



Equipment, systems, services . . .

Canadian transportation industry on the move around the world

by Don Wight
Assistant Editor, Canada Courier

Economically and efficiently transporting people and commodities at home and around the world is one of the things Canada does best. And little wonder! Faced with her own 3,852,000 square miles (10,015,000km²) of territory — and this including large metropolitan areas, mountain ranges, plains and inland waters — Canada has had to develop means of transportation that function trouble-free in all types of climate and over all types of terrain.

Canada's expertise in air, rail, road and water transport has gained her international recognition — and markets — for products, systems and services that are innovative and noted for their high quality, safety and reliability.

Highlighted in this edition of Canada Courier is a cross-section of Canada's capabilities in the increasingly important field of transportation.

Canada's aerospace industry manufactures a broad range of products, 75 per cent of which is exported to world markets.

Highly skilled technical and scientific personnel ensure the most advanced technology and production methods as well as the most meticulous quality control procedures. The results have been marked. Production value in 1974 was approximately \$700,000,000 of which almost \$500,000,000 was exported.

The industry's experience and expertise embraces aircraft, engines, components, avionics electronics accessories, ground handling equipment, spacecraft design and manufacture, space electronics and components. Its products can be found on the ground, in the air and in outer space programs involving many nations.

Companies range from large, fully integrated operations with a wide selection of products to smaller enterprises specializing in a few product lines. They all have one thing in common — the manufacture of products of the highest quality and reliability.

Supporting the industry is a vast network of government and university research facilities. The network includes the extensive research and testing laboratories of the National Research Council of

Canada and the Canadian Defence Research Board as well as leading universities across the country.

Over the years, Canada has established an enviable reputation for the design, development and manufacture of aircraft, including trainers, transports, short take-off and landing (STOL) craft, fire-fighting airplanes and utility and commuter aircraft. Sturdy airplanes suitable for flying from almost inaccessible airfields have been developed to meet Canadian and world needs.

In addition, the industry has developed highly successful small gas-turbine engines; a wide range of communications and transportation equipment; a host of precision-made components, accessories and controls; special electrical, mechanical and electromechanical devices; and ground support and allied equipment. Canada also has the capability to build and furnish completely operating airports — large or small — in any country.

In space, Canada has played a major role, becoming the third nation, after the United States and the U.S.S.R., to launch an operating satellite. The Alouette and ISIS spacecraft, designed and built in Canada, have added substantially to the world's knowledge of the ionosphere. In addition, Alouette I, the first Canadian satellite to be



The first de Havilland DASH 7 quiet STOL airliner rolled out from the company's plant February 5, 1975, and will make its first flight the end of March. The second DASH 7 will make its initial flight a month later and the craft will be in airline service in early 1977. Canada's latest entry in air transport, the 50-passenger short take-off and landing DASH 7 is the quietest transport aircraft on record and requires runways of only 2,000 feet (609.6m). Code 1-32

launched in 1962, has set unprecedented records for longevity and the volume of information gathered and transmitted.

Canada is also a leader in communications satellite technology and has developed the world's first domestic satellite communications network. The satellite Anik (Eskimo for brother), two back-up satellites and some 30 ground relay stations, large and small, will form a network bringing communications to the most remote and inaccessible regions of the nation.

Satellite communications will also be the subject of intensive research through use of the Canadian-designed and built Communications Technology Satellite (CTS) to be launched this year. It will be used for experiments in satellite design and components, ground station technology and the social

and economic implications of communications satellite systems.

Besides complete satellite systems, Canadian industry has de-

veloped space components and accessory capabilities and today has products in most major space programs.



Canadian shipyards, with their long experience in building for the domestic market, have no difficulty in satisfying the requirements of international customers. In fact, almost \$1,000,000,000 worth of export orders have been booked during the past five years.

Many of the ships in Canada's large merchant marine are Canadian-built. So too, are the modern bulk carriers which transport grain, iron ore and coal on the St. Lawrence-Great Lakes system; the specialized barges, including self-loading, self-dumping log carriers which serve the wood products industry on the Pacific Coast; and the icebreakers which were essential to the success of the Manhattan's passage through the Arctic.

Other products produced in Canadian shipyards include: tankers

of 80,000 d.w. tons; product carriers of 35,000 tons; smaller tankers and 17,000-ton cargo vessels. There are also roll-on, roll-off carriers, both ocean-going and freshwater carriers, tugs, barges, car ferries and a number of service vessels, some specially designed for Arctic service.

While most Canadian shipyards have heavy order books, there are a few berths available for customers requiring early deliveries.

When it comes to the motor vehicles sector of the transportation industry, Canadian companies have a great and varied degree of expertise, ranging from the manufacture of heavy duty trucks and off-highway trucks to the manufacture of urban buses, highway

(Continued on page 2)

Canada at the Paris Air Show

With her reputation in aerospace firmly established, Canada once again takes to the air.

The occasion is the 31st Salon International de l'aéronautique et de l'espace (Paris Air Show) being held May 30 to June 8, 1975 at Le Bourget, near Paris, France.

Canada's aerospace industry, which exports about 75 per cent of its output to world markets, will be represented at the Canadian Pavilion by some 32 Canadian companies, with emphasis on Canada's capabilities in innovation, manufacturing and servicing.

When it comes to innovation, design and development, Canada has an enviable record. Here Canada is a world leader in STOL transport systems and services. A STOL city centre to city centre service is operating 30 flights a day each way between Canada's capital, Ottawa, and its largest city, Montreal. The prototype of a new 50-passenger STOL airliner, the DASH 7, was rolled out a few

months ago and production is being set up (see story on page 4).

Other Canadian innovations include vertical short take off and landing aircraft like the tilting CL-84; utility aircraft, including the ST-27 and the Trigull; and the CL-215 water bombers for fighting forest fires.

Canadian competence in primary and sub-contract manufacturing is also highly regarded, with many of the world's major aircraft producers having end products and components produced in Canada's large-capacity, efficiently-run plants.

Airframe and components made in Canada and used on aircraft throughout the world include wings for the Douglas DC-10 and DC-9; landing gear, S-duct, pressure bulkheads, empennage structures for the Lockheed L-1011; wing and tail assemblies for the Dassault Mercure; landing gear for the Boeing 737; vertical fin, rudder and fuselage sections for the Boeing 707 and 747SP; and empennage for the Scottish Aviation Jet Stream.

Canada's capabilities in the service sector are legion. With the second largest civil air fleet in the world, Canada has had to become adept at keeping the fleet in the air. Today, Canada's service industry has the know-how and parts inventories and fast turn-around equal to those of the original manufacturers who more and more are using Canada's overhaul, repair and maintenance facilities.


Experience and expertise in everything from gas turbine engines, components, avionics, accessories and ground handling equipment to consulting services, spacecraft design and manufacture, space electronics and space components has made Canada a leader in the aerospace industry.

And the place to see it all is the Canadian Pavilion at the Paris Air Show! Code 1-232

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Canada's new high-speed inter-city train offers the ultimate in passenger comfort. This, and other transportation stories . . . pages 4 and 5.

canada

courier

Anna Armstrong Hibberd, Editor

Stephen Clarke, Designer

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 buses and trailers.

Canadian heavy duty truck producers are noted internationally as builders of safe, reliable vehicles, whether they be for use in logging and petroleum exploration, as prime movers for bulk transport or in heavy duty applications such as mobile crane chassis. Off-highway trucks, for use in various types of mining and construction operations, are available in capacities of from 25 to 200 tons (22.7

to 181.4 metric tons).

In the field of urban buses Canadian manufacturers have the capability of producing vehicles in nominal capacities of 18 to 50 persons. With this range of seating, the product may vary in design from an upgraded schoolbus to an advanced urban transit bus — with all available equipment designed largely to suit North American conditions.

Buses suitable to long distance highway usage are also developed and manufactured in Canada and are widely used on such continents as North America and Australia. These vehicles, available with either diesel or turbine engines, are designed for trouble-free operation in climates that vary from -20 to 90 degrees Fahrenheit (-28 to 32 centigrade).

As an outgrowth of the motor vehicles industry, Canadian companies are often engaged as transportation consultants. While many actually plan roads and highways, others assist countries in evolving transportation systems that most effectively use existing roads, railways and water transportation facilities.



One of the seven series of 15,000-ton multi-purpose cargo and container ships built for French owners by Marine Industries Limited, Sorel, Quebec. In the past five years alone, the export value of Canadian-made vessels has exceeded \$800,000,000.



Railways have and continue to be a prime force in Canada's growth and development and the Canadian railway industry has gained international recognition for its consulting services and for its expertise in the manufacture of high quality products, whether they be locomotives, freight cars, track maintenance equipment or components.

In Canada there are two principal manufacturers of diesel locomotives. Together these companies produce approximately 350 locomotives a year for use not only in Canada but in such areas as Europe, Africa, South America, Australia and New Zealand.

Canadian diesel locomotives — all of which meet either AAR (American Association of Railroads) or UIC (Union Internationale des Chemins de Fer) standards — are in the 1,000 to 4,500hp range and are designed for all types of work in all types of geographic and climatic conditions. They have axle loads from 12 to 33 metric tons and gauge widths from three feet (0.9m) upwards to suit American, UIC, African, South American and other clearance and structure standards.

Canada's locomotive manufacturers produce a variety of wheel arrangements and can also provide such options as electric or steam train heating, dynamic braking and inter-bogie control — all to the customers' specific requirements. In addition, the manufacturers are capable of adding sophisticated equipment, such as remote locomotive controls and radio and communications equipment.

Passenger cars produced in Canada and used throughout the world include: mainline cars of all types, commuter cars, self-propelled cars, subway cars and transit cars. The highly successful GO Transit commuter cars are one example. These cars are built to

AAR specifications, are made primarily of aluminum monocoque construction on a steel sub frame, and are 85 feet (25.9m) long, 10 feet (3m) wide and 13 feet (3.9m) high.

Freight cars are made in Canada by three major manufacturers, some of whom produce approximately 1,000 units a year, others who turn out from 4,000 to 5,000 a year. Types of freight cars produced include: all types of box cars, both insulated and mechanically refrigerated; all types of gondola cars; open and covered hopper cars; flat cars, including plain, drip centre container, piggy back and bulkhead flat; bi-level and tri-level automobile transport cars; and high capacity ore-carrying cars.

One freight car manufacturer produces tank cars in capacities from 10,800 Imperial gallons (49,140 litres) — suitable for carrying sulphuric acid, to capacities of 28,000 Imperial gallons (127,400 litres) — suitable for carrying propane. Some cars, with gross weight up to 263,000 pounds (119,402kg), are manufactured for specialized requirements of the petroleum, chemical, mining and pulp and paper industries.

Track maintenance equipment, such as ballast tampers, rail alignment vehicles, hand tools and track fastenings, are also made in Canada and exported worldwide. So too are such components as forged and cast steel wheels for locomotives and railway cars; brake systems; truck side frames; bolsters; couplers and draught gear castings; traction generators or alternators; traction motors and associated rectifiers and control equipment.

Canadian manufacturers of railway equipment are noted internationally for their competitiveness and ability to deliver. They are very good at parts supply and many

Forestry tire, world's largest

Off-highway tires used throughout the world by mining, forestry and construction industries are manufactured by United Tire & Rubber Co. Ltd., Rexdale, Ontario.

The 30-year-old company recently introduced the world's largest forestry tire. Designed to improve traction and stability on equipment weighing up to 60,000 pounds (27,240kg), the 38 by 35 tire is available in 20- and 24-ply ratings and has an overall diameter of 94 inches (238.7cm).

The new tire will virtually eliminate the need for chains and will enable users of log-loaders, dozers, harvesters and even giant skidders to receive the increased traction, flotation

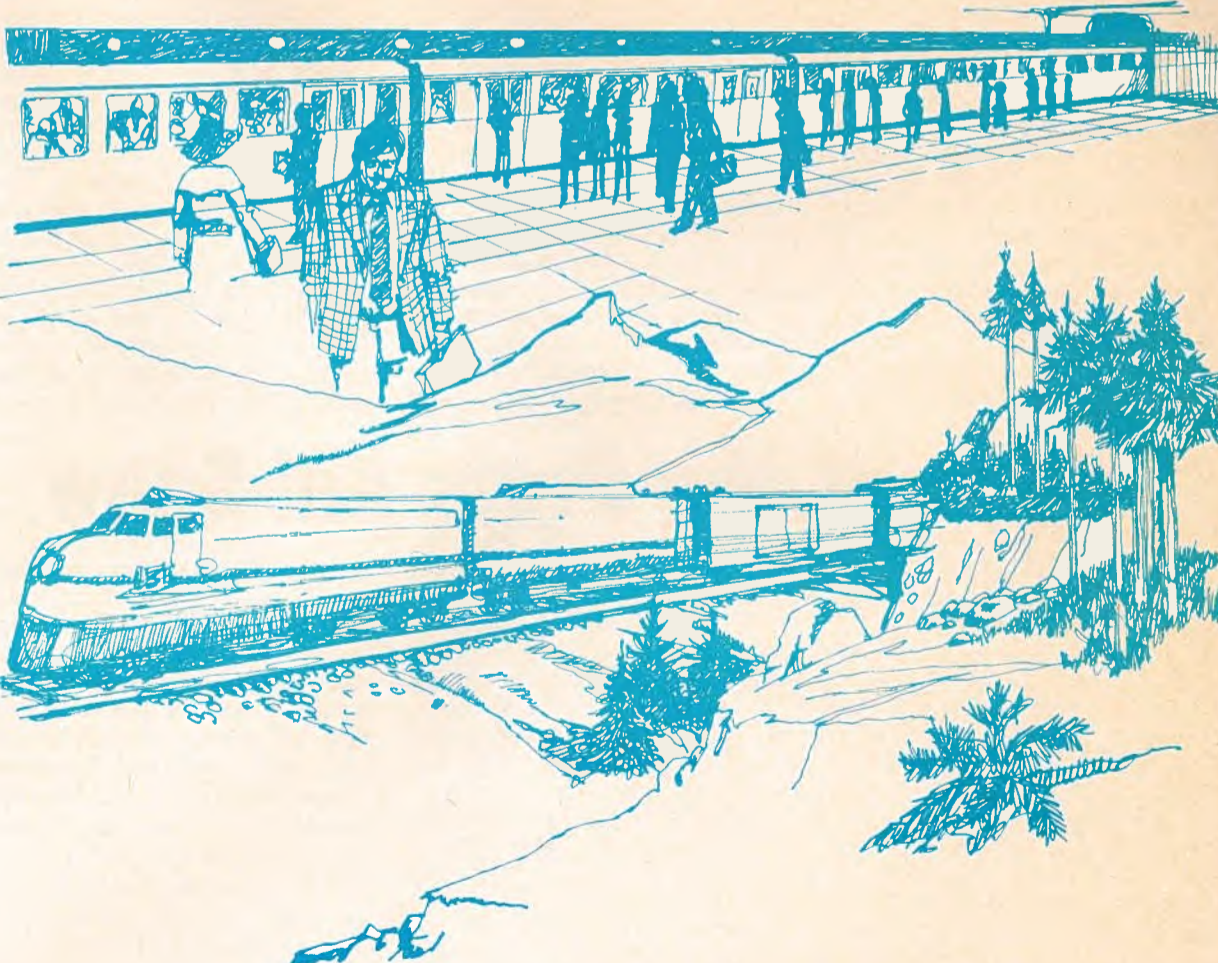
and stability inherent in forestry-designed tires.

The nylon-belted tread is four inches (10.1cm) deep with four-inch-wide tread bars spaced 12.1 inches (30.7cm) apart to provide maximum self-cleaning action. A void taper of 20 degrees narrows to 15 degrees at the shoulder and the tire's 12 pitches are set at 35-degree angles.

Another line of tire made by United and for use in forestry operations is the Super Woodlands. Manufactured from United's specially formulated crude rubber, the Super Woodlands is extremely tough and cut resistant. Its fabric features the highest possible tensile strength, permitting increased tread flexibility.

The Super Woodland's forestry tread is wider in bar width and up to 50 per cent deeper than other tires. It also has an improved bead guard. Available in sizes up to 38 by 39, the Super Woodlands does not require chains and can be used on rubber-tired dozers, loaders and harvesters.

United Tire & Rubber also offers specialized truck and earthmover tires. The Sooper Scooper has four to five times the life of standard tires and is easily retreaded. There is also the SS-Super Extra Mine Haulage tire of all nylon-belted construction, extra deep tread and wide pad design. Code 2-216



companies offer on-the-job training in Canada to other countries or, if preferred, in the client country.

Urban transit, an increasingly important facet of Canada's rail industry, is a field in which Canada is fast becoming a leader. Canadian companies are constantly engaged in research and development to produce newer and better means of transporting people within cities.

One Canadian company, for example, is developing a mini bus whose special feature is its optional wheelchair lift attachment — a technically simple device that can be adapted to all types of buses.

New and improved streetcars and subway cars are also in the works and one company is developing a double decker commuter car suitable for use in any large city where extremely large numbers

of people must be conveyed quickly and easily.

Still other Canadian companies are heavily involved in the development and manufacture of propulsion systems: linear induction motors, for railway and subway cars, and "chopper controls" which reduce energy consumption and provide more efficient over-all operation.

Code 2-132
 (Please indicate specific interest)

Custom tailored chalets economical, easy to build

Extras give luxury look



The most popular Nor-Wes chalet design, *The Town and Country*, has 1,140 square feet (105.9m²) on the main floor and 660 square feet (61.3m²) on the upper floor. Constructed of red western cedar from the forests of British Columbia, the model shown is located in Minneapolis, Minnesota. Highly adaptable, it features a cathedral ceiling.

Factory pre-cut homes that can be custom tailored to the preferences of the buyer are made by Nor-Wes Cedar Chalets Ltd., of North Vancouver, British Columbia.

Builders of cedar houses for year-round residence, as a second home or week-end retreat, the company uses only select western red cedar, tight knotted and kiln dried, from the forests of British Columbia. Providing natural protection from insects, rodents and the weather, the cedar has a very low shrinkage factor and seldom warps, twists or checks. When used correctly in specified sizes, it is extremely strong, though it is one of the lightest commercial woods available.

Truly versatile, all Nor-Wes models can be enlarged or changed when the plans are drawn up to suit the owner's taste. The chalet can be lengthened or reduced in five-foot (1.5-m) multiples to suit its surrounding area as well as individual living needs. The exterior decks can be expanded and the entry deck made to run along the length of the chalet to join up with the front deck. To accommodate the terrain, all models are reversible from right to left at no additional cost.

Many extras are available to give the chalet a luxurious look including hand-cut cedar pickets for the outside balcony railings and turned spindle wood columns for stair balustrades or for use as room dividers. The necessary doors,

stairs and windows for a basement and double insulated glass and screens can be provided, as well as complete kitchen cupboard units and vanities.

Standard wall insulation is fiberglass, 2½ inches (6.36cm) thick. One inch (2.54cm) of rigid polystyrene in the roof keeps the interior warm in winter and cool in summer. In areas where the temperature often dips lower than 10 degrees below zero on the Fahrenheit scale (-23 degrees centigrade) additional insulation can be installed.

Nor-Wes chalets are not only economical but easy for local contractors to assemble. After the buyer has decided the location and style he wants, Nor-Wes draws up plans that include all variations from the standard, the extras, and diagrams of recommended electrical wiring, plumbing and heating. Details of the front, rear and side elevations are given, in addition to information about the truss section and general construction system. A standard building manual is also included which gives easy-to-understand practical advice on how to assemble the chalet.

And when the pre-cut lumber arrives so does all the accompanying paraphernalia connected with building a house — everything from windows and doors to finishing nails and bolts comes in one box car or container.

To combat the spiralling costs of labour, Nor-Wes cedar chalets require little skilled labour on site.

Major components have already been measured, pre-cut and numbered for assembly on a planned system. Depending on the chalet, most can be completed after the foundations have been laid in 500-800 manhours.

The *Town and Country*, one of 15 Nor-Wes models, is an extremely popular full size year-round chalet home. A large unit with three bedrooms, it has the square footage necessary to permit the luxury of 2½ bathrooms, a spacious living room, family room and kitchen. Suited to a variety of settings, the *Town and Country* is a highly adaptable model with such features as a second balcony, a large deck area for outdoor living and a cathedral ceiling in the living room.

The *Nootka 30* is a favourite weekender that provides plenty of accommodation for summer or winter holiday fun. Due to the simplicity of design it is the easiest of the Nor-Wes A-line chalets to build. The specially engineered truss makes it possible for all interior main floor space to be stand-up floor area, with the bonus feature of two feet (0.6m) of usable space for built-ins on the sloping walls of the chalet — a feature that applies to all models in the A-line series.

Always looking for new markets, Nor-Wes is an expanding company whose chalets are being enjoyed in the Swiss Alps, France, Spain, Hawaii and the U.S. Code 3-125

V-grooving machinery for furniture fabrication

Machinery found in modern furniture factories throughout the world and which is used in the mass production of such items as television and speaker cabinets is made by Abal Manufacturing Inc., Weston, Ontario.

The machinery is designed for the V-grooving and folding technique — a system which consists of cutting V-grooves at predetermined angles and points, in both longitudinal and cross sections on one side of a panel, and then simultaneously gluing and folding the panel along these grooves to form the finished unit.

The results are identical in every way to conventionally produced counterparts. The advan-

tages, however, are many: material wastage is kept to a minimum; many sub-assembly operations are eliminated; production man hours are reduced by 35 to 55 per cent; skilled labour is unnecessary; and accuracy of machine-tool jointing is guaranteed.

Machinery and technique make the most efficient use of contemporary materials available for furniture production: wood veneer laminates; vinyl covered particle board; arborite; plexiglass and natural wood panels.

Abal Manufacturing's latest product is the M system, a complete mass production line for V-grooving and folding.

The M system provides modular

components that can be bought and operated as separate individual units or combined with ancillary equipment to form a mass production line for manufacturing complete assemblies.

With the M system, V-grooving, gluing, folding, raw edge finishing and dadoing (square edge slotting) can be handled in one operation at 65 feet (20m) per minute by only two unskilled operators.

Abal Manufacturing machinery is used in a number of countries, including the United States, New Zealand, Australia, South America, South Africa and the Caribbean. Code 3-226



An example of V-grooved and folded furniture made by mass production V-grooving machinery by Abal Manufacturing and used in furniture factories throughout the world.

Neat desks fold for shipping



Wood office furniture is the specialty of the house at Louis Ethan Ltd., Montreal, Quebec, manufacturers of the versatile FS file and storage system. The combination file and storage units — all in one tidy package — house file cases, cupboards and wardrobes. Tops, shelves and doors are interchangeable and a selection of heights is available in walnut and white oak. Another practical and compact line from Louis Ethan is the 34 Series collapsible desks shown here which fold neatly for shipping, to provide greater ease of handling and reduce damage risk. Unfolding and installation take only minutes and no tools are required. The complete 34 Series is convertible with changeable pedestals and reversible runoffs. Desks are smartly designed in walnut or oak veneer with matching or contrasting laminated plastic tops. Drawers contain dividers. Code 3-326

Bulldog strength for conveyor belts

As the company name suggests, products of Bulldog Lacing Limited, Hamilton, Ontario, are noted for strength — and bite!

Bulldog fasteners are used to join conveyor belts such as those in supermarkets, airport baggage systems and packing house assembly lines. The fasteners are so strong that they can withstand tensile loadings as high as 800 pounds per inch (363.2 kg/cm). In fact the lacing is often stronger than the belt it holds, making it perfect for installations where belts must operate over crowned pulleys or in troughing designs.

This flexible lacing system offers an easy-to-install, inexpensive alternative to vulcanization, metal plate, stamped steel hook and wire hook fasteners: strips consist of alternate long and short hooks staggered to ensure that no two adjacent hooks puncture the belt along the same line. Eight

fastener sizes accommodate various belt thicknesses and the 13.8-inch (35-cm) long strips can be cut at any point to match the length of the belt; leftover pieces can be ganged together again to eliminate waste.

With the aid of a Bulldog hydraulic lacer, magazine and pump, installations can be done quickly on-site to keep downtime to a minimum.

Bulldog Lacing can provide the right combination of equipment to fill the needs of any size industry. In addition to the lacings, the company manufactures hydraulic closing machines in two sizes — 12-inch and 24-inch (30.5-cm and 61-cm) — hand portable belt lacers and self-squaring cutters.

Already exporting to Hong Kong and the United States, Bulldog is ready and able to serve markets in any part of the world.

Code 3-431

AIRPORT FIRE-FIGHTERS FIRST ON SCENE



Four fire fighting vehicles, such as this one, were recently purchased by the International Airports Authority of India. They will be used as rapid intervention vehicles to reach an accident site quickly, initiate rescue and provide means of fire protection before the arrival of major units of equipment — a feat easily accomplished since the vehicles can accelerate from 0 to 50mph (0 to 80km/hr) in only 34 seconds and cruise at an average speed of 63mph (100km/hr.). The foam, water or dry chemical carriers are manufactured by C-D-N Research & Development Limited, Mississauga, Ontario.

Fires at airports are extinguished quickly and easily with rapid intervention vehicles from C-D-N Research & Development Limited, Mississauga, Ontario.

The company, a combined venture of Dyer & Miller Bros. Limited and Nordic Steel Products Limited, manufactures a wide range of fire control vehicles, from water and foam carriers to dry chemical carriers.

C-D-N's Foam Boss fire fighting vehicles — available in water capacities from 500 to 2,000 Imperial gallons (2,275 to 9,100 litres) have sufficient foam concentrates on board to proportion from three to eight per cent. The vehicles can produce either foam or water through all handlines and turrets.

The Foam Boss is engineered and designed primarily for one man operation from within the cab and all controls are mounted in a console between seats, making them easily accessible to either driver or crew. The fire fighting package also incorporates an automatic proportioning system that maintains proper and pre-set proportioning under varying flow conditions. This unique design does away with all the foam pumps or forcing foam makers.

Foam Boss turrets have a capacity range of up to 1,000 gallons per minute (4,550 litres/minute) of foam solution and the range of turrets varies from 125 to 250 feet (38.1 to 76.2m), depending on size and flow requirements. Depending on turret capacity, turrets have elevation angles of 45 degrees, depression angles of 12 and 15 degrees, and rotation angles of 120, 140 and 360 degrees. Turrets with capacities greater than 500 gallons per minute (2,275 litres/minute) are controlled by a specially de-

signed mechanism which allows the operator to negotiate all turret functions with one hand.

Dry chemical powder vehicles, produced by C-D-N in its Fire Boss line, are available in capacities ranging from 200 to 6,000 pounds (90.8 to 2,724kg) of dry chemical powder. Like the Foam Boss vehicles, the dry chemical units are engineered and designed to be operable from within the cab by either driver or crew.

The Fire Boss is a completely self-contained unit that does not rely on any outside sources, such as pumps or electricity. It can be a packaged unit, a skid unit, trailer, or incorporated on a vehicle.

Speed and versatility are important Fire Boss features. The secret of the Fire Boss speed is the patented inverted sphere. On activating one control, the sphere automatically rotates 180 degrees to an upside down position. The rotation agitates, aerates and fluidizes the dry chemical powder stored within the sphere. Simultaneously, the sphere is charged with compressed nitrogen which instantly expels the fluidized dry chemical through a controlled handline, turret or deluge.

Versatility is also a built-in factor: since different fires require different extinguishing agents, a number of Fire Boss models are designed to dispense not only dry chemical but all other fire fighting agents — straight water, chemically treated water, fog and mechanical foam, or any combination of these.

With more than 40 years' experience in the fire fighting business, C-D-N Research & Development Limited can put together any variation of fire fighting vehicle to suit individual customer requirements.

Code 4-132

Dash for a Dash

The first de Havilland DASH 7 quiet STOL airliner was rolled out February 5, 1975 and already 10 orders have been placed for Canada's newest entry in air transportation!

Designed and manufactured by The de Havilland Aircraft of Canada, Limited, of Downsview, Ontario, the DASH 7 is a short take off and landing aircraft which quietly and economically transports people or cargo over distances of 50 to 900 miles (80.5 to 1,449km).

Unlike conventional aircraft which require runway lengths of 10,000 feet (3,048m) or more, the DASH 7 uses runways that are only 2,000 feet (609.6m) long, enabling it to operate from downtown city centre to downtown city centre or to remote locations, such as resorts or areas with difficult terrain, which cannot accommodate large airstrips.

Powered by four United Aircraft of Canada Limited turbo-prop engines of 1,120 shaft horsepower, the DASH 7 has the lowest noise level of any transport aircraft on record. The noise on taking off and landing is about the same as that heard from a major expressway with the listener approximately 500 feet (152.4m) away — an important environmental factor and one that is made possible by using large propellers and turning them at low speeds.

Offering good, reliable, comfortable and economical STOL performance — and all this to transport category standards — the DASH 7 carries 50 passengers and a crew of two. It is also well suited to mixed passenger/cargo or all-cargo roles when the appropriate optional equipment is installed.

A removable cabin bulkhead can be positioned at 32-inch (81.3-cm) intervals for combined

operations and full use can be made of standard cargo loading systems. An optional cargo door 74 inches wide by 70 inches high (188 by 178cm) and 44 inches (112cm) above ground level will accept palletized loads, current jet "C" and "D" size containers or the LD3 "half belly" type used on the wide bodied jets.

The DASH 7's integral airstair door provides five easy steps from the ground to a cabin that guarantees practical and tasteful passenger comfort. Fully pressurized and air-conditioned, the cabin also has reading lights and air jets above each row of seats. Seat pitch can be varied and special provision is made for underseat, carry-on baggage to reduce the passengers' baggage-handling time. A coat rack, buffet and toilet are located at the rear.

The flight compartment of the DASH 7 is designed for two crew operation and can be flown from either seat. Essential controls are within easy reach of either crew member and visibility is excellent. The windshield is demisted and de-iced and equipped with windshield wipers. Sliding side windows provide clear vision panels and serve as flight compartment emergency exits.

A follow-up to the extremely successful 11-passenger STOL now operating 30 flights a day each way from Ottawa to Montreal, the DASH 7 offers a new and unique level of quietness. It also offers the economies of low fuel consumption, minimum servicing, ground support and airport facility costs.

De Havilland Aircraft of Canada, Limited is now preparing to fill orders, including one from Norway which already wants two for its intricate network of STOL-ports.

Code 4-232

Transport trailers travel the world



One of Canada's leading manufacturers of a wide range of quality utility line construction and line maintenance equipment is Truck Engineering Limited, Woodstock, Ontario. In addition to aerial devices, derrick/diggers, cable reel trailers and pole trailers, Truck Engineering — under the KING trademark — is known internationally for its transportation equipment, including such units as dump semi-trailers, lowbeds, pneumatic tankers, steering dollies, logging trailers and other special industrial trailers. The company recently provided the Dominican Republic with a wide range of line construction and maintenance equipment for use in a massive electrification project. Included in the equipment order were several hydraulic cable reel trailers, pole trailers, material trailers, combination line construction and maintenance trucks — complete with a variety of hydraulic tools and maintenance service parts. When coupled to the line construction/maintenance trucks, the single axle, 10-ton (9-metric ton) capacity pole trailers can be used for hauling poles up to 65 feet (19.8m) long. Shown here, behind a line construction/maintenance unit, is a pole trailer, material handling trailer and an interchangeable reach for the pole trailer. Products manufactured in Canada by Truck Engineering are exported to such areas as the Philippines, United States, South America and the Caribbean.

Code 4-332

INTERCITY TRAIN ATTRACTS WIDE INTEREST

Light, rapid, comfortable . . . that's Canada's LRC, the innovative, high-speed mainline intercity passenger train! And one that is attracting worldwide interest.

The result of five years of research and development, the LRC is the product of a joint venture of three Canadian companies: Alcan Canada Products Limited, Toronto, Ontario; Dominion Foundries and Steel Limited, Hamilton, Ontario; and MLW Industries, Montreal, Quebec.

Designed for low cost operation at a continuous average speed of 100mph (161km/hr) — and this on existing track — the LRC has a maximum speed of 120mph (193.2km/hr) and can be easily adapted to most of the world's railway gauges.

A special feature of the LRC, and one that is winning wide acclaim, is its power banked suspension system which allows the train to negotiate turns or curves at speeds 35 to 40 per cent higher than conventional passenger trains.

The system is operated by a sensor which responds to centrifugal force and seeks to establish a bank angle which reduces this force on the passenger. The passenger, in fact, is hardly aware a turn is being made.

"We don't spill your martini," is the way a company representative described the system's effectiveness on a four-day test run between Montreal and Ottawa — and it's that kind of courtesy that pleases passengers!

The LRC is now on a daily revenue service run between Toronto and Windsor, Ontario, having successfully completed seven weeks of rigorous testing at the United States Federal High Speed Ground Test Center at Pueblo, Colorado. In the process, the LRC set a test record: in one 11-hour, 10-minute stretch, the train averaged 98mph (157.8km/hr), travelling 1,096 miles (1,764km) over a nine-mile (14.5-km) oval circuit.

The vehicle was also successfully tested for such things as fuel

consumption, lateral force levels, wheel wear, acceleration and braking, noise and exhaust smoke levels, and crew reaction and adaptability.

Lauded for its design, stability, quietness and — most important to passengers — comfort, the LRC is regarded as the safest passenger equipment available. It is an all-welded stressed skin aluminum structure that meets and surpasses Association of American Railroads' strain standards for trains weighing more than 800,000 pounds (363,200kg). In other words, it meets standards set for trains that weigh nine times as much.

The LRC coach weighs only 90,000 pounds (40,860kg), compared with the more than 140,000-pound (308,370-kg) weight of most conventional coaches. This low weight is reflected in the coach's responsive performance — high top speed, rapid acceleration and low power requirement.

Power source for the LRC locomotive is the tried and proven Model 251 V12 diesel electric engine with a rated output of 2,900hp for traction and for all train services. The locomotive also offers proven technology, economical diesel fuel, reliable propulsion and other systems — all of which guarantee low capital, operating and maintenance costs.

Currently consisting of one locomotive and one coach, the LRC is a flexible system that can provide train lengths with standard railroad coupling arrangements varying from one locomotive and one coach (1-1) to basic trains of 1-5, twinned to produce push-pull 1-10-1s, with an ultimate makeup of 2-20-2. Each coach can accommodate up to 84 passengers.

The market for this type of passenger train is enormous and already interest in the Canadian-made LRC has been shown by such countries as the United States, Mexico, the Netherlands, Iraq, Greece, Israel, India, South Africa and Australia.



Canada's latest innovation in intercity passenger rail travel, the LRC (light, rapid, comfortable) locomotive and coach undergoing a test run between Montreal and Ottawa. With a continuous terminal-to-terminal speed of 100mph (161km/hr), the diesel electric locomotive and 84-passenger coach is attracting interest around the world.

Code 5-132

For your bookshelf . . .

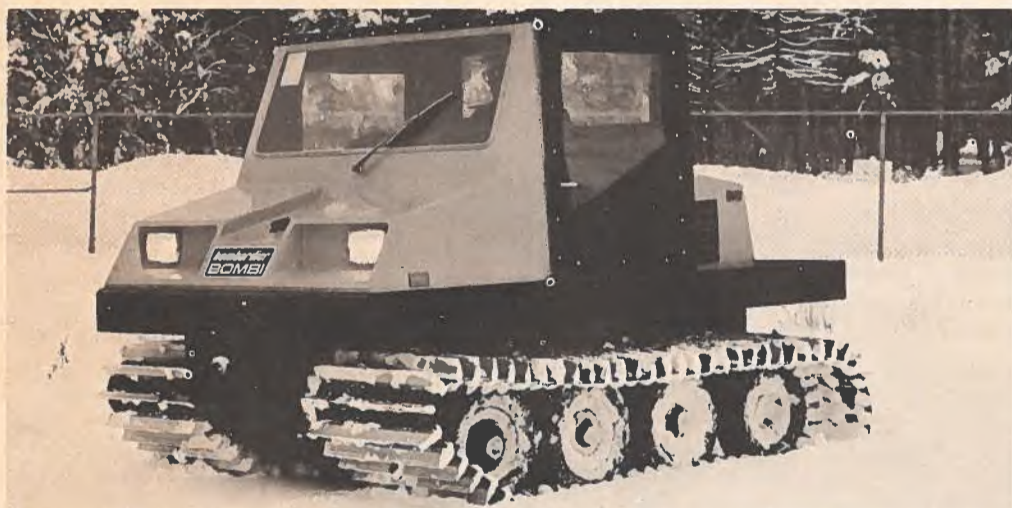
Marine Canada — a directory of Canadian shipbuilders, marine products and services — is published by the Canadian Department of Industry, Trade and Commerce and is available (in English only) free of charge: simply fill in the trade inquiry form on page 7.

This directory reflects the response of Canadian shipbuilders, consultants and manufacturers of marine components to the increased world demand for their services. Information is given on the

products and services available from more than 100 Canadian companies now selling in the international marine market.

The attractive, 100-page Marine Canada publication includes both product and company listings and gives the name of the person to contact at each company. It provides designers, shipyards and shipowners with a ready reference to Canadian sources.

Code 5-232



Designed for use in snow, swamplands and off-road areas, this compact multi-terrain vehicle is manufactured by Bombardier Limited, Valcourt, Quebec. The Bombi, a rugged three-passenger transporter, is meant primarily as a personnel carrier but can also be used for light hauling, general maintenance and snowmobile trail grooming. With a rear-mounted four cylinder 1,600cc engine and four-speed synchromesh manual transmission, the Bombi is capable of off-road speeds up to 22.5 mph (36.2km/hr) and can carry a payload of 1,000 pounds (454kg). The Bombi has a turning radius of four feet (1.2m). Its water-tight toboggan-type welded chassis gives it a fording depth of 18 inches (46cm), enabling it to slide over stumps and obstacles without hanging up. The smallest all terrain vehicle made by Bombardier, the Bombi is 70 inches (177.8cm) wide, 102 inches (259.1cm) long and weighs 2,000 pounds (908kg). Bombardier Limited makes tracked vehicles for oil-fields, logging, utilities, municipalities and other off-road uses. It also manufactures the Ski-Doo, the world's largest selling snowmobile.

Code 5-332

Canada's capabilities in urban transit

That's what several Canadian companies will be displaying at the Paris Transport Expo '75 being held at Le Bourget, just outside Paris, France, April 15-20, 1975.

The show, one of the two most important expositions of its type in the world, covers all aspects of surface transport — with emphasis on new developments in rail and rapid transit — and attracts the

principal world producers of urban transportation equipment.

Products and systems to be exhibited by individual Canadian companies include: a linear induction motor; a cut-away section of a mini bus equipped with a wheelchair lift; and models of new subway, commuter, street, and inter-urban rail cars.

Code 5-432

Terra Jet tackles all terrains



Safe, reliable, comfortable — that's the all terrain vehicle designed and manufactured by Terra Jet Inc., Drummondville, Quebec. With four-wheel drive and a maximum speed of 25mph (40.3km/hr), the Terra Jet has two forward speeds — low and high, one reverse and, as an added safety feature, two neutral positions. The vehicle's front hood opens for easy access to the gas tank which has a capacity of 4¾ Imperial gallons (21.6 litres) and the gas line is enclosed in aluminum tubing for better protection. The Terra Jet, with a very low noise level, has a single cylinder, four-cycle engine with an air cooled system. Other features include two bucket seats for driver and passenger comfort, an auxiliary seat with tool box and a rigid windshield that goes right up to the roll bar. The underbody is of steel welded construction with a fiberglass shell in colours of tangerine, yellow, apple green and olive green. The Terra Jet is 8.3 feet (2.5m) long, 4.6 feet (1.4m) wide and five feet (1.5m) high and weighs 1,000 pounds (454kg). Terra Jet is introducing in 1975 a second model that features an air cooled two cylinder engine and has a maximum speed of 50mph (80.5km/hr). The company, which also manufactures a wide variety of accessories for all terrain vehicles, exports to the United States, France and Kuwait and seeks additional markets.

Code 5-532

Computer supplies traffic surveillance

A portable computer that analyzes road traffic conditions is the newest product of a Winnipeg, Manitoba, company — SDS Technical Devices Ltd.

A modern, simple method of using electronic technology in highway surveillance, education and research, the MPT — Multi-Parametric Traffic Computer — simplifies measurement and gives six parameters: volume, queue, delay, and speed, headway, gap.

The lightweight, portable computer is operated by two pushbuttons mounted on five-foot (1.5-m) cables. Two additional cable reels extend the areas of observation to 400 feet (122m) for upstream and downstream observers. For automatic surveys, traffic detectors are used instead of observers.

All statistical data is given in digital format on the front panel. Volume, queue and delay information is displayed automatically and simultaneously as is the speed, headway and gap measurement data when another mode of operation is used. The information can be recorded by a digital printer or magnetic tape recorder, on an optional basis, for study at a later time.

The computer is sturdy and ideally suited to field and lab conditions: it can be operated from a standard 115 volt a.c. outlet or it can be plugged into a 12-volt auto-



Attractively housed in a streamlined fiberglass case with recessed instrument switches and display, the MPT computer from SDS Technical Devices Ltd. of Winnipeg, Manitoba, gives digital readouts of six types of traffic parameters.

mobile cigarette lighter plug.

The economical, easy operation of the MPT computer gives it many advantages over the time-lapse frame photography or closed circuit television methods previously needed to evaluate traffic conditions and the performance of control devices such as traffic signals, ramp controls, transit operations, railroad signals and queuing processes at parking facilities and shopping centres.

The MPT traffic computer, a proprietary device developed with the aid of the Manitoba Research Council, is available from SDS Technical Devices on a buy, rent or lease basis with an option to purchase. One unit is being used at Northwestern University in Evanston, Illinois, as a research tool and teaching aid for post-graduate studies in the Civil Engineering Department. Code 6-154

Construction work from B.C. company

One man can deliver 60 cubic yards (45.9m³) per hour of ready-mixed concrete to a 200-foot (60.9-m) elevation — provided he is at the controls of a Yo-Yo Hoist manufactured by Heede International, Ltd., Port Moody, British Columbia.

Designed to raise ready-mixed concrete up the outside wall of a multi-storey building under construction and deliver it to a designated floor, the Yo-Yo Hoist can be used on structures up to 1,000 feet (304m) high. Bucket capacity is 1.5 cubic yards (1.15m³).

The hoist is operated by an electrically powered winch system. The main mast consists of an inner and outer section. The inner section has an electrical rack and pinion-raising mechanism that allows it to position the receiving hopper for the concrete at the desired floor level. Both inner and outer mast sections are anchored by being bolted to brackets welded on the building.

When pouring has been completed at one floor, the unit is raised to the next pouring position



One of North America's original manufacturers of climbing cranes, Heede International Ltd. constructs cranes in capacities and sizes from those with a 100-foot (30.5-m) jib and 6,000-pound (2,724-kg) capacity to cranes with a 205-foot (62.5-m) jib and a 12,000-pound (5,448-kg) capacity. This "cover-lifter" portal crane was specially designed and built by Heede for Vancouver Wharves of North Vancouver, British Columbia. The crane efficiently removes, temporarily stores and ultimately replaces fiberglass covers which are placed over gondola cars during transportation of concentrates.

by unbolting the inner mast section, raising it to the new position and rebolting it. Four floors can be poured before it is necessary to unbolt the outer mast section, which is then lifted to the new position by the raising mechanism. A variable speed control gives a

maximum hoisting speed of 300 fpm (91.44mpm).

In addition to the Yo-Yo Hoist, Heede International, Ltd., also manufactures derrick cranes, climbing cranes, container cranes, bridge and portal cranes.

Code 6-231

Spicy best sellers from old-established company



Spices from Canada that are on the best-seller list in Britain and popular in more than 40 other countries are manufactured and distributed by W. H. Schwartz & Sons Ltd., Halifax, Nova Scotia. North America's oldest spice house, Schwartz has been in business for 134 years and is also now noted internationally for its peanut butter, prepared mustards, vinegars, dried fruit, extracts and cake decorations — all of which are made from the finest raw materials. All spice ingredients are sterilized and quality controlled in the company's new and fully equipped microbiological laboratory. Quality, service and a method of presentation with a great deal of customer appeal, also contribute to the company's continuing success. With its complete range of quality foods, Schwartz products are considered one of the best packaged presentations on today's markets. The attractive spice racks, for instance, are available in a wide range of designs to suit any kitchen. The company's spice stands for merchandizing and retail levels are available in many types and sizes and are part of a most comprehensive marketing program. Code 6-310

Where there's a fair, Canada's there

Discover Canada in your own country — all through 1975 Canadian manufacturers will be travelling to trade fairs around the world to share their expertise and their products.

From veterinary medicine to telecommunications equipment — from catering to furs and sporting goods — Canadian businessmen will take part in exhibits co-ordinated by Canada's Department of Industry, Trade and Commerce.

Be sure to look for the Canada logo and maple leaf at the following international trade shows:

April 4-8: National Food Services Exhibition, London, England.

April 7-10: National Children's Wear Association Junior Fashion Show, London, England.

April 15-20: International Exhibition Transport Expo, Paris, France.

April 23-27: International Fur Trade Exhibition, Frankfurt, Germany.

May 9-15: International Packaging Machines, Packaging Materials, Confectionery Machinery Fair (INTERPACK), Dusseldorf, Germany.

May 12-15: 33rd Interstoff Trade Fair, Frankfurt, Germany.

May 23-26: Tokyo Auto Service Equipment Show, Tokyo, Japan.

May 28-June 3: International Trade Fair for Machinery and Equipment for the Wood Industries (LIGNA), Hanover, Germany.

May 30-June 8: Paris Air Show, Paris, France.

June 8-17: Poznan Industrial Trade Fair, Poznan, Poland.

July 6-12: 20th World Veterinary Congress, Thessalonika, Greece.

August: International Restaurant Equipment Fair (IREF), Tokyo, Japan.

Aug.-Sept.: 12th Algiers International Trade Fair, Algiers.

Aug. 20-Sept. 20: Izmir International Trade Fair, Izmir, Turkey.

Sept. 6-9: Semaine du Cuir, Paris, France.

Sept. 15-18: International Airport Construction and Equipment Exhibition, Brussels, Belgium.

Sept. 16-19: Europe Offshore Exhibition and Conference, Aberdeen, Scotland.

Sept. 13-24: Tehran International Trade Fair, Tehran, Iran.

Sept. 14-16: Salon Professionnel des Articles de Sport et Loisir de Plein Air (SISEL), Paris, France.

Oct. 1-21: Baghdad International Trade Fair, Baghdad, Iraq.

Oct. 2-8: Second World Telecommunications Exhibition (Telcom '75), Geneva, Switzerland.

Oct. 7-11: 4th International Nuclear Industries Fair, (NUCLEX '75), Basle, Switzerland.

Oct. 31-Nov. 10: 21st Japanese Motor Show, Tokyo, Japan.

Nov. 11-15: Shipbuilding, Marine Engineering and Communication Exhibition (Europort '75), Amsterdam, The Netherlands.

Nov. 18-21: 34th Interstoff Trade Fair, Frankfurt, Germany.

Nov. 20-30: International Building Exhibition (BATIMAT), Paris, France.

Smooth operation with flexible couplings

Vibration-reducing flexible couplings make for a smooth running system when they come from Lo-Rez.

Lo-Rez Vibration Control Limited, a Vancouver, British Columbia company, is a specialist in the manufacturing of isolators, dampers for engine crankshafts and flexible couplings for power transmission.

The company was one of the first to recognize the importance of soft couplings. Widely used in diesel generating sets, compressor sets, marine propulsion systems, or on other machinery drives, they provide a very soft, or flexible, connection between the driving and driven members to control torsional vibration, shock and misalignment in coupled machinery.

A variety of coupling configurations and special features allows selection of optimum coupling char-

acteristics for any application. Couplings are built in a wide range of soft to stiff ratings in sizes from an 8-inch (20.32-cm) to 85-inch (216-cm) diameter and in torque ratings from 1600 lb. ft. (220.8-kg.m) to 230,000 lb. ft. (31,740-kg.m). Another important feature is the virtually constant stiffness factor, regardless of load, which permits consistent and predetermined torsional vibration characteristics. The coupling is non-lubricated and is made up of a series of helical compression springs mounted between retaining lugs around the circumference of the unit. Nylon faced limit stops are mounted through the centre of the springs to prevent them from going solid under maximum torque conditions. The springs are mounted so they will never become unloaded and the stops prevent impact stresses in the springs for

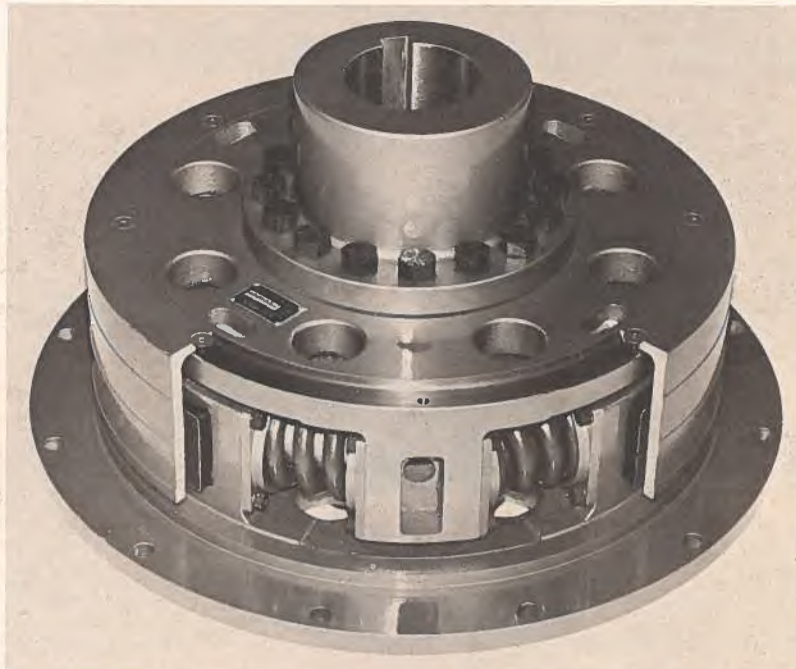
longer life.

The friction dampers in the outer periphery of the alternate lugs prevent high transient vibratory torques in the drive system. On-site adjustments can be made easily to suit particular machinery requirements.

Installation and servicing are no problem either. The couplings can be inserted or removed without shifting equipment and the springs can be changed with the coupling in place. Electrical insulation or non-magnetic materials can be supplied where required.

All units are available in several flange and hub arrangements depending on the prime mover-to-driven equipment set-up.

Lo-Rez products are exported to Japan, The Netherlands, Britain, France, Venezuela, Arabia, Italy and the United States.



A flexible coupling from Lo-Rez Vibration Control Limited is an unbeatable source of torsional vibration compatibility in power transmission systems. This cutaway shot shows the spring and lug arrangement within the cover. Code 7-131

Going down? It's slow and easy with this chute



On a slow, safe descent, this jumper is wearing the new TU 7 Gore Search and Rescue Canopy (SAR) from Irvin Industries Limited, Fort Erie, Ontario. Canopy deployment malfunctions are eliminated with the SAR chute because of Irvin's special net skirt. Code 7-232

A new parachute designed especially for search and rescue operations in remote areas is a product of Irvin Industries Canada Limited, Fort Erie, Ontario.

Called the TU 7 Gore Search and Rescue Canopy (SAR), it has an extra-large 32-foot (9.8-m) diameter that permits the safe, slow descent of the chutist carrying heavy loads of rescue equipment and medical supplies. Because of its low-permeability fabric, the chute is ideally suited where high winds and bad weather conditions prevail.

Manufactured from a special

woven low porosity fabric (uncoated), the TU 7 SAR is a high performance steerable low profile canopy for maximum control drive and lift, with ease of handling, minimum wind sail and low rate of descent. A standard suspension line system ensures simple and safe canopy deployment.

The chute, developed to meet Canadian Forces' requirements, was tested last April in simulated rescue jumps as part of Operation Frozen Tusker at the North Pole. Successful jumps were made by six members of a para-rescue team using Irvin's SAR canopies from a

C-130 aircraft at 90 degrees North.

The parachute has also been demonstrated with encouraging results in various parts of the world including a number of South American countries. Sales have been made recently in New Zealand and Ecuador and more are under negotiation.

Irvin specializes in developing and producing highly sophisticated parachute systems. It is also a leading maker of automotive safety equipment, can-making machinery, air support structures and an extensive line of industrial products.

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Spontaneity captured in solid bronze sculptures



Original and limited edition solid bronze sculptures being sold in Canada, the United States and Britain and attracting customers from as far away as Australia and New Zealand are created in Canada by Siggy Puchta and marketed by Voyageur Art Exclusive Inc., Alliston, Ontario. This "Mother and Child" bronze sculpture, 14 inches by 6 inches (35.6cm by 15.2cm), exemplifies the spontaneity and freedom of expression which characterize all Mr. Puchta's pieces — whether wildlife (his principal subject matter), or humans, both full figures and busts. Cast by the "lost wax" method, which retains all the details of the original sculpture when casting it in metal, Mr. Puchta's sculptures are available in galleries and prestigious gift and jewelry stores. They have also been exhibited — with great success — at shows in Cleveland, New York, Chicago, Toronto, Vancouver, the Bahamas and Acapulco. Mr. Puchta from time to time also accepts special commissions. Code 8-167

Ceramic giftware much in demand



"The beauty of nature sculptured in pottery" — that's what's offered in the decorative ceramic giftware created by the artisans of Blue Mountain Pottery, Collingwood, Ontario. Purchased by collectors of fine pottery in Canada, Britain, the United States, Europe, the West Indies, Australia and New Zealand, the creations from Blue Mountain are universally recognized for their colour, gracefulness and lyrical lines. The pieces — jugs, book ends, swan planters, vases, dolphins, deer, table lighters, ashtrays — are all glazed and fired at 2,000 degrees and are made from native rich red clay that has been aged for two years and purified. Code 8-262

Italian pizza from Canada suits Japanese tastes!

In business for nine years, Pizza Patio Management Ltd., a Vancouver, British Columbia, company, provides a total franchise restaurant package including site location, building design, kitchen

equipment, staff training and marketing methods.

The phenomenal rise of the fast-food industry during the past decade has seen pizza becoming one of the most popular of foods. No

wonder, then, that Pizza Patio is becoming an international success: in addition to its 13 Canadian restaurants or "pizza pubs" — which seat as many as 180 and serve beer and wine — a new franchise outlet has just been opened in Kobe, Japan, with another 30 Japanese establishments planned. Jeffrey Barnett, president of Pizza Patio Management, decided to enter the Japanese market after taste surveys showed that the Japanese would like pizza. Only minor modifications need to be made to the existing menu, says Mr. Barnett — ingredients added that will have more appeal for the Japanese palate, such as cuttlefish, and substitutions made for such things as pepperoni, which is not available locally.

With a Pizza Patio franchise, the new owner gets much more than a recipe for pizza sauce. He is in business for himself but, at the same time, enjoys all the advantages of a well organized franchise. He is given help with the selection of a site — Pizza Patio people are constantly out looking for good areas; advice on building design and layout, including estimates from local contractors for outittings; and even help with construction if desired. For an additional fee the new owner can take possession of a fully operational restaurant.

The buyer is also supplied with the kitchen equipment, the pizza mix and packaged sauces from the Vancouver commissary, signs, specially printed paper products, take-out containers and uniforms — all in Pizza Patio's yellow ochre and terracotta brown colours.

Intensive management, staff and records training courses are also given at the head office training school for the owner or manager.

Already established in Japan, Pizza Patio is ready to introduce its pizza business to other markets.



Getting into the dough, Jeffrey M. Barnett (right), president of Pizza Patio Management Ltd. and Norman Pfoh, general manager, demonstrate how their product is made for a Japanese audience. With an outlet already opened in Kobe, Japan, Pizza Patio offers its total franchise package including building design, pizza mixes and paper products. Code 8-388

Seasoned by variety savoured worldwide



Only the best raw materials from the four corners of the earth go into the 95 different lines of herbs, seeds and condiments manufactured by Barbour Foods Ltd., Sussex, New Brunswick, a company that has been in the spice business since 1905. The more than 80 varieties of Barbour spices are presented — alphabetically arranged and colour coded — in special presentation racks for easy customer recognition: spice jars have rust coloured caps and labels; herbs, green coloured caps and labels; and condiments, yellow coloured caps and labels. The racks have also been designed with the kitchen very much in mind. Their "earth" colours blend with practically any kitchen decor and the labels are made from a special paper that resists food and grease stains. Barbour Ltd., which also manufactures tea, coffee, peanut butter, mustard, extracts and baking powders, exports to Britain, the United States, Jamaica, Trinidad, Curacao and Bermuda. Code 8-410