecting the arm to expose its components would reveal more of its analogy to the human body. The arm will have a skin — a coat of metal and plastic films to protect it from the temperature extremes of space; muscles — sophisticated electric motors and gear trains; and an eye — a television camera mounted on its wrist. Like nerves, a network of wires will spread through the arm, and like the brain, a computer will process the signals pulsing through the network, translating the commands of the operator into coordinated movements of the whole system.

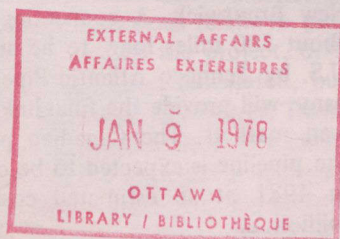
After surviving the severe buffeting of a rocket launch, the arm has to work reliably and accurately in an extremely hostile environment — an almost total vacuum, bathed in intense radiation, with temperatures that alternately plummet and soar. Designing within these con-

straints has severely taxed the collective ingenuity of hundreds of engineers and technicians.

In a carefully orchestrated process, they have refined their design from its starting point, NASA's requirements. Options have been selected following trade-off studies and computer simulations, electronic circuits spread out in so-called "breadboard" models to check their feasibility, components built, critically examined and modified, the evolving configuration of the arm constantly monitored, and its performance as an integrated system compatible with the Space Shuttle's even more complex system constantly improved.



An artist's impression of the Space Shuttle using its Canadian-built manipulator arm.

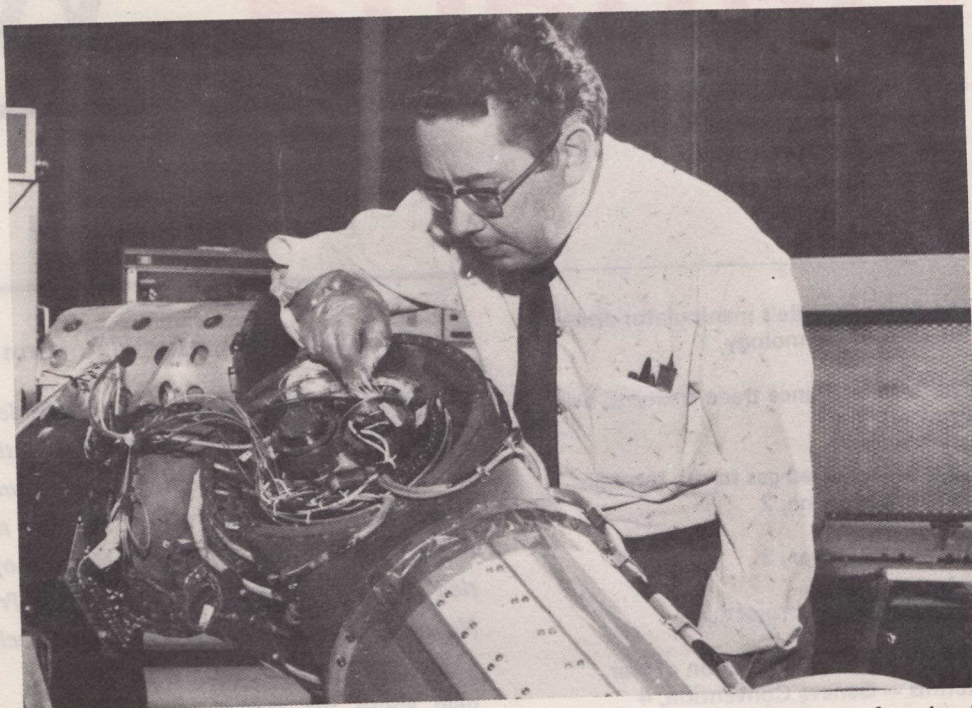


Jan. 4/78

Most of the arm's hardware now exists as engineering models — full-size performance tested prototypes. Their ability to withstand severe vibration, low pressure and extreme temperatures is being evaluated in the Department of Communications' spacecraft testing laboratory in Ottawa, where the environment of space can be simulated in special chambers.

Test co-ordinator Geoff Garside of Spar explains: "We're trying to get a feel for the kind of beast we've built. Even though we have a lot of aerospace experience to guide us, no one has ever built or used anything quite like this before, and before we send it up we want some "hands-on" sense of how it's going to behave in space. We're down the line a fair way, and don't expect problems that surface in these tests to have severe impact on fundamental design, but you always run into unknowns when you're playing at the edge of technology."

The foregoing article by Séan McCutcheon is reprinted from Science Dimension, Vol. 9, No. 6, 1977.



Geoff Garside prepares a prototype shoulder joint for tests of its ability to function in the hostile environment of space.

Old Canada/France trade treaty to be scrapped

Secretary of State for External Affairs Don Jamieson recently announced Canada's decision to terminate the Canada/France Trade Agreement signed in 1933.

The pact, no longer effective in governing Canada's economic relations with France, has been superseded by the two countries' common membership in GATT, French membership in the EEC and Canada's developing relations with the Community as a whole. Only Article 11, providing for the mutual protection of appellations of origin for goods produced in either country, continues to have significance.

However, in recent years this article has become increasingly contentious in Canada/France relations as a result of a series of court actions undertaken in the late 1960s by French industry concerning the use of the champagne appellation by Canadian producers.

In Canada's view the agreement no longer provides for a balanced exchange of advantages and has come to discriminate unfairly against Canadian industry in favour of foreign producers.

New legislation which is being prepared by the Minister of Consumer and Corporate Affairs in conjunction with the revi-

sion of the Trade Marks Act will include provisions for protection of many of the appellations of origin now registered under the Canada/France Trade Agreement but not of champagne and other terms commonly used as the names of Canadian products. This legislation will, among other things, protect appellations of origin in order to avoid deception of consumers.

As provided for in the agreement, termination will take effect three months from the date of notification.

Algerian liquefied gas to run through Canadian pipeline

The National Energy Board recently granted licences to the United States company Tenneco LNG Inc. of Houston, Texas allowing liquefied natural gas (LNG) from Algeria to be imported by tanker at Lorneville, New Brunswick and exported by pipeline to the U.S. The gas is to be sold to Tennessee Gas Pipeline Company, a division of Tenneco Inc.

The Board held a joint public hearing to consider five applications related to the LNG project. They were submitted by Tenneco LNG Inc., Canadian Lowell Gas Ltd., Lorneterm LGN Ltd. and TransCanada PipeLines (New Brunswick) Ltd.

Licences granted by the Board allow Tenneco LNG to import for delivery to the U.S. up to 100 billion thermies of liquefied natural gas a year (equivalent to 376 billion cubic feet a year) for a 20-year period expected to start in 1983.

Maximum volume for the 20-year term will be 7.5 trillion cubic feet of gas (or 2,000 billion thermies). Tenneco has a 20-year supply contract with the Société Nationale Sonatrach of Algeria.

TransCanada (New Brunswick) and Lorneterm will construct, over four years, at a cost of \$636 million, terminal and pipeline facilities that include unloading, storage and vaporization facilities at Lorneville, New Brunswick. The pipeline, 36 inches in diameter, will extend some 66 miles from the vaporization plant to the Canada-U.S. border at St. Stephen, New Brunswick. A connecting pipeline, about 500 miles long, to be built in the U.S. by Tenneco Atlantic Pipeline Company, will provide the final link to American markets. The Canadian portion of the pipeline is expected to be completed in 1981 at an estimated cost of \$68 million.

The Board has asked that some quantity of gas, not exceeding 5 per cent of the LNG imported from Algeria, be available for sale in Canada if terms and conditions are economically feasible.

Aircraft sales soar

Canadair Limited of Montreal will receive some \$100 million in contracts from the United States Lockheed-California Company for *Aurora* and *P-3C* aircraft structural parts and maintenance-training devices.

The first step is an immediate contract for \$20 million to supply Lockheed with initial quantities of airframe structural elements. Included are nose and aft radomes to house the aircraft radars, main electrical load centres, inner and outer wing boxes, the aft portion of the fuselage and machine parts.

Lockheed contemplates buying a total of 150 sets of the components including those required for the 18 *CP-140* aircraft for Canadian Armed Forces. The other sets will be used to build *P-3C* aircraft for sale to the U.S. Navy and the armed forces of other countries.

Canadair has already shipped the first sets of radomes and aft fuselage sections to Lockheed and work is in progress on five *CP-140* maintenance trainers and

other structural elements peculiar to the *Aurora* design.

At Burbank, California, Canadair engineers and technical writers are working with Lockheed personnel developing engineering data and technical publications for the *Aurora* aircraft, and a team of instructors is at Burbank learning maintenance techniques and procedures.

The Canadair award is the latest in a series that Lockheed and its major suppliers have placed with Canadian firms as part of the company's total offset commitment which is expected to exceed \$900 million.

In addition, Lockheed has been credited with offset benefits in the amount of \$81.8 million to the end of September 1977 against a contractual obligation of \$61.7 million to December 31, 1977.

"This is part of a deliberate plan to ensure that the benefits of the massive *CP-140* contract are reaped throughout as many regions of Canada as possible," says Minister of Supply and Services Jean-Pierre Goyer.

Major contracts have been placed already with Bristol Aerospace at Winnipeg,

Manitoba, Enheat Ltd., at Amherst, Nova Scotia, IMP Ltd. at Dartmouth, Nova Scotia, CAE at Montreal, Quebec and Litton Systems at Toronto, Ontario.

Contracting agency negotiates sale

With the assistance of the Canadian Commercial Corporation, DeHavilland Aircraft of Canada, Downsview, Ontario, has obtained a contract from the Tanzanian Peoples' Defence Forces for four *Buffalo DHC-5D* aircraft.

The Canadian Commercial Corporation, wholly owned by the Government of Canada, acts primarily as the contracting agency when other countries and international agencies wish to purchase supplies and services from Canada on a government-to-government basis.

The value of the four aircraft, together with a spares-supply program and pilot and maintenance crew training has been estimated at \$28 million (U.S.).

Financing is to be completed through the Export Development Corporation. This contract should provide a total of 753,920 direct and indirect labour man-hours.

A dangerous aid project

During the past few years, while Ethiopians have been waging war amongst themselves and with neighbouring Somalia, a team of seven Canadian veterinarians living in the country has been waging war on rinderpest, an acute infectious cattle disease. Six team members completed their work and returned home in 1976, but the team leader, Dr. Charles Morris of Vancouver, just returned recently after staying an extra year to ensure a smooth takeover of the project by Ethiopian veterinarians.

The vaccination program sponsored by a Canadian International Development Agency grant of \$1.1 million, began in 1973 in the mountainous northern provinces. By the end of the project, 6.75 million cattle had been inoculated, but not without hazardous adventures. Travel on mules was painfully slow. Frequent shortages of supplies occurred. A severe famine, an armed uprising and the disintegration of the administrative framework of the project owing to political upheavals hampered the work.

Nevertheless, at the end of the four years (1973-77), the team left with the knowledge that the Ethiopians had ac-



Dr. David Dempsey supervises the loading of rinderpest vaccine.

quired the expertise to control further outbreaks of the dread disease — the main deterrent to improving the quality of cattle in Africa.

The Canadian project was one phase of

an extensive vaccination campaign involving assistance from many countries, and resulting in the vaccination of some 110 million cattle in the Sahel and some east African countries.

Canada supports protection of war victims — Geneva Convention

The Canadian Ambassador to Switzerland recently signed two Protocols to the Geneva Conventions of 1949 relating to the protection of victims of armed conflict. These Protocols were adopted by a diplomatic conference convened as a result of an initiative of the International Committee of the Red Cross. The Canadian delegation to the conference, which held four sessions in Geneva from 1974 to 1977, played an active role in the negotiation of both Protocols.

Protocol I deals with the protection of victims of international armed conflict. The Geneva Conventions of 1949 afford protection to sick and wounded members of the armed forces, to prisoners of war and to the civilian population. Recent efforts now provide protection of non-defended localities, of the environment and of food and water supplies. There are also special provisions on reunion of families, protection of journalists and measures in favour of women and children.

For the first time, under Protocol II, international law has established standards for the treatment of victims of internal conflict (civil war). Such protection had previously been available only in situations of traditional types of war between states.

Canadian heads international expositions agency

Patrick Reid, Director General of the Bureau of Public Affairs of the Department of External Affairs, was elected President of the International Bureau of Expositions at its annual meeting in Paris on December 14.

The Bureau, whose headquarters are in Paris, has a membership of 37 nations. Under an international convention established in 1928, it regulates the frequency and conduct of all world expositions, such as Expo '67, Montreal.

Mr. Reid, whose term of office will be for two years, is the first non-European president in the Bureau's 50-year history. He was proposed by the delegation of the U.S.S.R., seconded by United States and elected unanimously. He has been Canada's Commissioner General at seven world expositions — an international record — and has been the chairman of the steering committee of participants at two



Patrick Reid

of them, Expo '70 Osaka and Expo '74 Spokane.

Mr. Reid will continue his duties as Director General of Public Affairs during his tenure as president of this international organization.

Pensions, allowances rise

The basic Old Age Security pension rises this month to \$153.44 from \$150.43.

The new monthly total at the single rate for persons receiving both the basic Old Age Security pension and maximum Guaranteed Income Supplement will be \$261.06.

For a married couple, both pensioners, the combination of the basic pension and maximum supplement will provide a payment of \$498 for the couple monthly.

The Spouse's Allowance, paid to persons between 60 and 65 years of age who are married to Old Age Security pensioners and meet residence requirements, will increase to \$249.00, from \$244.12.

Family allowances

Also effective this month, the Federal Government monthly allowance paid for children under 18 will rise to \$25.68 from \$23.89 in most provinces and in the territories.

The amount and method of payment of Family Allowances varies in Quebec and Alberta. Under a provision in the Family Allowances Act, a provincial government may ask the Federal Government to vary the rates according to the age or number of children in a family,

providing the payments average \$25.68. Quebec and Alberta have again chosen this option.

Special Allowances, which are paid to foster parents, welfare agencies, government departments and institutions maintaining children, will also increase to \$25.68 from \$23.89.

Each month during 1977 the Federal Government paid more than \$173 million in Family Allowances to 3.6 million families. The cheques covered 7.2 million children. The national average allowance for each recipient family was about \$49.

Make-work program

Robert Andras, President of the Treasury Board, announced on December 15, that 15 departments will participate in the \$150-million Federal Labour Intensive Projects (FLIP) program, which will generate 157,000 man-months of employment.

The program, now under way, ends September 30, 1978, and will be made up of projects undertaken by federal departments and agencies through employment of individuals, as well as by contracts with private industry for roughly \$30 million of the total.

Mr. Andras said: "The departmental proposals we approved met the following criteria: they had a high labour content, were from areas of high unemployment, and had a direct relationship to the programs of the department."

The breakdown of fund allocation, by province, is: Quebec, \$53.2 million; Ontario, \$40.6 million; British Columbia, \$20.9 million; New Brunswick, \$9.3 million; Nova Scotia, \$9.3 million; Newfoundland, \$7.9 million; Manitoba, \$3.9 million; Alberta, \$3.0 million; Saskatchewan, \$1.8 million; Prince Edward Island, \$1.0 million; Northwest Territories, \$170,000; Yukon, \$55,000. The amount allocated to each province was calculated on the numbers and percentage of unemployed persons.

Mr. Andras emphasized that the resources being allocated to FLIP are in addition to the \$458 million previously provided for the 1977-78 Employment Strategy, which includes major direct job-creation programs such as Canada Works and Young Canada Works, summer programs for students, expanded training opportunities and other employment-related activities.

New wheelchair helps handicapped

The following item has been reprinted, in edited form, from Transport Canada, November/December 1977.

Life for a severely handicapped person is not easy at the best of times but a new design in wheelchairs may make it a little less difficult.

Transport Canada's electric wheelchair can climb curbs, negotiate fairly rough terrain, and can also handle narrow passageways.

Designer Doug Ball, who developed the wheelchair for the Transportation Research and Development Centre, says "the chair is not only the key to transportation for the disabled, but also the key to a whole new way of life. There's a new dimension of freedom in work and play that was never available in the conventional electric wheelchair"

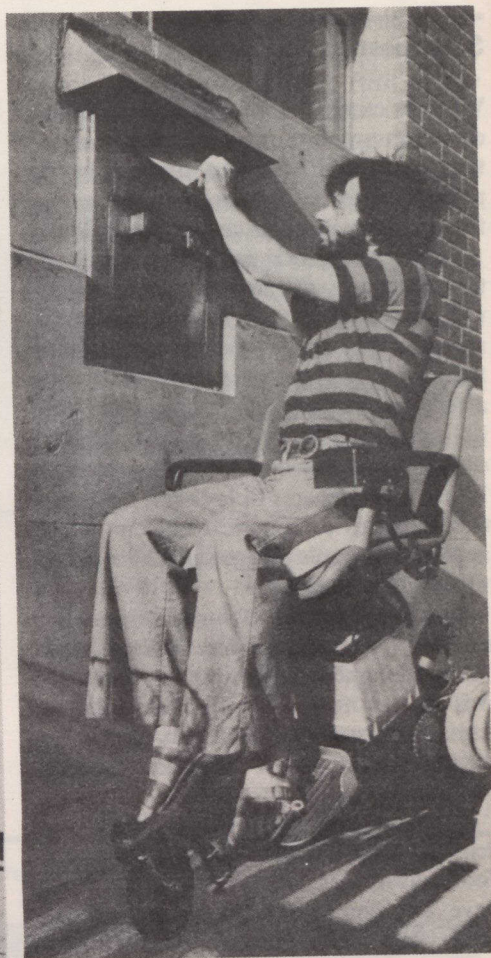
The new chair is not the result of technological breakthroughs — an outboard starter motor and an automobile windshield-wiper gearbox turn the power platform; sealed automotive batteries power it, and the same type of balance switch found on a quadraphonic sound system steers it. Even the seat is borrowed — it's part of an office furniture system Mr. Ball designed for a furniture company.

The new configuration allows the user to negotiate a 57-cm-wide doorway, an escalator or a vertical-level change of over 20.32 cm. The occupant's reach can be improved by raising the seat level 25.40 cm and the seat angle can be changed for increased comfort. For easy transportation, the wheelchair can be broken down into pieces which are easily stored in the trunk of a car.

The project originated at the University of Toronto with senior year electrical engineering students. TDC then directed Doug Ball Inc. to take over the design and assemble the components.

At present, the prototype is undergoing final testing and evaluation. TDC is searching for a manufacturer and distributor. The price should be about \$2,000, a few hundred dollars more than existing models. Until final results are in and performance measured, satisfaction can be measured in terms of user comments.

For example — the little boy who said "Now I really know what the flowers and woods smell like" or the war veteran who said "For the first time I can go to the corner store alone."



Safer pest control

When it comes to controlling a pest that costs consumers money, agricultural scientists aren't a bit bashful about probing its personal quirks. They even know its preference for particular shapes and colours.

Willis Neilson, a specialist at Agriculture Canada's research station at Kentville, Nova Scotia, says that the apple maggot even has a changing preference for shapes as it matures. Early in its life, after it emerges from the soil in July, it likes anything rectangular in shape — similar to the leaves of an apple tree. Later, as it prepares to lay eggs, its preference changes to spherical objects — like apples. The apple maggot also is attracted to the colour yellow.

"It might seem to some to be a useless sort of observation," Mr. Neilson says. "In fact, combined with other knowledge, it is the key to reducing dramatically the damage caused by the insects and to reducing the amount of insecticide used by farmers."

The other knowledge to which the scientist refers involves adult nutrients — food substances which the female must have in order to develop eggs. These nutrients have been successfully synthesized in laboratories for various species of insects. The apple maggot prefers hydrolyzed proteins. These nutrients are placed in special sticky traps in farmers' fields to attract female apple maggot flies.

"The knowledge that the emerging flies prefer rectangles and yellow colours is essential to the design of the traps. They are made in a rectangular shape and are a bright yellow colour."

Mr. Neilson started a program last summer, using traps and synthetic attractants to try and combat the apple-maggot problem in eight test orchards covering 100 acres in the Annapolis Valley of Nova Scotia.

"We found that ten acres of the 100 under test didn't have to be sprayed at all because there were no flies trapped. It would normally have received three to five sprays automatically. That's costing the producer money that is passed along to the consumer in the end."

An equally important aspect of the work is that fewer chemicals are being applied to the environment.

"Based on our tests, I'd say we now have the upper hand on the apple maggot," the scientist says.

Canadians stand up to be counted — post-war babies grow up

The most significant characteristic of the 1976 age distribution of Canada's population concerns the continuing process of "population aging". In 1976, the population count for persons aged 65 and over was 2,002,000 (8.7 per cent), compared with 1,744,000 (8.1 per cent) in the 1971 census. At the same time, the 1976 count for persons aged 14 or younger was 5,896,000 (25.6 per cent), compared with 6,381,000 (29.6 per cent) in the 1971 census. These findings are even more striking when one recalls that between 1971 and 1976 Canada's population as a whole increased by 6.6 per cent, while the older population (65 and over) increased by 14.8 per cent and children (up to 14) decreased by 7.6 per cent.

Of special interest in connection with employment and unemployment is the population in the "junior working ages" (20-34) and the "senior working ages" (35-64). In 1976, the count for the

"junior" group was 5,754,000, compared with 4,779,000 in 1971, representing a 20.4 percent increase. For the "senior" group the corresponding figures are: 1976 — 6,994,000 and 1971 — 6,550,000, representing a 6.8 percent increase. Clearly, whereas the "senior" group grew at a rate close to that of the total population, the "junior" group grew at a much faster rate (this phenomenon is, of course, a consequence of the post-war baby boom).

Also of interest is the composition of the population by sex. In 1976, for the first time in the history of Canadian censuses, the number of females actually exceeded that of males. The 1976 ratio of 992 males *per* 1,000 females is a far cry from the ratios observed in the past (e.g. 1961 — 1,022 males *per* 1,000 females). The predominance of females is particularly pronounced among those aged 65 and over, where the 1976 sex ratio reached 777 males *per* 1,000 females.

Construction industry goes metric

Canada's largest industry — construction — was among the first to have its metric-conversion plan approved by Metric Commission Canada and is all set to "go metric".

A prime goal has been achieved — the metric conversion schedules for housing and on-site construction, designers, land surveyors, town planners, and the materials-supplying industries have all been co-ordinated. A key common denominator has been the choice of January 1, 1978 as "M-Day". This is defined as "the first day of Metric Construction Year in which the Canadian construction industry will work in SI (metric). Following M-Day, drawings and specifications, materials and components which are necessary in metric terms will become available."

In accordance with the construction industry's plan:

— Manufacturers of materials and components that are essential for metric construction have undertaken to make them available by M-Day; so have the suppliers of many other construction items.

— Federal and provincial construction agencies are on record at the ministerial level as supporting the industry's plan; this guarantees a large market for metric-

sized materials.

— Metric supplements to the 1977 National Building Code and to Residential Standards 1977 have been published and a steady stream of metric standards for construction materials has been produced by the Canadian Standards Association and other standards-writing organizations.

Close liaison is being maintained with counterpart groups in the United States actively working on construction metric-conversion programs.

Whereas relatively few construction workers will have to invest in metric tools, Metric Commission Canada's Assistance Program — Workers' Metric Tools, will provide them with financial help in this regard during the next five years.

A decade ago the construction industry advocated the metric system in the interests of greater efficiency and economy. Now Canada's \$33 billion-a-year construction program is on the metric threshold.

Pressure appears to be mounting on *Le Devoir* publisher Claude Ryan to reconsider an earlier decision not to seek the leadership of the Quebec Liberal party. Reports showed Ryan was a three-to-one favourite for party leader.

News of the arts

Canadian film awards

Two National Film Board feature productions, *J.A. Martin, Photographe* and *One Man*, swept last year's Canadian Film Awards with a total of 13 wins. In all, the NFB took 16 Etrog awards at the annual presentation in Toronto on November 20. Thirteen of its productions had been nominated earlier for a total of 51 awards.

J.A. Martin, Photographe, directed by Jean Beaudin, was chosen as the year's top feature film. Beaudin was also named as the year's best director. For the same film, Monique Mercure was selected as best actress, as she was earlier this year in Cannes, France.

Other Etrog acting awards for feature films went to: Len Cariou as best actor for his role in *One Man*, directed by Robin Spry. For the same film, Jean Lapointe was named best supporting actor and Carol Lazare as top supporting actress.

Again this year, the National Film Board won the best animation film award. This time the Etrog went to *Spinolio* by John Weldon.

Out of 14 craft awards for feature films 12 were won by the NFB.

In categories other than those for feature films the Board took two awards. Marina Dimakopoulos was named best actress for her part in *Happiness is Loving Your Teacher* and the award for best non-dramatic script went to Donald Brittain for his film *Henry Ford's America*, co-produced by the Canadian Broadcasting Corporation.

International recognition

Since capturing seven awards in Yorkton, Saskatchewan, in October, the Film Board has added another 12 wins.

Four of these were presented at the International Film Festival of Columbus, Ohio. Awards went to *First Steps*, directed by Philip Bridgeman and Alec MacLeod; *Tara's Mulch Garden*, directed by Ian Pedersen; *The Lady and the Owl*, directed by Bill Canning, and the highly-praised animation film *The Street* by Caroline Leaf.

At the 21st Annual San Francisco In-

ternational Film Festival, Special Jury Awards went to the NFB for *Augusta*, directed by Anne Wheeler; *Path of the Paddle: Doubles Whitewater* by Bill Mason; *Henry Ford's America*, directed by Donald Brittain; *Mindscape*, directed by Jacques Drouin (also honoured for its "remarkable direction").

Other recent awards to the Film Board include those from: Besançon, France for *Chérie ôte tes raquettes*, directed by André Leduc; Manherin, Germany for *Jornaleros Agrícolas* by Eduardo Maldonado; Nyon, Switzerland for *Raison d'être*, directed by Ives Dion, and Chicago for *Living and Growing*, directed by Doug Macdonald.

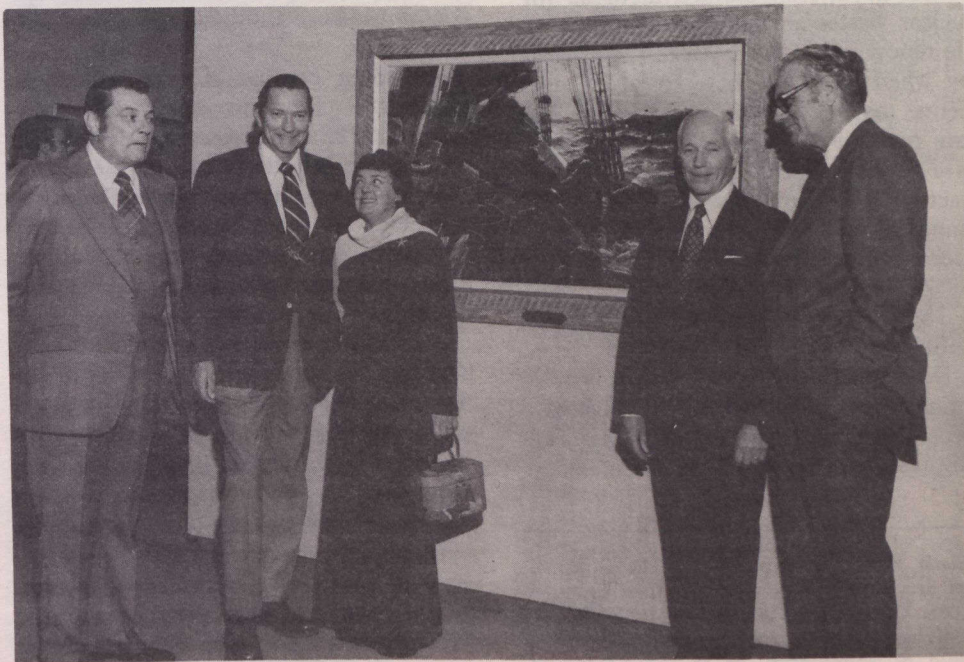
A Canadian film recently rose to a rare third position on the American *Variety's* 50 top-grossing films chart. *Rabid*, produced by Ivan Reitman and released in Canada by Montreal's Cinepix Studios, grossed \$100,000 in Montreal before opening in 200 theatres across the United States last summer.

Television and private industry

• Mr. Brittain's *Henry Ford's America* won an international Emmy award in the non-fiction category. Global Television's *Tides of War* and CBC's *Homage to Chagall*, produced by Harry Rasky, were also considered for the award. CBC's *Sarah*, the drama based on the life of Sarah Bernhardt, was nominated for best film in the fiction category. The Canadian programs competed against entries from Britain and Japan.

• The non-competitive Paris Film Festival awarded an unofficial first prize to the Canadian film *Who Has Seen the Wind?* Based on the novel by Canadian author W.O. Mitchell, the film was described by the Paris daily *Le Matin* as "a film of muted lyricism" and as "a discreet tribute to the men of good will who people the rural literature of the New World". *Who Has Seen the Wind?*, produced by Alan King, observes the growth of a sensitive young boy in a small Saskatchewan town in the 1930s. It was shot last year in Arcola, Saskatchewan.

Jack Gray exhibition at Mount Allison University



Halifax artist Jack L. Gray's *Dressing Down, the Gully*, commissioned in 1962 by the late U.S. President John F. Kennedy, was one of 43 works in a recent exhibition of the artist's paintings at Mount Allison University, Sackville, New Brunswick. Shown with the painting (from left to right): T. Keilor Bentley, director of the university's Owens Art Gallery, Mr. and Mrs. Jack Gray, John Stiles, foreign service visitor to the university (from the Department of External Affairs), and Dr. W.S.H. Crawford, president of the university. The painting was later returned to the John F. Kennedy Memorial Library for permanent exhibition.

Radioactive waste disposal examined

Good prospects for the safe, permanent disposal of nuclear reactor wastes exist and should not delay Canada's nuclear power program, provided work on a national plan for the disposal of nuclear waste is begun immediately.

That was the main conclusion reached by an independent panel of three experts in a report recently released by Minister of Energy, Mines and Resources Alastair Gillespie. Release of the report, which is entitled *The Management of Canada's Nuclear Wastes*, is neither a statement of policy nor an endorsement of recommendations by the Federal Government.

Dr. Kenneth Hare, director of the Institute for Environmental Studies at the University of Toronto; Dr. A.M. Aikin, a former vice-president of administration and planning for Atomic Energy of Canada Limited; and Dr. J.M. Harrison, a former deputy secretary-general for science of UNESCO, and former senior assistant deputy minister at EMR, outlined a consolidated plan for the management of radioactive wastes in their report commissioned by EMR.

Present interim storage methods for nuclear wastes are reliable and safe, but, the report notes, the day is fast approaching when there will have to be arrangements made for ultimate disposal. To date over 1,500 tonnes of irradiated fuel have been produced by Canadian power reactors. It is predicted that about 50,000 tonnes of radioactive wastes may be produced by nuclear reactors by the year 2000.

The report concludes that the best potential for disposal of high-level radioactive waste from nuclear reactors is deep burial in geological formations of igneous Precambrian rocks, preferably in Ontario. However, the report calls for immediate

and accelerated research and development programs to solve the many technical problems and to satisfy the public that the deep geological burial repositories will work as expected.

News briefs

Canadian exports are expected to total \$47 billion this year, up \$10 billion from last year. But economic growth in the industrialized countries — Canada's main markets — is faltering and will be modest at best in 1978, despite a trend of more expansionist policies, says the Canadian Export Association.

Steve Handfield-Jones, Assistant Deputy Finance Minister, told the Agriculture Outlook Conference on December 12, that the Canadian economy should be healthier in 1978, with real growth reaching 5 per cent and inflation dropping to 6 per cent. The trade surplus would improve on the \$2-billion figure for 1977 and all indications showed renewed consumer confidence in the economy. Industrial expansion, however, he said, appeared unlikely and could fall below the 1977 level.

Canadian companies and individuals had \$10.67 billion invested abroad at the end of 1975, an increase of \$1.37 billion or 15 percent over the total at the end of 1974, reports Statistics Canada. Direct investments of \$5.68 billion in the U.S. accounted for 53 per cent of the foreign investment total and Brazil, with \$1.07 billion, was the second largest recipient.

New Democratic Party leader Ed Broadbent attended the 1977 party leaders' conference of the Socialist International in Tokyo, December 17 to 18. Broadbent was elected vice-president of the organization in 1977.

France and Quebec have signed an agreement to invest jointly \$10 million over the next five years in exploring for copper in Quebec and are discussing the possibilities of industrial and technological co-operation in asbestos production.

The Federal Government has imposed global quotas on imported footwear, effective immediately, in a move to protect the domestic shoe industry from further deterioration. Footwear imports will be restricted to 32.5 million pairs annually for the next three years. The quotas will apply mostly to leather footwear imports.

A timetable for a national waste disposal program is proposed, starting with the declaration of a national plan in 1978 and concluding with a repository fully operational by 1995-2000.

Plastic, rubber or canvas footwear and downhill ski boots will not be affected.

A \$20,000-grant to produce an information manual on family-support services for the mentally handicapped is among nine National Welfare grants announced by Health and Welfare Minister Monique Bégin. The grants, which total \$180,287, cover a wide range of demonstration and research projects and other activities in the social welfare field.

Canadian Superior Oil Ltd., of Calgary, is participating in a joint oil-exploration venture in the Dominican Republic which could provide an additional source of petroleum for eastern Canada, Industry, Trade and Commerce Minister Jack Horner revealed recently. The firm's production-sharing agreement is supported by a \$25-million Export Development Corporation foreign investment guarantee. Distributors in eastern Canada will have the first opportunity to buy Superior's share of the oil discovered as a result of this exploration.

Claude Lambert of the Department of External Affairs, has been appointed to succeed Claude Sirois as attaché to Governor-General Jules Léger. Mr. Sirois, who held that position for two years, has been posted by the Department to Geneva, Switzerland.

Captain Louise Chevalier, 26, is the first Canadian woman and the youngest person ever to graduate from the Edwards Air Force Base jet test pilot school, California, U.S. A native of Montreal, Captain Chevalier, who holds an engineering degree from Montreal's McGill University, is a member of the Canadian Armed Forces. After writing an entrance exam that brought her into competition with qualified men from many parts of the world, she began the 46-week course which has been offered to a woman only once before, since the program began in 1950. Captain Chevalier, who has flown everything from gliders and "jumbos" to supersonic jets, will join the staff of the jet test base in Cold Lake, Alberta. She is the only female aerospace engineer in the Canadian Forces.

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