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CANADA

IN THE WORLDWIDE RAILWAY MARKET



Canada. Dept. of Industry, Trade and Commerce. Railway Division.



A Directory of Canadian Suppliers of Railway Equipment, Components and Services

CONTENTS

	Page
Introduction	5
Product Listing	6
Locomotive Manufacturing	6
Freight and Passenger Cars	6
Track and Maintenance Equipment	6
Consulting and Construction	7
Components	8
Company Listing	
Locomotive Manufacturing	10
Diesel Division, General Motors of Canada Limited	12
MLW Industries	13
Freight and Passenger Cars	14
Hawker Siddeley Canada Ltd., Canadian Car Division	16
Hawker Siddeley Canada Ltd., Trenton Works Division	16
Marine Industries Limited	17
National Steel Car Corporation, Limited	18
Procor Limited	18
Track and Maintenance Equipment	19
Algoma Steel Corporation, Limited	21
Canron Railgroup	22
Con-Force Costain Concrete Tie Co. Ltd.	22
Domtar Chemicals Ltd., Wood Preserving Division	23
Francon	23
Koppers International Canada Ltd.	23
Lister Bolt & Chain Ltd.	24
Pandrol Canada Limited	24
Frederick Parker (Canada) Limited	25
Portec Ltd.	26
Bert Pyke Limited	26
SMI Industries, Division of Caelter Enterprises Ltd.	27
Sydney Steel Corporation	27
Steel Company of Canada Limited	28
Upright Bros. Ltd.	28
Williams and Wilson Limited	29

COVER: Photo courtesy of Public Relations and Advertising Department,
Canadian Pacific: the Alyth yard, Calgary, Alberta.

	Page
Consulting and Construction	30
Beauchemin-Beaton-Lapointe Inc.	32
CANAC Consultants Ltd./Ltée	32
Canadian Pacific Consulting Services Ltd. (CPCS)	32
CANATRANS Ltd.	33
Cole, Sherman & Associates Limited	33
Delcanda International Ltd.	34
M. M. Dillon Limited	35
N. D. Lea & Associates Limited	35
McCormick, Rankin & Associates Limited	36
Pervidic Contracting (1971) Limited	36
H. A. Simons (International) Limited	36
Swan Wooster Engineering Co. Ltd.	37
Tecsult International Limitée	38
Components	39
Abex Industries Ltd.	41
Airchime Manufacturing Company Limited	41
B. G. Checo Engineering Limited	42
Buffalo Brake Beam Co.	42
Canadian Bronze Company, Limited	43
Chloride Systems (Canada) Limited	43
ESB Canada Limited	43
Frederick Electronics Canada Limited	44
Galt Equipment Limited	45
Glenayre Electronics Ltd.	45
Hawker Siddeley Canada Ltd., Canadian Steel Wheel Division	46
Hawker Siddeley Canada Ltd., Trenton Works Division	47
Headhunters (Diesel Heads) Ltd.	47
Motor Coils Mfg. Co. Ltd.	48
NTN Bearing-CAE Ltd.	48
Railtech Limited	49
Joseph Robb & Company Limited	49
Saft Batteries Limited	50
Simmonds Precision Canada Limited	50
United Welding Processes (Canada) Inc.	51
Whiting Equipment Limited	51

INTRODUCTION

A tough testing ground for technology naturally, Canada's severe and diverse geography and climate have made enormous demands on its developers, none more than the railway industry.

More than 104,000 kilometres of track have been laid throughout the 9,976,128 square kilometres of Canadian territory — the semi-tropical Great Lakes peninsula and southwest Pacific coast, wide prairies, great areas of mountains, lakes and rocks, seemingly endless stretches of northern wilderness and arctic tundra.

The experience gained by the Canadian railway industry through the hard years of development has served many foreign customers as well as the home market, not only in the design and manufacture of

rolling stock, components and equipment, but also with the systems expertise of the consulting and construction companies.

The capabilities of the Canadian railway industry's five major categories — locomotive manufacturing, freight and passenger car manufacturing, track and maintenance equipment supply, consulting and construction, components supply — are well illustrated by the operations of the more than 50 companies described in this directory. But these by no means comprise the whole of the Canadian railway industry.

The Railway Division of Industry, Trade and Commerce will be pleased to provide further details on the industry and its products.

Railway Division
Transportation Industries Branch (53)
Department of Industry, Trade and Commerce
235 Queen Street
Ottawa, Ontario, Canada
K1A 0H5

PRODUCT LISTING

LOCOMOTIVE MANUFACTURING

DIESEL ELECTRIC LOCOMOTIVES

1,000 to 4,500 hp

MLW Industries

1,000 to 3,600 hp

Diesel Division, General Motors of Canada

FREIGHT AND PASSENGER CARS

FREIGHT CARS, RAILWAY

(General)

Hawker Siddeley Canada, Trenton Works Division

Marine Industries

National Steel Car Corporation

LEASING SERVICES, FREIGHT AND TANK CAR

Procor

PASSENGER COACHES, MAINLINE PASSENGER CARS (First and second class)

Hawker Siddeley Canada, Canadian Car Division

SPECIAL PURPOSE CARS, RAILWAY

Hawker Siddeley Canada, Trenton Works Division

Marine Industries

National Steel Car Corporation

Procor

TANK CARS, RAILWAY

Hawker Siddeley Canada, Trenton Works

Procor

TRACK AND MAINTENANCE EQUIPMENT

ANCHORS, RAIL

Portec

ASPHALT MINING PLANT

Frederick Parker (Canada)

BARS, JOINT, ANGLE AND FISH PLATES (FOR HEAVY AND LIGHT RAILS)

Algoma Steel

Portec

BOLTS, RAILWAY TRACK, FISH BOLTS

Lister Bolt & Chain

Stelco

CHAIN (COIL, RING, STUD AND LONG LINK)

Lister Bolt & Chain

CLIPS, RAIL ("PANDROL")

Pandrol Canada

CONVEYOR PLANT

Frederick Parker (Canada)

CRANE, 15-TON RAILWAY

Bert Pyke

CRANE, RAILWAY UTILITY

Bert Pyke

CRANE, TIE HANDLING

Bert Pyke

CRIB AND SHOULDER CONSOLIDATOR

Canron Railgroup

CRUSHER, ROCK

Frederick Parker (Canada)

EQUALIZER/REGULATOR, BALLAST

Canron Railgroup

Bert Pyke

FISH PLATES, ANGLE BARS, RAIL JOINTS (FOR HEAVY AND LIGHT RAILS)

Algoma Steel

Portec

HANDLING SYSTEM, RAIL

Williams and Wilson

HEATER, SWITCH

Upright Bros.

JOINTS, INSULATED RAIL

Portec

MELTER, SNOW, FOR YARD RETARDERS

Upright Bros.

PADS, RAIL ("PANDROL")

Pandrol Canada

PLATES, TIE

Algoma Steel

Sydney Steel

RAILS, STEEL (HEAVY AND LIGHT RAIL)

Algoma Steel

Sydney Steel

RENEWAL EQUIPMENT, TIE

Canron Railgroup

ROLLER MACHINERY, CONSTRUCTION

Frederick Parker

SNOWBLOWER, TRACK

Canron Railgroup

SMI Industries

SPIKE DRIVER, TRACK

Canron Railgroup

SPIKES, RAILWAY TRACK

Lister Bolt & Chain

Stelco

SWITCH BROOM/BALLAST REGULATOR

Bert Pyke

TAMPER, BALLAST

Canron Railgroup

TAMPER, COMPACTION (CONSTRUCTION MACHINERY)

Frederick Parker (Canada)

TIES, RAILWAY CROSS AND SWITCH (WOODEN)

Domtar
Koppers International

TIES, RAILWAY (CONCRETE)

Con-Force Costain
Francon

TOOLS, RAILWAY TRACK

Williams and Wilson

TRACKWORK, RAILWAY

(Switches, frogs, guard rails, closure rail,
complete turnouts, switch stands, connecting
rods, crossings of all types)
Abex Industries

TRACKWORK SPECIALTIES, RAILWAY

(Double slip switches, switch point guards,
inert and hydraulically opened retarders, rail
expansion joints, special trackwork for subway
and docks, etc.)
Abex Industries

TRIMMING SYSTEMS, RAIL

Williams and Wilson

WASHING EQUIPMENT, ROCK

Frederick Parker (Canada)

Track maintenance of way, track location, yard layout, bridge and structures, signalling and communication systems

Beauchemin-Beaton-Lapointe
CANAC Consultants
Canadian Pacific Consulting Services
CANATRANS
Cole, Sherman & Associates
M. M. Dillon
N. D. Lea & Associates
McCormick, Rankin & Associates
H. A. Simons (International)
Swan Wooster International

Workshops, maintenance and repair facilities

Canadian Pacific Consulting Services
CANATRANS
Cole, Sherman & Associates
M. M. Dillon
N. D. Lea & Associates

EQUIPMENT SPECIFICATIONS, PREPARATION OF, INSPECTION SERVICES

CANAC Consultants
Canadian Pacific Consulting Services
H. A. Simons (International)

EVALUATION OF MOTIVE POWER AND ROLLING STOCK NEEDS

CANAC Consultants
Canadian Pacific Consulting Services
CANATRANS
N. D. Lea & Associates
H. A. Simons (International)

PERSONNEL SELECTION, TRAINING AND DEVELOPMENT

CANAC Consultants
Canadian Pacific Consulting Services
CANATRANS

PROJECT MANAGEMENT (Costing, scheduling, routing, financial and administrative control systems)

Beauchemin-Beaton-Lapointe
CANAC Consultants
Canadian Pacific Consulting Services
CANATRANS
Delcanda International
M. M. Dillon
N. D. Lea & Associates
H. A. Simons (International)
Tecsult International

PURCHASING AND PROCUREMENT SERVICES

Beauchemin-Beaton-Lapointe
CANAC Consultants
Canadian Pacific Consulting Services
Delcanda International
Penvidic Contracting (1971)

CONSULTING AND CONSTRUCTION

ADVISORY SERVICES

(Railway management and methods)
Canadian Pacific Consulting Services

ANALYSIS OF MARKET DEMANDS, TRAFFIC USAGE, MARKET TRENDS, TARIFF RATES

CANAC Consultants
Canadian Pacific Consulting Services
M. M. Dillon
N. D. Lea & Associates
H. A. Simons (International)

CONSTRUCTION MANAGEMENT AND SUPERVISION

Beauchemin-Beaton-Lapointe
CANAC Consultants
Canadian Pacific Consulting Services
CANATRANS
Delcanda International
N. D. Lea & Associates
McCormick, Rankin & Associates
H. A. Simons (International)
Tecsult International

ENGINEERING, PLANNING AND DESIGN SERVICES

Specialized loading and unloading systems,
yard, terminal, and storage facilities

CANAC Consultants
Cole, Sherman & Associates
Swan Wooster Engineering

COMPONENTS

AXLES, FREIGHT AND PASSENGER CARS

Hawker Siddeley, Trenton Works Division

BATTERIES, DIESEL STARTING

ESB Canada

BATTERIES, LEAD ACID

Chloride Systems (Canada)

BATTERIES, NICKEL-CADMIUM

Saft Batteries

BATTERY CHARGER, SOLID STATE

Saft Batteries

BEARING ADAPTERS

(For railroad roller bearings)

Abex Industries

BEARINGS, SOLID JOURNAL

Canadian Bronze Company

BEARINGS, TAPERED ROLLER

NTN Bearing - CAE

BLOCKS, DIESEL LOCOMOTIVE, REPAIR OR EXCHANGE SERVICE

United Welding Processes (Canada)

BOLTS, TEMPERATURE INDICATOR

Railtech

BRAKE BEAMS

(For railway freight cars)

Buffalo Brake Beam Co.

BRAKE PINS

National Steel Car Corporation

BRAKE ROD CONNECTORS FOR BRAKE BEAMS

Buffalo Brake Beam Co.

BRAKE SHOES AND LOCKEYS

Abex Industries

CENTRE PLATES, FREIGHT CAR

Abex Industries

National Steel Car Corporation

CONTROL AND DISPLAY CONSOLES, DESKS AND BOARDS

B. G. Checo Engineering

CONTROL SYSTEM, AUTOMATIC, TRAIN (Cab signal/ATP/ATO)

B. G. Checo Engineering

COUPLER CARRIER WEAR PLATES

Abex Industries

National Steel Car

COUPLER YOKES

Hawker Siddeley, Trenton Works Division

CYLINDER HEADS, DIESEL ENGINE (Repair and remanufacture)

Headhunters (Diesel Heads)

United Welding Processes Canada

DOORS, STEEL (YOUNGSTOWN)

National Steel Car Corporation

DRAFT GEARS

Hawker Siddeley, Trenton Works Division

DRAFT KEYS

National Steel Car Corporation

DROP TABLES

(For removal of trucks from locomotives, passenger coaches or freight cars)

Whiting Equipment

DUMP CAR PARTS

National Steel Car Corporation

GAUGES, D6 AND BDL LIQUID CONTENTS GAUGE FOR LOCOMOTIVE FUEL TANKS

Simmonds Precision Canada

GEAR CASES

(For locomotive traction motors)

Railtech

GENERATORS, DIESEL ELECTRIC

(Repair and manufacture)

Motor Coils Mfg. Co.

HATCHES AND COVERS FOR GONDOLA CARS

National Steel Car Corporation

HEATERS (CARTRIDGE) FOR CONTAINERS

Galt Equipment

HORNS, LOCOMOTIVE

Airchime Manufacturing Company

ICE MAKER (SHELL)

(For containers)

Galt Equipment

JACKS, PORTABLE

(10, 25, 35, 50 ton capabilities)

Whiting Equipment

JOURNAL BOX LIDS AND WEDGES

(For AAR use)

National Steel Car Corporation

LADDERS, STEEL, AND HAND GRABS FOR FREIGHT CARS

Buffalo Brake Beam

National Steel Car Corporation

LIGHTING EQUIPMENT AND INVERTORS

B. G. Checo Engineering

LIGHTING AND STATIONARY BATTERIES, CAR; LIGHTING EQUIPMENT, EMERGENCY

ESB Canada

Chloride Systems (Canada)

LOCATION IDENTIFICATION CONTROL (LIC) SYSTEM, LOCOMOTIVE

Glenayre Electronics

PANELS, PLYMETAL
(For interior finishes of passenger cars)
Railtech

PISTONS, DIESEL ENGINE, REPAIR OR EXCHANGE SERVICE
United Welding Processes (Canada)

PISTON RINGS, DIESEL ENGINE
Joseph Robb & Co.

REFRIGERATED CONTAINERS
Galt Equipment

REPAIR PACKAGES, CAR, ONE-SPOT
(For use in riptrack situations)
Whiting Equipment

ROOFS, BOX CAR, STEEL OR ALUMINUM
National Steel Car Corporation

SANDING BRIDGES OR STATIONS, LOCOMOTIVE
Whiting Equipment
Williams and Wilson

SIDE FRAME WEAR PLATES FOR BRAKE BEAMS
Buffalo Brake Beam

SIDING AND ENDS
(For freight cars)
National Steel Car Corporation

SUPERVISION SYSTEMS AND DATA TRANSMISSION SYSTEMS
B. G. Checo Engineering

SWITCHES, SENSOR, SINGLE OR MULTIPOINT
Simmonds Precision Canada

SWITCHING SYSTEMS
Frederick Electronics Canada

TELEX CONTROL UNIT/AUTO DIALER
Frederick Electronics Canada

TERMINAL CONTROLLER, UNIVERSAL (MODEL 7500), CRT DISPLAY TERMINAL
Frederick Electronics Canada

TRACTION ELECTRIFICATION SYSTEM
B. G. Checo Engineering

TRACTION MOTORS, LOCOMOTIVE
(Repair and remanufacture)
Motor Coils Mfg. Co.

TRANSFER TABLE, LOCOMOTIVE
Whiting Equipment

TRUCKS, FREIGHT AND PASSENGER CAR
Hawker Siddeley, Trenton Works Division

WASHERS, CAR
(For exterior of passenger cars and interior of covered hopper cars)
Whiting Equipment

WHEELS, STEEL, FORGED
Hawker Siddeley Canada, Steel Wheel Division

LOCOMOTIVE MANUFACTURING



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MLW Industries, Division of Bombardier-MLW Limited (Montréal), sells its locomotives in many parts of the world — two M240s (1), 2,000 hp, were bought by Venezuela's Ferrocarriles del Estado; 31 MXS620s (2), were ordered by Iraq (the 620 series ranges from 2,000 to 2,700 hp); the DL532B (3), 950 hp, is working in Jamaica.

Three examples of locomotives sold abroad by Diesel Division, General Motors of Canada Limited (London, Ontario). The G26CW (4), 6-axle, standard gauge, 2,000 hp, is one of 148 bought by the Yugoslavian State Railways. The GT26CW (5), 3,000 hp, standard gauge is one of 25 built for the Algerian National Railways (SNTF) for use as freight locomotives. The G12 (6), 1,310 hp was built for the New Zealand Railways which has acquired 138 Diesel Division locomotives since 1955.

DIESEL DIVISION, GENERAL MOTORS OF CANADA LIMITED

Contact: Harold E. Mitchell, Government Liaison Manager
P.O. Box 5160
London, Ontario, Canada
N6A 4N5
Tel: (519) 452-5221
Telex: 064-7112
TWX: 610-352-1531

Since Diesel Division, General Motors of Canada Limited began building locomotives in 1950, more than 3,000 have been shipped from the company's London, Ontario, plant. Many are now operating on every continent in the world and have established a reputation for reliable long life performance and low operating costs. The services of Diesel Division field engineers ensure top performance for its customers.

As well as building locomotives for Canadian railways, Diesel Division has shipped to customers in Yugoslavia, New Zealand, Brazil, Sri Lanka, Norway, Liberia, Pakistan, Sweden, Mexico, Egypt and Algeria.

Ranging from 1,000 to 3,600 horsepower, most models are available with either four or six axles, and can be produced in track gauges from 1 to 1.68 metres. Many options are available to meet individual requirements. The table gives specifications of six export models. Diesel Division subjects each locomotive to 90 man-hours of test

procedures before giving the stamp of approval for delivery. Piece parts, purchased items and sub-assemblies are inspected and tested constantly throughout production.

Diesel Division has pioneered a number of developments in the locomotive field:

- Designed and built the first GM narrow gauge railway locomotive, and the forerunner of the GM Model G export locomotive.
- Modified its GP40 model to meet special requirements of the government of Ontario transit commuter operation in the Toronto area and now provides all the locomotives for this GO transit system.
- Co-operated in developing a system to permit unmanned control of a locomotive, later installed in nine electric locomotives that the Division built for the Iron Ore Company of Canada. These units operate by remote control at the mine site with no on-board personnel.

LOCOMOTIVES FOR EXPORT — DIESEL DIVISION, GENERAL MOTORS OF CANADA LIMITED

Model Engine	G-18 GM 8 cylinder 645E diesel	GT-18 GM turbocharged 8 cylinder 645E3 diesel	G-22C GM 12 cylinder 645E diesel	GT-22C GM turbocharged 12 cylinder 645E3 diesel	G-26C GM diesel 16 cylinder 645E diesel	GT-26C GM turbocharged 16 cylinder 645E3 diesel
Traction Horsepower — continuous input to the main generator for propulsion	1000 hp	1500 hp	1500 hp	2250 hp	2000 hp	3000 hp
Gross Horse- power — continuous engine output (International Railway Union — UIC rating). Includes power for propulsion and auxiliaries.	1100 hp	1675 hp	1650 hp	2475 hp	2200 hp	3300 hp
Gauge	designed for all gauges from 1.000 m (3 ft 3 3/8 in) to 1.676 (5 ft 6 in)					
Wheel Arrangement	B-B (AAR designation) 0440 (common designation)	C-C (AAR designation) 0660 (common designation)	C-C (AAR designation) 0660 (common designation)	C-C (AAR designation) 0660 (common designation)	C-C (AAR designation) 0660 (common designation)	C-C (AAR designation) 0660 (common designation)
Minimum Axle Load	15,220 kg (33,545 lb)	12,141 kg (26,766 lb)	12,643 kg (27,874 lb)	14,303 kg (31,534 lb)	13,562 kg (29,900 lb)	19,817 kg (43,690 lb)
Minimum Weight	60,880 kg (134,100 lb) with lightweight underframe and bogies, fully loaded, no modifications	72,847 kg (160,600 lb) with meter gauge trucks, six universal gauge, close centre motors, fully loaded	75,680 kg (166,700 lb) with lightweight underframe and bogies, six D29 motors, fully loaded, no modifications	85,820 kg (189,200 lb) with six universal gauge motors, fully loaded, no modifications	81,375 kg (179,400 lb) with lightweight underframe and bogies, six universal gauge motors, fully loaded, no modifications	112,220 kg (247,400 lb) with standard underframe and bogies, six broad gauge motors, fully loaded, no modifications
	65,227 kg (143,800 lb) with standard gauge bogies, fully loaded, no modifications		89,200 kg (196,800 lb) with standard gauge bogies, six D75 broad gauge motors, fully loaded, no modifications	101,880 kg (224,600 lb) with six broad gauge motors, fully loaded, no modifications	97,861 kg (215,757 lb) with standard gauge bogies, six broad gauge motors, fully loaded, no modifications	105,510 kg (232,604 lb) with six universal gauge motors, fully loaded, no modifications
	Also available as a 6 axle G18C locomotive	Also available as a 4 axle G18 locomotive	Also available as a 4 axle G22 locomotive			

MLW INDUSTRIES

Division of Bombardier-MLW Limited

Contact: John Byrne, Vice-President
1505, rue Dickson
Montréal (Québec) Canada
H1N 2H7
Tél: (514) 255-3681
Télex: 05-828841
Câble: MONLOCO

MLW Industries' integrated locomotive manufacturing facilities include development laboratories, design engineering, full after-sales service support, a large inventory of spare parts, instruction school, technical publications, and testing facilities for its full range of engines and locomotives under no load and load conditions.

MLW stands for the original name of the company, Montreal Locomotive Works, which was founded in 1904. From that date until 1950 the company produced more than 4,000 steam locomotives, many of them classic models, for service in Canada and overseas. In 1948, MLW manufactured the first Canadian-built production model diesel locomotive.

M-line domestic locomotives introduced in 1969 and the MX export series, in service since 1971, are MLW's modern generation of high performance motive power, arrived at through continuing development of engines, chassis, electrics, interior environmental control and suspension systems.

Locomotives designed for worldwide applications offer the best possible accommodation to geographical and

climatic conditions, limited axle loads from approximately 26,455 lb to 68,000 lb (12,000 kg to 31,000 kg), and all U.I.C., African and other reduced clearance structure gauges. High adhesion trucks (bogies) provide the maximum of effective adhesive weight; they can be offered with pilot axles and/or interbogies control. The table gives major specifications for the MX export line.

In 1975 MLW exported locomotives to Iraq, Cuba, Venezuela and Tunisia for a total of 73 units worth \$47 million.

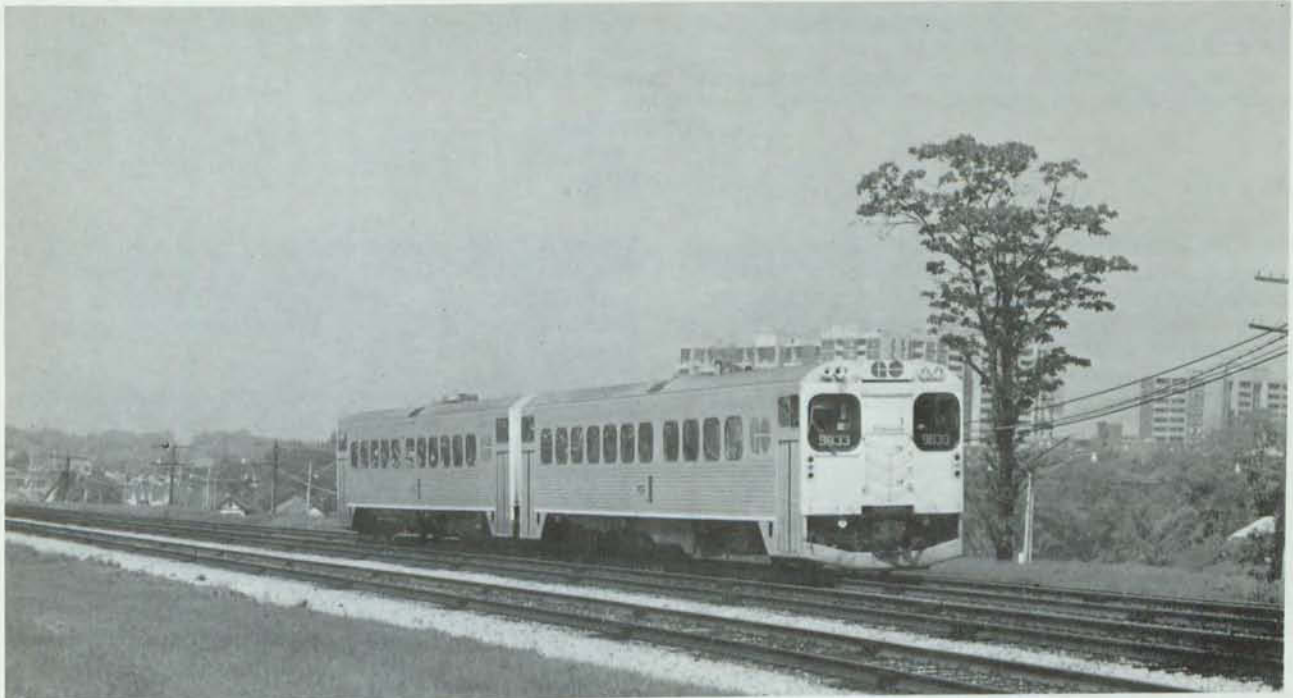
All MLW locomotives are powered by the universally popular, 4-cycle turbocharged Model 251 diesel engine. The 251 offers low fuel consumption, low thermal loading for rated BMEP, tolerance to a wide variety of fuels, easy installation and maintenance, and durability. Diesel engine research and development at MLW's privately-owned laboratory emphasizes improvement of existing equipment. Engine improvements, when fully proved, are not only built into new engines but are also offered to owners of existing 251 engines as replacement parts and modification kits.

TYPICAL LOCOMOTIVES FOR EXPORT — MLW INDUSTRIES

Model	Wheel Arrangement	Horsepower, traction	Engine	Axle load minimum	Transmission
MX615 — maximum adhesive weight and tractive capability for low axle loads and low rail stress limitations	C-C/1-C-C-1 (Co-Co/1-Co-Co-1)	1,500 (1520 CV)	8V251	31,958 lb (14,500 kg)	DC, 6 traction motors or AC/DC, 6 traction motors
MX620/627 — a general purpose mainline locomotive for heavy haulage on light axle loads around the world. Built with or without steam generators	C-C/1-C-C-1 (Co-Co)	2,000/2,700 (2028 to 2737 CV)	12V251	32,000 lb (14,515 kg)	DC, 6 traction motors or AC/DC, 6 traction motors
MXS624 — a road locomotive with the same proven power train as others in the MX620 series designed with an operating cab at each end and fully enclosed car body. Other powers also available in this style	C-C/1-C-C-1 (Co-Co)	2,400 (2433 CV)	12V251	36,016 lb (16,337 kg)	DC, 6 traction motors or AC/DC, 6 traction motors
MX636 — an AC/DC power plant and high adhesion low weight transfer trucks furnish high traction capability with low axle loading. Available with steam generator or electric train heating	C-C (Co-Co)	3,500 (3599 CV)	16V251	43,650 lb (19,797 kg)	AC/DC, 6 traction motors
MX640 — a heavy haulage locomotive with the 18-cylinder power plant for operation where slightly higher axle loads are permitted	C-C (Co-Co)	4,000 (4055 CV)	18V251	45,666 lb (20,714 kg)	AC/DC, 6 traction motors
DL532B — a reliable, lightweight all-purpose locomotive, the standard unit for many railroad operations	B-B (Bo-Bo)	950 hp (963 CV)	6 (in-line) 251	34,500 lb (15,648 kg)	DC, 4 traction motors or AC/DC, 4 traction motors

FREIGHT AND PASSENGER CARS





2



3

(1)¹ A Procor Limited (Oakville, Ontario) unit train loads bunker fuel oil. Procor designs railway cars for any purpose and railway systems.

From the Canadian Car Division (Thunder Bay, Ontario) of Hawker Siddeley Canada Limited — diesel-propelled and trailer coaches for commuter service (2); passenger coach for Ferrocarriles Nacionales de Mexico which ordered 60 first class and 140 second class (3)

HAWKER SIDDELEY CANADA LTD. CANADIAN CAR DIVISION

Contact: Robert A. Campbell, Marketing Representative
P.O. Box 67
Thunder Bay, Ontario, Canada
P7C 4V6
Tel: (807) 577-8431
Telex: 073-4560
Cable: CANCAR

One of the world's leading manufacturers of railway passenger equipment Canadian Car Division of Hawker Siddeley Canada Limited has had a long and successful history — since the late 1880's — as an innovative designer and builder of rail and light transportation equipment. Its products include subway cars, rapid transit cars, mainline passenger cars, double-decker cars and light rail vehicles.

Canadian Car's design and development capabilities include conceptual design, car renderings, interior designs and renderings, production of full-scale models, followed by detailed design and production. Once equipment has been manufactured, the company's team of service personnel will carry on the required service conditions of the contracts.

Development and construction of the long 75 ft. (22,860 mm) lightweight subway car was pioneered by Canadian Car in the early 1960's. Using aluminum extrusions for the side and upper rails, vertical extrusions, roof bows, body sheathing and roof, with end frame and cross members of low alloy, high tensile, corrosion resistant steel, the company produced a car structure which is just as strong but about only half the weight per unit length of an all-steel car.

When the government of the Province of Ontario initiated its GO Transit rail commuter service, Canadian Car received the order for 85 ft. (25,908 mm) long passenger coaches and self-propelled diesel-engined cars. First customer for Canadian Car's new double-deck commuter car is also GO Transit.

The double-deck commuter car is 85 ft. (25,908 mm) long, 16 ft. (4,876 mm) high, 9 ft. 7 in. (2,920 mm) wide and has an unloaded weight of approximately 96,000 lb (43,545 kg). Various interior arrangements can comfortably seat up to 164 passengers.

The basic structure has the underframe and centre part of the body forming the main structure element of the car. The two end sections are built as separate modules and this permits the company to offer several different versions. A washroom, control cab for push-pull operations, additional seats, lunch counter, first class lounge and other amenities can be incorporated. Also, several small orders for different versions can be economically combined on the production line. And, the car can be self-propelled with the end module housing a diesel or gas turbine engine with a mechanical or electrical transmission.

For intercity rail operations, Canadian Car has supplied train sets of coaches of the same lightweight concept, including passenger coaches, club cars and cafe-lounge cars. All cars are equipped with disc brakes.

An active exporter, Canadian Car Division has supplied 46 air-conditioned rapid transit cars to the Port Authority Trans-Hudson, a subsidiary of the Port Authority of New York and New Jersey. It is now working on an order from Ferrocarriles Nacionales de Mexico for 140 second class mainline passenger cars and 60 first class cars. In addition, deliveries are scheduled to begin in 1978 on 190 subway cars for Boston's Massachusetts Bay Transportation Authority.

HAWKER SIDDELEY CANADA LTD. TRENTON WORKS DIVISION

Contact: R. C. Frost, Export Marketing Manager
P.O. Box 130
Trenton, Nova Scotia, Canada
Tel: (902) 752-1541
Telex: 019-36510
Cable: HAWSIDTREN

One of Canada's major freight car manufacturing facilities, Trenton Works Division of Hawker Siddeley Canada Ltd. can meet both domestic and overseas design and specification requirements. It has consistently exported to all parts of the world for more than 40 years.

For export customers, the company will supply freight cars in the most advantageous form — fully assembled and finished, assembled but not finished, completely knocked-down as major assemblies, as prefabricated materials and components, or in any required combination. In this way, customers may benefit from reduced ocean freight rates and lower tariffs by contributing local materials and labour where conditions permit.

During its some 60 years of operation Trenton Works has built nearly 100,000 cars of many different types, including: air dump, auto-rack, bottom dump, box, bulk coal, caboose, cattle, container, covered hopper, depressed centre flat, flat, furnace, heated and insulated box, hopper, hot metal ladle, mechanical refrigerator, mine, ore, piggy-back, quadruple hopper, side dump, snow plow, special flat for heavy equipment, sugar cane, triple hopper and wood chip cars.

In addition, the plant is fully equipped to produce rolling stock tank cars in various sizes, both insulated and non-insulated, coiled and non-coiled, with capacities up to 33,900 U.S. gallons (128,323 litres).

Trenton Works builds many cars to the customer's own design, but it also serves smaller railways and industrial companies with private railways which do not have car design and engineering facilities. For these customers, it will prepare new designs if existing types do not meet requirements. Each type of car is engineered to meet the specifications of the Association of American Railroads or other recognized standards.

Although steel to various specifications is the principal material used in most of the railway freight units built by

Trenton Works, the company has considerable experience in manufacturing aluminum-bodied cars. Some of this work has been of an experimental nature to produce special cars for railroad evaluation in service.

Welded construction is used for all freight cars. Components are held in positioners during welding operations, resulting in cars that are more accurately built, stronger, and far less subject to corrosion at joints than rivetted cars.

MARINE INDUSTRIES LIMITED

Contact: Donald Guévremont, General Manager, Railway Car Division
C.P. 550

Sorel (Québec) Canada
J3P 5P5

Tél: (514) 743-3351

TWX: 055-61081

Câble: MARINDUS SOREL

Marine Industries Limited began constructing railway cars in the early 1950's and has since developed its production capacity to approximately 1,800 freight cars a year. The company has a long-established reputation as a major shipbuilder.

Since it first began freight car manufacturing, Marine Industries has used the welded construction method. In the early 1960's the firm built the prototype of an all-aluminum welded hopper car, and more than 400 units have been ordered and built up to now.

Production is diversified, as the following list shows, ranging from conventional flat cars to self-unloading covered hopper cars, and special types for transportation of pulpwood, ore, hot metal, grain and other commodities.

Bulkhead Flat Cars

- 70 ton (64 metric ton) and 100 ton (91 metric ton), steel, wrap-around with wood floor, straight end, straight with wooden or steel floor.

Container Flat Cars

- 100 ton (91 metric ton), steel.

Highway Trailer Flat cars

- 63 foot (19,202 mm), carries two 28-foot (8,534 mm) highway trailers, equipped with front mounted refrigeration units.
- 50 ton (45 metric ton) single hitch, carries one highway trailer.

Plain Flat Cars

- 70 ton (64 metric ton), steel.
- 100 ton, 62 foot, 6 inch (91 metric ton, 19,050 mm), steel.
- 100 ton (91 metric ton), wood decking.

Covered Hopper Cars

- 100 ton (91 metric ton), steel, pressurized covered tank hopper, four roof hatches, four pressure hopper discharge outlets.
- 100 ton (91 metric ton), steel, covered, full length loading hatch, four doors for centre dumping.
- 100 ton (91 metric ton), steel, covered, full length through type loading hatch, four hopper doors for centre dumping.
- 50 ton (45 metric ton), aluminum, tank, six round hatches, three hopper doors, centre dump.

Gondola and Ore Cars

- 70 ton (64 metric ton), steel, for ore, fixed sides and ends, five bottom side dump doors.
- 100 ton (91 metric ton), steel, gondola, five foot (1,524 mm) high sides, fixed ends, nailable steel floor.
- 100 ton (91 metric ton), for ore, fixed sides and ends, open top, solid bottom.
- 100 ton (91 metric ton) gondola, for coal, fixed sides and ends.

Woodchip Cars

- 70 ton (64 metric ton), end door.

Hot Metal Torpedo Car

- 150 ton (136 metric ton) and 245 ton (222 metric ton), carries molten copper, ladle performs function of car body, rotates 360 degrees.

Iced Express Refrigerator Car

- 50 ton (45 metric ton), steel sheeted, wood lined, for passenger service, overhead ice tanks, underslung heaters.

NATIONAL STEEL CAR CORPORATION, LIMITED

Contact: H. S. Ashby, Vice-President Sales
P.O. Box 450
Hamilton, Ontario, Canada
L8N 3J4
Tel: (416) 544-3311
Telex: 061-8255
Cable: NASTEEL

National Steel Car builds steel or aluminum railway freight cars for standard, broad or narrow gauge tracks, to AAR specifications for interchange service, or to customer specifications. The company will undertake sizable export orders to AAR specifications.

The company's design engineers will design a new unit from scratch to meet a customer's special requirements, or will follow through to completion the design supplied. New designs can be tested in the plant with static and dynamic testing using strain gauges, stress coats and photo-elastic techniques.

Types of railway freight cars produced by National Steel Car Corporation, Limited are:

Box — standard, insulated and heated

Refrigerator — mechanical

Flat — standard, bulkhead, piggy back, trailer, container, depressed centre

Gondola — standard, drop end, bottom dump, rotary dump, bulkhead end, coal

Schnabel — transformer

Hopper — rapid discharge, tank type ore, standard cross, longitudinal, ballast, covered, tank type covered, pressure discharge covered

Side Dump — air operated, ram operated

Auto Rack — tri-level, bi-level

Log — stake type

Wood Chip

All the hundreds of different fabrication and assembly steps in the manufacture of freight cars are carried out within the company's industrial complex at Hamilton, Ontario, a steelmaking centre. Only one mile away, Hamilton harbour provides docking for international cargo ships.

On-site facilities at National Steel Car include pattern making, tool and die making, plate work, machining, forming and forging, assembly, shot blasting, painting. Modern welding equipment includes metallic inert gas shielded arc welding units and plasma arc cutting equipment.

PROCOR LIMITED

Contact: K. Jagger, President and Chief Executive Officer
2001 Speers Road
Oakville, Ontario, Canada
L6J 5E1
Tel: (416) 827-4111
Telex: 06-982241
TWX: 610-495-2665

Procor exports expertise — expertise in the translation of a shipper's needs into an appropriate system coupled with the right hardware and support services. Procor designs railway cars for any purpose, particularly specialized purposes such as pressure flow cars and unit trains, and covers virtually every aspect of physical distribution, starting with how the product is loaded into the rail cars, the cost effectiveness of the car in transit and the system of unloading.

Support systems which Procor supplies include the selection of minimum car inventories, computerized control and implementation of inspection, preventive maintenance and repairs and the compilation of records for controlling a fleet.

Procor has developed its expertise in Canada where it is a major private owner of unit trains and a designer and builder of specialized rail cars and shipping systems. In Canada, the company's support systems include maintenance of spare car inventories, and repair shops across the country.

In 1970, Procor (U.K.) Limited was established as a full service leasing company for all types of railway rolling stock. It now owns and leases in Britain some three thousand railway tank and freight cars carrying products for the petroleum, chemical, construction and food industries.

TRACK AND MAINTENANCE EQUIPMENT

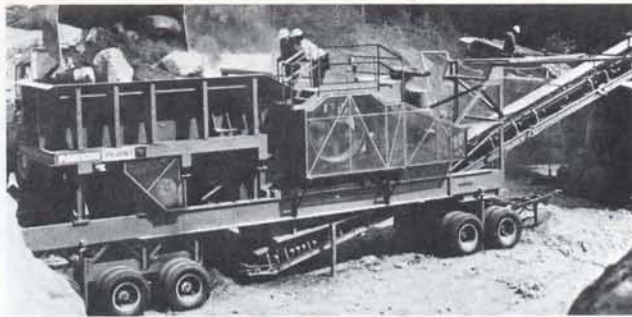


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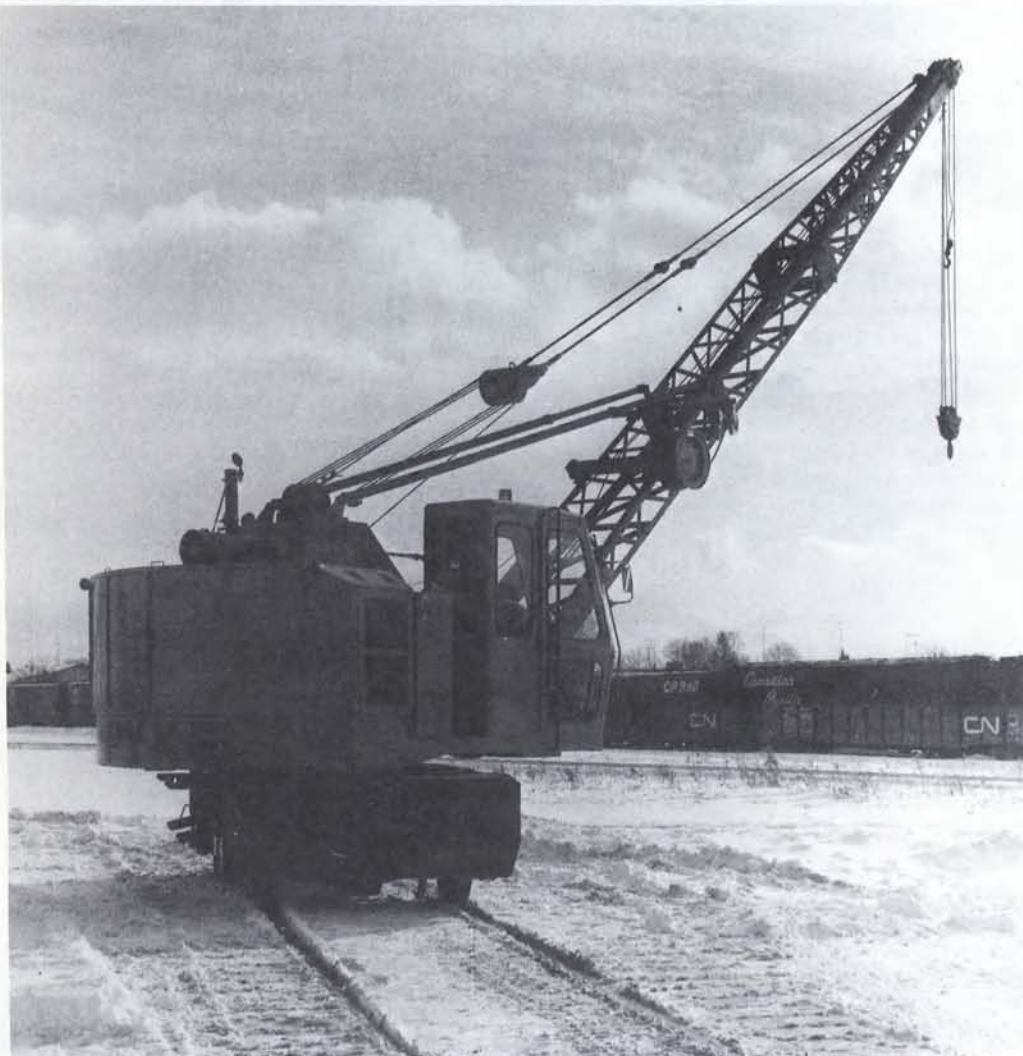




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4



5

(1) Highly engineered rotary railway snow blower manufactured by SMI Industries Division of Caelter Enterprises Ltd. (Montréal).

(2) Diesel locomotive sanding station made by Williams and Wilson Limited (Montréal) can be adapted to one or two track service; side and overhead hoses service front and rear sand boxes and top sanding.

Two of the wide range of construction machinery manufactured by Frederick Parker (Canada) Limited (Scarborough, Ontario) — (3) Super-screen Ranger, a 400 ton-per-hour screening plant; (4) mobile Primary Crusher, Model 5255, one of the largest made.

(5) A 15-ton rail mounted locomotive type crane, with clamshell bucket and magnet, manufactured by Bert Pyke Limited (Oshawa, Ontario), handles maintenance of way work, moves laden cars and rerails box cars.

THE ALGOMA STEEL CORPORATION, LIMITED

Contact: Harold A. Parr, Manager, Export Sales
 Rail-Sales, 395 Queen Street West
 Sault Ste. Marie, Ontario, Canada
 P6A 5P2
 Tel: (705) 945-3196
 Telex: 067-77168
 TWX: 610-344-5033

High quality rails and accessories from The Algoma Steel Corporation, Limited are in service throughout the world, their reliability proved during a long history of production — since the turn of the century.

Carbon steel grade to A.R.E.A. and major railroads' specifications are manufactured, as well as special alloy steel that has been developed for special service

applications. Throughout each stage of the operation — cutting, cambering, controlled cooling, straightening, drilling, end hardening, inspection and testing — Algoma maintains its tradition of quality.

The following tables give the specifications of the types of heavy and light rails, tie plates and joint bars available from Algoma.

HEAVY RAILS

Section Designation	100 A.R.A.-A	100 R.E.-H.F.	115 R.E.	132 R.E.	136 R.E.
Algoma Number	120	142	145	146	147
Area in. ² (mm ²)	9.84 (6,349)	9.76 (6,297)	11.25 (7,258)	12.95 (8,355)	13.35 (8,613)
Weight (nominal) lb/yd (kg/m)	100 (49.8)	100 (49.4)	115 (56.9)	132 (65.5)	136 (67.6)
Height in. (mm)	6 (152)	6 1/16 (154)	6 5/8 (168)	7 1/8 (181)	7 5/16 (186)
Base in. (mm)	5 1/2 (140)	5 3/8 (137)	5 1/2 (140)	6 (152)	6 (152)
Head Width in. (mm)	2 3/4 (70)	2 39/64 (66)	2 23/32 (69)	3 (76)	2 15/16 (75)
Web Thickness in. (mm)	9/16 (14.3)	9/16 (14.3)	5/8 (15.9)	21/32 (16.7)	11/16 (17.5)

TIE PLATES FOR HEAVY RAILS

Size in.	Type	Rail Size	Weight Each Punched	
			lb	kg
11 x 7 1/2	C.N.R. (DS)* TS-501	100# (ARA-A)	13.12	5.95
11 x 7 1/2	C.N.R. (DS) TS-501	115# (RE)	13.12	5.95
11 x 7 1/2	C.P.R. (DS) TS-501	115# (RE)	13.90	6.31
14 x 7 1/2	C.N.R. (DS) TS-501	115# (RE)	22.34	10.13
14 x 7 1/2	C.N.R. (DS) TS-501	132# (RE)	20.97	9.51
14 x 7 1/2	C.P.R. (DS) R-14-57-1	132# (RE)	21.16	9.60
16 x 7 3/4	C.P.R. (DS) R-14-57-5	132# (RE)	25.30	11.47

*(DS) Double Shoulder

JOINT BARS FOR HEAVY RAILS

Algoma Section Number	Corresponding Rail Designation		Weight Per Pair Punched*			
			4-Hole		6-Hole	
			lb	kg	lb	kg
115-A	80# Std.	H.F.	43.08	19.54		
113-F	85# C.N.	H.F.	43.72	19.83		
113-F	85# C.P.	H.F.	43.34	19.66		
120-E	100# A.R.A.-A.	H.F.	53.52	24.27	80.28	36.42
145	115# R.E.	H.F.	69.38	31.47	99.80	45.27
138-A	130# R.E. C.N.	H.F.			94.60	42.91
	130# R.E. C.P.	H.F.			111.32	50.49
	132# R.E. C.P.	H.F.			111.90	50.76
	132# R.E. C.N.	H.F.	74.54	33.81	111.80	50.71

*Weights given are average figures for estimating purposes and for identification.
Other splice bars may be produced by special arrangement.

A.S.C.E. LIGHT RAILS

Weight		Area		Height		Base		Head Width		Web Thickness	
lb/yd	kg/m	in. ²	mm ²	in.	mm	in.	mm	in.	mm	in.	mm
40	19.8	3.94	2,542	3½	89	3½	89	1⅞	48	25/64	9.9
60	29.8	5.93	3,826	4½	114	4¼	108	2⅜	60	31/64	12.3

JOINT BARS FOR LIGHT RAILS

Rail Designation	Weight Per Pair	
	lb	kg
40# A.S.C.E.	16.0	7.26
60# A.S.C.E.	24.2	10.98

CANRON RAILGROUP

Railway Division
Contact: O. H. Riel, General Sales Manager
171 Eastern Avenue
Toronto, Ontario, Canada
M5A 1H7
Tel: (416) 363-8801
Telex: 06-23289

Canron Railgroup designs and produces a complete range of railway track maintenance equipment, including fully automatic ballast tampers equipped with levelling and lining attachments and also crib and shoulder consolidators, tie renewal equipment, spike drivers, ballast equalizers and snow blowers.

The major objective of the Canron Railgroup is to help railways throughout the world maintain their trackage to the highest standards in the most efficient manner possible. The company's design goal for maintenance equipment is to provide high productivity levels while reducing machine maintenance and down time. The goal is achieved through a combination of design ingenuity,

quality materials and workmanship and high component reliability.

The commitment of the Canron Railgroup does not stop with the supply of efficient and reliable equipment. The Railgroup offers comprehensive training programs to customers' employees to ensure that Canron track maintenance equipment is operated and maintained to its full potential. Sales and service backup is thorough, with complete facilities located in the United States, Canada, Australia, Switzerland, Italy, France, Britain, Germany, Spain and Japan. A network of more than 40 agents serves Central and South America, Africa, Europe and Asia.

CON-FORCE COSTAIN CONCRETE TIE CO. LTD.

Contact: J. G. White, Vice-President and General Manager
1000 Alberta Place
1520 - 4th Street Southwest
Calgary, Alberta, Canada
T2R 1H5
Tel: (403) 264-1590
Telex: 03-821669

Precast, prestressed concrete rail ties are the only product of Con-Force Costain Concrete Tie Co. Ltd., formed in 1973 specifically to design, manufacture and market this product in Canada, the United States and Mexico.

Con-Force Costain concrete ties give many years of trouble-free service when fitted with compatible elastic rail fastenings, reduce maintenance costs and assure that the correct line and level of track is maintained over long periods. The company manufactures the monoblock type with embedded iron shoulders to accommodate Pandrol fastenings.

Con-Force Costain with 27 years experience of concrete tie design and manufacture is prepared to design and develop ties to customer requirements, both transit and mainline.

Initially, concrete ties are more expensive than wood ties, but in life cycle costing, cheaper because of their greater life expectancy (at least 50 years), and because they increase rail life and reduce maintenance by providing a more rigid track structure. Concrete ties also increase safety by permitting use of continuous welded rails.

Other advantages of prestressed concrete ties are uniformity, rigidity that prevents gauge spread, fire proof, rot and fungus proof and — termites don't like concrete.

Experiments in the substitution of concrete for wood ties began as early as 1893 in the United States and 1900 in France, and Britain tried them during the 1914-18 war. Little progress was made until the shortage of wood

during World War II made further development necessary. Success followed the introduction of prestressed concrete. By the end of 1976, British Railways had installed more than 20 million prestressed concrete railway ties.

Con-Force Costain Concrete Tie Co. is owned 75 per cent by Con-Force Products Ltd., a Canadian company and 25 per cent by Costain Concrete Company Limited of London, England, which has been designing and manufacturing prestressed concrete railway ties for more than 27 years.

DOMTAR CHEMICALS LTD. WOOD PRESERVING DIVISION

Contact: J. E. Law, Assistant General Manager
395 ouest, boul. de Maisonneuve
Montréal (Québec) Canada
H3C 3M3
Tél: (514) 282-5252
Télex: 055-60625
TWX: 610-421-4630
Câble: TARDOMCO

The Wood Preserving Division of Domtar Chemicals Ltd. is the largest operation of its type in Canada with nine pressure treating plants located across the country from the east to the west coast. It carries a large inventory of railway cross and switch ties and utility poles, and also produces a variety of pressure treated sawn lumber, timber and other products.

The division's methods are in full accordance with Canadian Standards Association and other specifications

covering the pressure preservative treatment of wood and it has a full range of oil-type and water-borne preservatives.

The Wood Preserving Division's quality control and its products are backed by a large research and development facility. The division has the wood supply capability and the capacity to contract for the supply of large export requirements within acceptable time limits. Markets in the past two years have included Cuba, Peru and Libya.

FRANCON Division of Canfarge Ltd./Ltée

Contact: Lino Pansieri, Co-ordinator, Sales and Promotion
8300, boul. Pie IX
Montréal (Québec) Canada
H1Z 3T6
Tél: (514) 722-2511

Francon, a fully owned subsidiary of Canada Cement Lafarge Ltd. and a leading Canadian manufacturer of prestressed concrete railway ties, is also well known as a supplier of construction materials, a heavy construction contractor and a manufacturer of prestressed precast concrete elements.

The company owns and operates several limestone quarries, sandpits, ready mixed concrete and asphalt batching plants, as well as a vast fully-enclosed plant for the manufacturing of prestressed concrete railway ties and precast architectural and structural elements.

The technology that Francon has developed and refined over the years assures economical mass production of prestressed concrete railway ties of constant quality and precision. This technology is offered to all clients interested in the manufacturing of prestressed concrete ties. In addition, Francon can also supply clients with tooling, equipment, personal training programs and all technical assistance required in designing, marketing and production of prestressed concrete railway ties.

KOPPERS INTERNATIONAL CANADA LTD.

Contact: W. N. McDuffie, Vice-President
10106 Shellbridge Way
Richmond, British Columbia, Canada
V6X 2W7
Tel: (604) 273-1911
Telex: 043-54795

A leading wood laminating and wood pressure-treating company, Koppers International Canada Ltd. was founded initially (in 1930) to serve the railroad industry with pressure-treated wood cross ties. Since then Koppers' line of products for that industry has grown and now

includes pressure-treated wood sleepers, timbers, pilings, poles, decking; laminated wood bridge girders, caps and stringers, beams, arches and columns for buildings; corrugated metal helical pipe, riveted pipe, structural pipe.

Koppers can supply treated wood products in Douglas fir, Western red cedar, lodgepole pine and Western hemlock. Chemicals used in pressure treatment are creosote, pentachlorophenol and WOLMAN® CCA, and the process is carried out in accordance with Canadian Standards Association specifications, unless otherwise required by the customer.

Laminated wood products are manufactured in facilities certified by the Canadian Standards Association and with the most advanced, mechanized techniques for controlling quality of material and integrity of bond. Koppers laminated timbers provide a remarkably competent construction material which is stable under extreme climatic conditions and inhibits condensation. Another important

feature is that it retains its structural integrity longer than unprotected metal in the event of fire.

Koppers laminated timber railroad bridges are virtually maintenance free and have design load capabilities of up to 270 metric tons, and, for clear spans up to 61 metres (200 ft). Given design span, axle loads and axle spacings, Koppers can submit a proposal for a bridge design that meets these requirements.

The company operates ten plants across Canada, with export capabilities for laminated wood out of Montreal, Quebec and Vancouver, and for pressure-treated wood products out of Vancouver.

LISTER BOLT & CHAIN LTD.

Contact: W. V. Stobbart, Manager of Marketing and Sales
1771 Savage Road
Richmond, British Columbia, Canada
V6V 1R1
Tel: (604) 273-5411
Telex: 043-55637
Cable: CHAINS, VCR

Lister Bolt & Chain Ltd. is a privately owned company, incorporated in 1911, producing custom forged bolts and chain for various industrial uses. The company has become an established exporter and during the last two years has sold over \$1,600,000 worth of its products to many countries, including Malawi, the Dominican Republic, the United States, the Philippines, Haiti, Peru and Indonesia.

Lister manufactures track fasteners for railways, line bolts for mining and cement mill liner, construction bolts for timber construction and anchoring requirements, pole line hardware for power distribution. Manufacturing range is:

hot headings, 12 mm to 50 mm (½ in. to 2 in.) diameter; threading, 12 mm to 100 mm (½ in. to 4 in.) diameter; mild steel, alloy, stainless, bronze.

Electric resistance flashwelded chain, 16 to 50 mm (¾ in. to 2 in.) bar size, is produced in coil, ring, stud and long link configurations, from mild steel, alloy and stainless steel. Lister makes chain for marine use, kiln heat transfer, conveyors and hoisting requirements.

Lister Bolt & Chain Ltd. has complete heat treating facilities at its plant and equipment for hardness and tensile testing.

PANDROL CANADA LIMITED

Contact: W. M. Zacharkiw, President
8180, chemin Côte de Liesse
Montréal (Québec) Canada
H4T 1G8
Tél: (514) 735-4371
Télex: 05-826811

Pandrol Canada Limited is a wholly Canadian company engaged in the marketing and manufacturing of the Pandrol Rail Fastening System. Formed in 1974, the Canadian company has a fully qualified technical staff at its Montreal plant and in addition has access to extensive design and other facilities in Britain.

The Pandrol rail fastening was first introduced on the British Railways in the late 1950's and after exhaustive testing became the standard fastener for that system in 1964. The fastening system has been installed in more than 38 countries in the world and has become the standard in many of these countries.

A fully resilient, modern rail fastening, Pandrol rail clip is hot formed from high-quality chrome round bar of varying diameter depending on the application and service condi-

tions. It may be used with wood, prestressed concrete or steel railway ties, also for specialized industrial applications such as crane rails.

Properties of Pandrol rail fastening that make it one of the most efficient rail fastenings available today are:

- Fully resilient, it absorbs vibrations from traffic forces preventing them being transmitted to the tie.
- Easily installed and removed with an ordinary hammer.
- Does not come loose of its own accord and therefore does not require regular maintenance.
- No screw threads requiring careful adjustment and frequent attention.

- Resists rail creep in both directions.
- Large working deflection absorbs manufacturing tolerances in the fastening components and reduces the influence of normal wear in service.
- Minimum number of components.
- No special skill required in installation as the deflection and consequent toe-load are predetermined in the design and manufacture.
- Rate of track laying much faster than the screw type rail fastenings.
- Rail changing is simple and clips can be re-applied with no loss of toe-load.

Although no special tools are needed, a simple, light-weight and inexpensive hand tool, the Panpuller, for installing and extracting is available, and also the Pandriver, a machine that drives quickly and correctly all the rail clips of a tie in one operation.

The Pandrol Rail Fastening System allows old steel sleepers to be rehabilitated at low cost. Rail sections differing from the section for which the sleeper was originally supplied can also be used. Many hundreds of thousands of old steel sleepers have been strengthened and prepared for further long life by welding to the rail seats pressed or rolled steel plates designed to provide housings for the Pandrol rail clips.

FREDERICK PARKER (CANADA) LIMITED

Contact: D. G. McCallum, General Manager
441 Ellesmere Road
Scarborough, Ontario, Canada
M1R 4E5
Tel: (416) 759-6721
Telex: 06-963564
Cable: CRUSHING TORONTO

Frederick Parker (Canada) Limited manufactures a wide range of construction machinery ranging from small vibratory plate compactors to 300 ton per hour portable crushing and asphalt mixing plants.

An associate of Frederick Parker Limited, Leicester, England, the Canadian company is capable of designing equipment for domestic and overseas markets. In the past three years, the company has supplied machinery to Saudi Arabia, Ghana, the Trucial States, Nigeria and Kuwait. It provides field service engineering and has resident sales engineers in Hong Kong, Tehran and Buenos Aires who can assist customers in any area of the world.

Frederick Parker (Canada) will supply machinery to any voltage specified for any part of the world: from 25, 50 and 60 cycles to voltages ranging from 110, 220 through to 575 volts. Equipment includes:

"Rocksizer" roller bearing crushers with upthrust toggle crushing action that gives greater output and an exceptionally well-shaped product, with low and even wear on jaws.

"Rock-Ranger" fully mobile primary single crush plant with vibrating feeder, single toggle jaw crusher; entire plant mounted on one welded steel chassis with pneumatic-tired wheels, controls centralized on one platform.

"Rollsizer" crushing rolls with roller bearings for fine crushing, particularly compact machines for use as secondary or tertiary crushers to produce big outputs of small sized aggregate; can be supplied as independent machines mounted on single chassis with power unit.

"Crush-Ranger" fully mobile secondary crushing and screening plant; Series Eleven has granulators, jaw crushers, impact breaker or cone crusher; Series Twelve with jaw crusher and crushing rolls provides a smaller sized product.

"Rock-Sledger" down-thrust single-toggle roller bearing crusher for primary rock crushing with 42 by 32 in. (107 x 81 cm) jaw opening; free-standing design requiring no packing blocks.

"Secondary-Ranger" mobile secondary crushing plant screens and recrushes the crusher-run product from a mobile primary crushing plant, provides smaller sized all-in product with a small percentage of oversize.

"Screenranger" mobile screening plant screens the all-in crushed gravel or rock from a primary crushing unit by a Rapide multi-deck vibrating screen into two, three or four sizes plus rejects.

"Rapide" Screen, two-bearing, free-floating, inclined vibrating screen infinitely variable for a wide range of duties.

"Loadascreen" Mk 111 mobile conveying and screening plant for bulk materials such as gravel, sand, crushed stone, coal coke and rubble; hydraulic drive for screen countershaft and hydraulic boom hoisting.

"QL" mobile belt conveyor, strong, lightweight, inexpensive, ideal for general conveyor work, for linking units, stockpiling the product; easily assembled; three belt widths, five boom lengths.

Compaction units — "Dyna-Tamper" includes at no extra cost a specially designed laminated eccentric weight for conversion from earth to asphalt compaction in only five minutes; "Tandem Vibratory Roller", sturdy, dependable, simply designed with every part "get-at-able".

"Starmix 70" fixed asphalt and bituminous mixing plant, multi bin feeding units, large dryers and paddle mixers, featuring vibrating screen, choice of controls, wide range of options.

"Blackmobile" and "Super-Blackmobile" mobile, high output asphalt and bituminous mixing plants operating around the world in every possible climate.

"Drum-Mix" continuous drum mixing plant for bituminous coated materials, no need for mixing tower with screen, weighing equipment or paddle mixer; available in sizes from 30 tons per hour to 500 tons per hour.

PORTEC LTD.

Contact: Walter F. Wood, President
1010 ouest, rue Ste-Catherine, suite 500
Montréal (Québec) Canada
H3B 1G4
Tél: (514) 866-9368
Télex: 05-24893
Câble: PAMCO, MONTREAL

Portec Ltd., formed in 1912, manufactures the Portec rail anchor in Saint-Jean, Quebec. A major supplier to railroads in Canada, the company has sold more than one billion Fair rail anchors to railways throughout the world.

Portec Fair anchors are tough, durable and reusable, have a simple, one-piece design, are low in ultimate cost and easy to apply. These rail anchors completely control the movement of the rail. Because of their special T-Power design they will not chew into or climb across the top of the tie or tilt under pressure and nick the rail base. Their exceptional holding power permits them to carry any load.

Both models, the Portec XL-1 Fair and the heavier Improved Fair, give the largest bearing of any anchor — up to 11 sq. in. (70.968 cm). The T-Power design gives two working surfaces, which means that the anchor has superior effectiveness whether it is applied to the tie alone or is in contact with both tie and tie plate. Direct bearing against the tie plate dampens the dynamic as well as the

visible vibrations which cause throat-cut spikes and spike-killed ties.

Made of a specially T-shaped spring steel, Portec's Fair rail anchors are forged and heat treated to give uniform structural strength. They not only outlast the rail but can be reapplied again and again with no appreciable loss in holding power. No special tools are needed to apply the Portec; one striking face means fast accurate installation by man or machine, and the snap-on design assures proper application. They can be taken off and reapplied without a special tool when it is time to renew the tie. And they can be installed on smaller size rails with the use of soft steel shims.

Portec Ltd. also designs special rail joints to cover the requirements for insulated signalling, standard rail joint concepts, and the compromising of one rail section to a different rail section by a specially designed joint. For each of these categories the company can provide different design concepts to achieve the purpose.

BERT PYKE LIMITED

Contact: A. E. Pyke, President and General Manager
185 Hillcroft Street
Oshawa, Ontario, Canada
L1G 2L6
Tel: (416) 579-4058/4059
Telex: 0-981210

Bert Pyke Limited began manufacturing specialized machinery for railways in 1954 with a hydraulic operated tie removing and inserting machine. In 1959 the company developed a machine for cleaning snow from switches in the hump yards that were then being built across the country, and this machine is still widely used on Canadian railroads.

A utility crane and a tie handling crane were later added to the company's production, and most recently a 15-ton rail mounted locomotive type crane was built. All the Bert Pyke railway machines are diesel powered and hydraulically operated. Some detail on each follows.

Self-Propelled Snow Switch Broom Blower and Ballast Regulator, Model K — An all seasons machine, used in summer months for plowing in and out, transferring ballast, shoulder trimming and ballast brooming. During the winter it is used for switch cleaning, snow plowing and spreading. Options include stone deflector assembly, ballast boxes, V-plow assembly, screw assembly, blower assembly, spreader wings.

Self-Propelled Utility Crane — Used by B & B crews to change out bridge ties and stringers and by Maintenance of Way crews to transpose rail (up to 11.9 m/39 ft. lengths) and change frogs. Boom length adjusts manually from 4,876 mm (16 ft.) minimum to 7,620 mm (25 ft.) maximum, and can be pinned in four positions. Boom end is drilled to take jib for extra reach if required. Options include

jackknife and telescopic type booms; hydraulically activated grapples which rotate 360° in both directions, with hydraulic tilt and basket type grab tongs opening from 127 to 762 mm (5 to 30 in.); hydraulically activated articulated tie grapple head with 360° rotation; rail clamps, hydraulically operated with manual safety release; travelling and rail clamp circuits to be interlocked to mutually exclude each other; rail tongs; tie puller tongs, inserted hook and inserter snatch block; clam bucket; four foot boom extension.

Self-Propelled Tie Handling Crane — Fitted with a grapple basket to pick up old ties or a tie tong to place new ties for inserting. Jackknife (articulated) boom fabricated from rectangular tubing and plate; tie grapple head equipped with hydraulic clamp arm or basket grapple, 127 to 762 mm (5 to 30 in.) opening and 360° continuous rotation both directions. Options include an equivalent unit arranged for operation on 1,067 mm (42 in.) gauge track; electric emergency hydraulic hand pump (12 volt); side set-off wheels, portable adjustable set-off; hydraulically activated basket grapple, opening 127 to 762 mm (5 to 30 in.), 360° continuous rotation both directions, can be mounted in place of tie grapple without modification; cab (instead of canopy) of all-welded construction, equipped with heater and defroster.

Diesel Hydraulic Rail Car Crane, 15 ton (13½ metric ton)
— Self-propelled and designed for use by Maintenance of Way crews in rail transposing, frog and rail changeout, railthreading and bridgework. Moves laden cars of new and reclaimed material to and from the work area, and

rerailed box cars. A .57 cubic metre (¾ inch yard) clam-shell bucket permits ditching work and loading and unloading of sand, gravel and other coarse material. The 1,000 mm (40 in.) magnet is used for handling rail, tie plates, anchors and joint bars.

SMI INDUSTRIES

A DIVISION OF CAELTER ENTERPRISES LTD.

Contact: Paul A. Rivard, Director Marketing
2055, av. Bennett
Montréal (Québec) Canada
H1V 2T3
Tél: (514) 255-2883
Télex: 05-828753
Câble: SNOWMASTER

SMI Industries Division of Caelter Enterprises Ltd. is a leading manufacturer of motorized maintenance equipment. The company was founded in 1972 to take over the maintenance equipment division of Sicard, Inc., a firm whose accomplishments since the 1920's included the development of the first snow blower, the first railway snowblower and the first airport runway sweeper.

SMI has continued Sicard's exceptional development and design program. The company's engineering and design departments are continually designing vehicles from the conception stage through a thorough prototype and testing program to a final production model. Its experienced

production people ensure that the vehicle is produced efficiently in SMI's modern facilities.

The company also manufactures the American Snowblast line of highly engineered railway and road rotary snowblowers which are exported throughout the world.

SMI Industries prides itself on its reliable and effective parts and service operation. A large spare parts inventory is held in the Montreal plant for distribution to Canadian and overseas markets. An off-the-shelf record of 90 per cent has been attained in spare parts provisioning through use of computerized controls and field maintenance visits.

SYDNEY STEEL CORPORATION

Contact: James P. Cusack, Sales Manager
P.O. Box 1450
Sydney, Nova Scotia, Canada
B1P 6K5
Tel: (902) 564-5471
Telex: 019-35197
Cable: SYSTCO

The Sydney Steel Corporation has been producing railway rails since 1905 at its integrated steel plant which has an ingot capacity of approximately 1 million tons (910,000 metric tons) of steel a year. Sydney Works is situated on a 440-acre (178-hectare) site at tide water with excellent harbour and docking facilities that make it an ideal shipping point for the export market. In the past few years, rails were shipped to the United States, Mexico, Poland, Malawi, Peru and Bangladesh for a total value of \$51,611,000.

Primary production at the Sydney Works is railway rails and tie plates with blooms, billets and bars as secondary products. Rails are produced in weights of 36 kg/m to 70 kg/m (72 to 140 lb/yd.) in lengths to 25 metres (82 ft.), and to international standards. Tie plates are manufactured to North American standards in sizes 7 x 10 in. to 7¾ x 14¾ in. (17.8 x 25.4 cm to 19 x 37.4 cm).

Production of first quality steel is the initial step in the manufacture of steel rails. At Sydney Works, five open

hearth furnaces, oxygen lance equipped, are all using basic linings to produce high quality grades of rail steel.

Rail specifications are so exacting that the utmost precision is necessary in the initial roll design and the inspection which follows. Sydney Steel checks quality control at the hot bed, and immediately after roller straightening each rail is inspected visually and ultrasonically to ensure internal soundness. Other quality control checks conducted by Sydney Works include the drop-test (falling-weight test) to determine a rail's ductility and resistance to impact, and the nick and break test to check the interior condition of the rail.

Sydney Steel Corporation's continuing research and development program for improvement of railway rails is currently pursuing ways of strengthening and hardening rails for longer life through different processing methods and alloy contents. New high strength rail is being road tested.

THE STEEL COMPANY OF CANADA LIMITED

Contact: D. Bylsma, Assistant Manager Overseas Sales
Stelco Tower
100 King Street West
Hamilton, Ontario, Canada
L8N 3T1
Tel: (416) 528-2511
Telex: 061-8621, 061-8626
Cable: STELCO, HAMILTON

Tie plates, track bolts and track spikes for railways are on the long list of steel products manufactured by Stelco, The Steel Company of Canada Limited. Many other items among the categories of products made apply to railway maintenance work.

Product categories include: bars, hot rolled steel and cold finished steel; bolts; chemicals; fencing; forgings — closed die; grinding media; merchant wire; nails; oil rods and couplings; pipe and tube; plate; pole line hardware; reinforcing; residential; rod and wire; screws (bulk only); hot rolled semi-finished steel (forging quality); sheet; special products (cultivator shanks, grader blades); tin mill products; track materials; wharf materials.

The recently formed Stelco Technical Services Limited offers clients highly technical assistance from preliminary surveys through detailed engineering, planning and operational management of steelmaking plants.

Stelco has begun the largest expansion venture ever undertaken by the Canadian steel industry. The entirely new plant being built at Nanticoke, Ontario, on Lake Erie will eventually double the company's production capacity (in 1976, 5.7 million tons/4.9 million metric tons). Company facilities in Eastern, Central and Western Canada are also being expanded.

UPRIGHT BROS. LTD.

Contact: Neil Upright, President
16653 - 113 Avenue
Edmonton, Alberta, Canada
T5M 2X2
Tel: (403) 484-6167

A family-owned company specializing in heating and air conditioning, Upright Bros. has developed snow melters for various types of railway switches and yard retarders. Upright has also produced manuals covering installation techniques, operation and maintenance of this equipment. The company can evaluate requirements for any type of snow melter and work with railways to meet their specifications.

Upright's snow melter combines the heater itself and an air distribution system which, with the right temperature and air velocity, removes the moisture from the rail bed by evaporation. This prevents soft beds at the switches and allows them to be kept clear in the worst winter weather.

Various models, fired by natural or propane gas or oil have been developed to handle single switches and their variations in length. A low current battery-operated model is produced for areas where electrical power is not available.

Specifications for the Upright Bros. switch heater models follow:

MARK VI

- gas (propane or natural) fired hot air blower, maximum input 550,000 BTUH (138,600 kg/c), 1,300 CFM (36,812 dm³) of air
- electric motor drive, 220 volt, single phase, one hp
- safety equipped to prove air and pilot, temperature overheat limit
- heater, 220 volt, thermostatically controlled, dual main solenoid valves, electrical panel (c/w 1,000 W heater for building)
- entire unit to be enclosed in 6 x 8 ft. (1.8 x 2.4 m) insulated housing complete with duct work

- for No. 12 turnout switch; this unit also suitable for No. 16 turnout.

MARK VIA

- gas (propane or natural) fired hot air blower, maximum input 550,000 BTUH (138,600 kg/c), 1,300 CFM (36,812 dm³) of air
- electric motor drive, 220 volts, single phase, 2 hp
- safety equipped to prove air and pilot, temperature overheat limit
- heater, 220 volt, thermostatically controlled, dual main solenoid valves, electrical panel (c/w 1,000 W heater for building)
- entire unit to be enclosed in 6 x 8 ft. (1.8 x 2.4 m) insulated metal housing complete with duct work
- for two No. 12 turnout switches within 20 ft. (6.09 m) of each other, or one No. 20 turnout switch.

MARK VII (LOW CURRENT)

- propane gas fired hot air blower, maximum input 850,000 BTUH (214,200 kg/c), maximum 2,600 CFM (73,624 dm³) of air driven by Briggs & Stratton 10 hp propane engine with remote panel providing low lube oil safety shut down
- safety equipped to prove air and pilot, temperature overheat limit
- heater, dual main gas valves, electrical panel for 115 volt
- power source of 1 amp for control circuit
- entire unit to be enclosed in 6 x 8 ft. (1.8 x 2.4 m) insulated metal housing equipped with thermostatically controlled propane space heater
- for No. 12, two No. 12, No. 16 or No. 20 turnout switches

WILLIAMS AND WILSON LIMITED

Contact: R. Banham, Marketing Manager
1260, rue Richmond
Montréal (Québec) Canada
H3K 2H2
Tél: (514) 931-7301
Télex: 01-20456

Custom built diesel locomotive sanding stations and rail trimming and handling systems are produced by the Manufacturing Division of Williams & Wilson Limited. The company, founded in 1891, is one of the largest machine tool and industrial supply distributors in Canada.

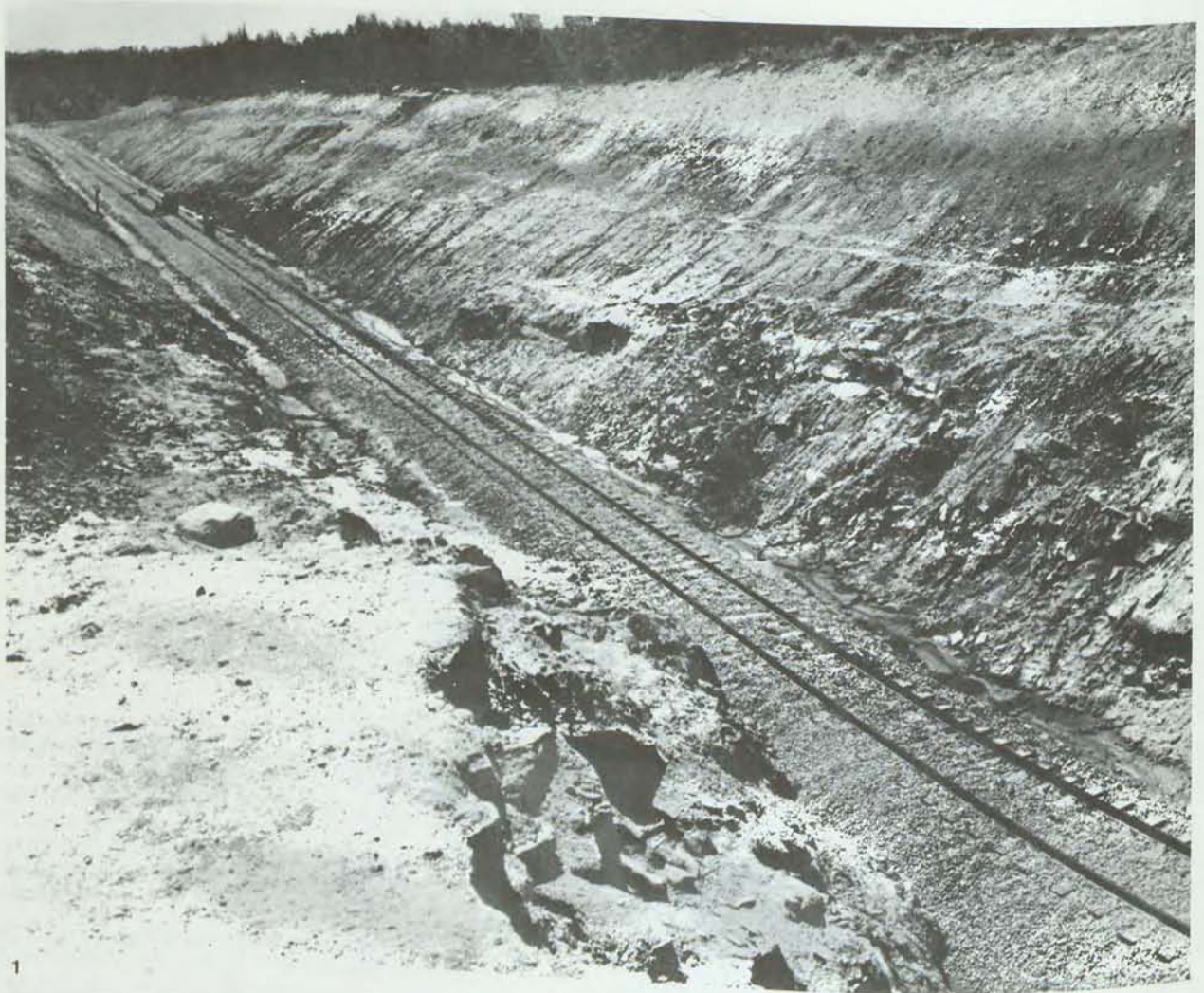
Williams and Wilson equipment is designed for the international market; standard parts are used wherever possible to enable customers to purchase replacement parts from local sources. Sales engineers are available to assist customers in the selection and layout of systems tailored to their particular needs.

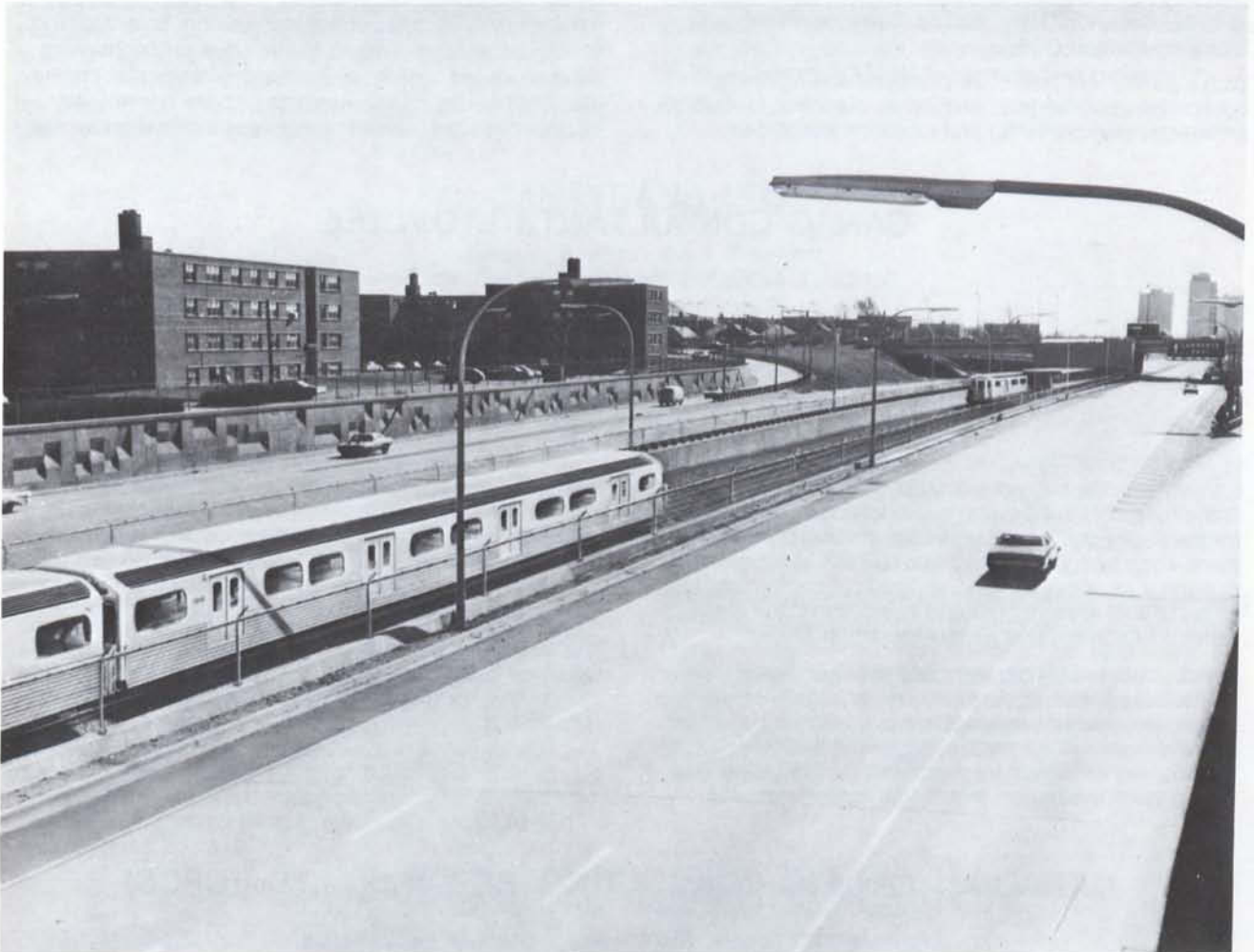
The diesel locomotive sanding tower can be adapted to one or two track service. Front and rear side sand boxes

are sanded by hoses spaced along the sides of the tracks to suit the variable locations of the boxes. Top sanding is serviced by hoses located overhead on the centre lines of the track.

The company's rail handling system provides a rail length range of 22 ft. to 4 ft. 6 in. (6.7 m to 1.37 m). Ten hydraulically operated rail stops set to standard rail lengths can be moved and reclamped to suit other dimensions; positioning is automatic. D.C. drive controls acceleration and retardation of rail, reducing impact forces when rails are positioned against stops.

CONSULTING AND CONSTRUCTION





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(1) H. A. Simons (International) Ltd. (Vancouver) has undertaken numerous railroad engineering projects around the world, including design and construction of mainline track for the Maine Central Railroad (United States). A relocated section is shown here.

(2) This railcar for PUSRI, an Indonesian state fertilizer corporation was built to the specifications of Swan Wooster Engineering Co. Ltd. (Vancouver), a consulting firm of engineers and economists which specializes in planning of transport systems for moving dry bulk commodities.

(3) Functional planning for the open-cut, three-mile northern section of Toronto's newest rapid transit expansion was carried out by M. M. Dillon Limited (Toronto), a multi-discipline firm of consulting engineers and planners.

BEAUCHEMIN-BEATON-LAPOINTE INC.

Contact: W. H. Beaton, Chairman of the Board
1134 ouest, rue Ste-Catherine
Montréal (Québec) Canada
H3B 1H4
Tél: (514) 871-9555
Télex: 055-61161
Câble: BELCONS

Beauchemin-Beaton-Lapointe is a comprehensive consulting engineering firm, one of whose main fields of activity and specialization is transportation. During the past two years it has undertaken transportation studies in Chile, Colombia, Peru, Bolivia, Ecuador, Venezuela, Saudi Arabia and Oman.

With a permanent staff of 75 professional engineers, economists, sociologists, architects, planners, landscape architects, environmental and project management

specialists, the company can undertake all aspects of ground transportation projects — planning, demand forecasts, feasibility studies, preliminary and detailed design, surveying and mapping. Its project management services include cost control, scheduling, programming, construction management. Multidisciplinary consulting services cover corridor selection, environmental impact, etc. Engineering design services provide right-of-way designs, bridges, culverts and miscellaneous structures.

CANAC CONSULTANTS LTD./LTÉE

Contact: L. R. Eggenhofer, Director, Technical Services
C.P. 8100
Montréal (Québec) Canada
H3C 3N4
Tél: (514) 877-5741
Télex: 055-60753
Câble: CONDIV

CANAC is in the business of identifying problems related to the movement of people, goods or ideas, and arranging for their solution through provision of advisory, management, engineering or operational skills. It has carried out assignments under conditions ranging from tropical rain forest to sub-Arctic tundra and has covered the major aspects of surface and air transportation modes.

Services offered by CANAC include management contracts, market and economic surveys, route reconnaissance, location and construction supervision, operations and management studies, management and technical training and development programs, motive power and rolling stock evaluation, intermodal systems studies.

CANAC Consultants Ltd./Ltée is a wholly-owned subsidiary of Canadian National Railways whose growing involvement in the provision of transportation know-how led to the incorporation of CANAC, and whose resources, as well as those of Air Canada, can be called on by the consulting firm for projects it undertakes.

CANAC will provide technical, economic, management and personnel development services for the implementation or improvement of large or small transportation operations.

CANADIAN PACIFIC CONSULTING SERVICES LTD. (CPCS)

Contact: J.-D. Bélisle, Vice-President, Business Development
Gare Windsor, Pièce 171
Montréal (Québec) Canada
H3C 3E4
Tél: (514) 861-6811
Télex: 055-60147

Canadian Pacific Consulting Services Ltd. is a broadly-based transportation management and economic consulting organization. As an active member of the Canadian Pacific group of companies, CPCS has access to the services of experienced transportation managers, marketing experts, engineers, technicians and economists. Drawing on this pool of expertise, the company can plan, advise, train and produce results in almost any sphere of land, sea and air transportation, telecommunications, hotels, real estate and resource development.

In the rail transportation field, CPCS can advise on management and methods that will improve the efficiency of railway systems. The company will undertake economic, technical and operational feasibility studies; marketing, cost and tariff development and implementation; specifications, purchasing and inspection; information processing and management information systems; technical assistance and training.

CPCS will study a system's equipment requirements and make recommendations for planning and construction of maintenance and repair facilities. It will examine fixed plant, alignment, gradient and track conditions, and analyze proposed changes and improvements through computer simulations. The company has expert knowledge of signalling, control, communication and automated systems, and will train personnel.

International rail transport clients of CPCS have included governments, national railroads and companies in Africa — Tunisia, Congo, Togo, Nigeria, Egypt, Mozambique, East Africa, Cameroon, South Africa; in Latin America — Honduras, Venezuela, Panama, Brazil, Peru, Nicaragua; in Asia — Malaysia, Turkey, Thailand, Bangladesh, Indonesia, Sri Lanka, Republic of Korea; and in Australia. In some cases, CPCS's services were retained by the African Development Bank, the Asian Development Bank, the World Bank, the United Nations Development Program, the Canadian International Development Corpora-

tion, the Commonwealth Secretariat for technical assistance, governments and private companies.

The variety of projects undertaken by Canadian Pacific Consulting Services in these countries include studies, reconnaissance mission, assessments, examination and recommendations for replacement of locomotives, improved operating methods, purchase of rolling stock, new railway line and replacement of line, signalling and communications, engineering, improved volume carryings, cause and prevention of damage to rails, dieselization program, marketing, economies, and commercial policies.

CPCS also introduced a costing system, designed a container system, supervised reconstruction of railway line, trained staff, devised and supervised efficient rail car repair shop procedures, developed and constructed a System Operating Model to increase line capacity at a mine.

CANATRANS LTD.

Contact: Benoit G. Côté, President
1130 ouest, rue Sherbrooke
Montréal (Québec) Canada
H3A 2R5
Tél: (514) 288-3750
Télex: 055-61250
Câble: LAVALIN

CANATRANS is a Canadian consulting firm which specializes in guided ground transport systems. Its expertise is drawn from three leading engineering companies — the LAVALIN Group, the Shawinigan Engineering Company Limited and the SNC Group.

Its areas of expertise include transportation planning, urban development, engineering design, architecture, economics, environment, ecology and project management. It provides a full range of services for clients including feasibility studies, transport impact analysis, capacity and performance, planning for methods of operation, topographic surveys, land use studies, alignment and station location, station layout and access, signals and automation, rolling stock identification and commissioning and testing as well as structural design.

Among many overseas projects CANATRANS completed a study on rail traction equipment and a rail spur of 15 km (7.3 miles) with bridges and marshalling yards for Algeria, and planned and organized a ten-year railway investment program for Honduras.

Within Canada, CANATRANS has planned, designed and supervised the construction of a station for the Montreal Metro, recommended electrifying 700 km (435 miles) of railway line, integrated port and rail development, designed the track and electrification system for Expo 67, and completed a preliminary engineering design of a rapid rail system between Montreal and Mirabel Airport.

COLE, SHERMAN & ASSOCIATES LIMITED

Contact: D. E. C. Wicks, Vice-President
2025 Sheppard Avenue East
Willowdale, Ontario, Canada
M2J 1W3
Tel: (416) 491-4503
Telex: 06966647
Cable: COLESHERMN, TOR

Serving a variety of railway companies and operating authorities for more than 20 years, this independent Canadian company has developed extensive and unique experience in the planning and design of railway facilities.

Typical projects undertaken by Cole, Sherman & Associates Limited include the provision of total engineering services for the planning, design and implementation of

diesel repair shops, spot car repair, passenger car repair and freight car repair facilities, passenger train servicing, customer service centres, yard operations, track layout, modern signalling systems, maintenance-of-way facilities, road-to-rail transshipment terminals, commuter rail repair and servicing facilities, ancillary workshops, stores and crew centres.

The company has managers, engineers and technicians in all major engineering disciplines who specialize in the particular requirements of railway-oriented projects. These specialists vary from industrial engineers and analysts engaged in the study of existing operations and the preparation of reports concerning modernization or improvement to designers and technicians providing

detailed plans varying from high speed indoor locomotive fuelling installations to track layout.

Cole, Sherman provides assistance both for projects that require individual specialists giving advice in a specific area and for those that call for a complete team for total execution from inception to operation.

DELCANDA INTERNATIONAL LTD.

Contact: E. R. Bennett, President
P.O. Box 8004
Billings Bridge Plaza
Ottawa, Ontario, Canada
K1G 3H6
Tel: (613) 733-9220
Telex: 053-4152
Cable: DELCAN

Delcanda International Ltd. is the overseas operation of DeLeuw Cather, Canada Ltd., a firm of consulting engineers and planners incorporated in 1953 and wholly owned by its Canadian employees. Delcanda offers a complete range of consulting services in the fields of transportation, housing and municipal works. Services have been provided to clients on an international basis since 1963 in more than 20 countries in Europe, Africa, South America and Asia. Clients included government and private agencies and major international lending agencies such as the World Bank, the Inter-American Development Bank, and the Canadian International Development Agency.

For railway projects the company provides research, planning and design, and its experience includes projects dealing exclusively with rail freight or passenger facilities as well as comprehensive assignments involving the co-ordination of railway and other modes of transportation with land-use development plans. The scope of the railway consulting services provided by Delcanda is outlined below:

Railway Location and Construction — Current railway development calls for new rail lines to be located and built to develop natural resources, to improve the capacity and operating efficiency of existing rail routes or to replace existing rail routes which have an adverse effect on urban development. Delcanda's experienced staff deals with the engineering, environmental, economic and operational aspects of route evaluation and selection as well as the design and construction of the new rail facilities.

Railway-Highway Grade Crossings and Separations — The company is fully qualified to assist municipalities in

carrying out an inventory of railway-roadway protection needs, developing crossing protection and grade separation priority programs, estimating cost sharing and preparing requests for financial assistance from senior levels of government. Design and construction supervision are also provided for the road, rail and structural works required.

Railway Relocation and Consolidation — Delcanda has carried out numerous studies and evaluations of the costs and benefits of railway relocation and consolidation projects. These projects have reduced the impact of rail lines on urban development, created opportunities for redevelopment and reduced conflicts between road and rail traffic.

Commuter Rail Services — Abandoned or underutilized railway tracks or rights-of-way can be a major asset in solving transportation problems in large communities. Their use reduces the problems of property acquisition and environmental disturbance, as Delcanda has proved in numerous commuter rail and rapid transit projects. Design services are also provided for commuter rail yard and station facilities.

Inventory and Upgrading of Existing Rail Facilities — Delcanda carries out independent evaluations and appraisals of the condition and value of rail facilities in accordance with railway accounting practices and as required by regulatory agencies. The firm also prepares improvement programs for reduction of curvature or grades and upgrading track structure to carry increased traffic at higher speeds.

M. M. DILLON LIMITED

Contact: J. J. Heffernan, Vice-President
P.O. Box 219
Toronto, Ontario, Canada
M4P 2G5
Tel: (416) 482-5656
Telex: 064-7540
Cable: DILLENG, TORONTO

A multi-discipline firm of consulting engineers and planners, M. M. Dillon Limited was incorporated more than 30 years ago and is entirely owned by its Canadian employees.

Among the company's services are the planning, design, general administration of construction, and project management of railway and rail transit facilities. In addition to the design of railway structures and trackage associated with structures, it has in the course of transportation planning completed railway relocation or rationalization studies for three Canadian cities.

The functional planning for the open cut, three-mile northern section of Toronto's newest rapid transit extension, the Spadina line, was carried out by M. M. Dillon. Subsequently, the firm provided civil engineering design

and construction administration services to the Toronto Transit Commission for a portion of the open cut and cut and cover tunnel, including a station.

Current projects (in consortium) include mass transit studies for three major Canadian cities, all three involving the light rail transit option.

During 1964-1967, M. M. Dillon provided complete project management for the heavy rail mass transit system for Expo 67 in Montreal, as well as the design of four stations. This 3.5 mile double track system was the first automated rail passenger system in the western hemisphere.

From its offices in Birmingham, Bristol and London, the firm's affiliate, Transportation Planning Associates, offers similar services in Britain and abroad.

N. D. LEA & ASSOCIATES LTD.

Contact: F. Weber, Vice-President, Overseas
1455 West Georgia Street
Vancouver, British Columbia, Canada
V6G 2T3
Tel: (604) 685-9381
Telex: 04-55144
Cable: LEACONSULT, VANCOUVER

N. D. Lea & Associates Ltd. is a Canadian firm of transportation engineers, economists and planners wholly owned by its principals and associates. An associated firm, N. D. Lea & Associates Inc., serves the United States with an office in Huntsville, Alabama. Overseas project offices are established as required, such as those operating at present in New Guinea, Nepal, Nigeria, Thailand and Trinidad. Approximately half of the company's work is done in Canada and half overseas.

With a high degree of specialization in the key disciplines of transportation and with key staff with extensive experience, N. D. Lea provides a full range of competent professional services from policy development, feasibility and planning through design and construction to operations and maintenance.

Consulting services provided for the rail sector include:

Policy — analyses of economic and financial costs and benefits to shippers, operators and governments of various transport policies, including rate structures, transport regulations, intermodal competition, abandonment or phasing out of lines or services.

Traffic and Forecasts — analysis of present use of rail transport by commodity groups and by origin and destination; forecast of future demand for rail transport, including possible elasticities with respect to price and service and competing modes; market trends as they affect rolling stock, handling equipment and packaging characteristics.

Operations — analyses with regard to cost, routing, time and service of passenger services, bulk and general freight services, express services, container operations, intermodal transfer and handling operations, road feeder services, unit train operations, piggy-back operations.

Fixed Installations — planning, design, construction supervision and maintenance of track, bridges, freight yards, passenger terminals, signal and telecommunications systems.

Rolling Stock — analyses with regard to cost, utility and utilization and advice on the selection of motive power units, passenger equipment, freight cars.

Administration — analyses of organization and administration structures, personnel and financial operations.

MCCORMICK, RANKIN & ASSOCIATES LIMITED

Contact: R. D. Nairn
60 Briarwood Avenue
Mississauga, Ontario, Canada
L5G 2N6
Tel: (416) 274-3477

Established in 1957, this wholly owned Canadian consulting engineering firm specializes in the transportation field with emphasis on highways, railways and transit. During the last 20 years, McCormick, Rankin & Associates has carried out the planning, design and construction management of more than 900 projects.

Civil engineering disciplines that the company can provide include route location, feasibility and environmental studies related to transportation facilities; hydrology studies; soils engineering (field investigations and preparation of design reports); highway design; structural design (culverts, highway bridges, railway bridges, retaining walls, transit stations); traffic engineering; transportation needs studies; construction management.

McCormick, Rankin has carried out the design of approximately 20 railway grade separation projects, some

directly for the railways, including a unique curved railway span.

Some of the firm's larger projects include:

Feasibility study of the Queen Elizabeth Way-Burlington Bay Skyway Corridor for the Ontario Ministry of Transportation and Communications (\$150 million project).

Functional planning of the Eastern Parkway in Ottawa, Ontario for the National Capital Commission (\$16 million project).

Detailed design of the internal road system at the Toronto International Airport for the Federal Ministry of Transport (\$20 million project).

Detailed design of Penn Central Railway grade separation structures for the Federal St. Lawrence Seaway Authority.

PENVIDIC CONTRACTING (1971) LIMITED

Contact: Brent L. Penvidic, President
864 Drury Lane
P.O. Box 130
Burlington, Ontario, Canada
L7R 3X8
Tel: (416) 632-5890

Construction of railway trackage has been Penvidic Contracting's primary activity since the company's incorporation in 1947. Its clients are drawn from both government and the private sector.

Penvidic has become the largest and most experienced railroad construction company in Canada, offering a complete service that includes design, procurement of

track structure materials and rolling stock and construction. Its modern equipment and experienced personnel can provide efficient performance on any size of railroad building project.

The company is seeking opportunities to expand its operations offshore.

H. A. SIMONS (INTERNATIONAL) LTD.

Contact: T. A. Simons, President
425 Carrall Street
Vancouver, British Columbia, Canada
V6B 2J6
Tel: (604) 685-3411

Simons is a major international engineering firm involved in resource development and general engineering projects, serving clients around the world from its main office in Vancouver.

The firm provides the full range of management and engineering services and undertakes assignments ranging from initial studies through feasibility analysis, design development, detail engineering, project management (including estimating, scheduling, procurement, budget and cost control, and construction management).

The Simons approach has been developed to meet client needs in the most efficient manner and to provide the client with the maximum control of his project.

Simons past experience in railroad engineering has been extensive and it has undertaken numerous projects which have generally included the following work:

- Assessments: of capital and operational cost of railway systems as opposed to other means of transportation; of tractive effort; of necessary rolling stock.

- Time and motion studies of industrial railway systems.
- Planning and design of trackage, roadbed, specialized railcar handling, loading and off-loading equipment, weigh station for uncoupled or couples weighing in motion, signalling and control equipment, road-railway intersections.
- Liaison: with railway companies to obtain approval of railway systems, for agreements for plant shunting, rental of track, construction of track; with railway commissions for industrial company to obtain charter as an operating railway; with both railway companies and commissions to obtain approval of operational standards.
- Specifications of materials and equipment and purchase of same.
- Preparation of contracts for construction of railways.
- Construction supervision of installation.

Some of the major projects Simons has undertaken outside Canada are listed below:

UNITED STATES

Maine Central Railroad — industrial railway systems for two-stage project; design and construction of mainline track, at Androscoggin, Maine.

South Pacific Railway — industrial railway system, at Sheldon, Texas

Illinois Central Railroad — industrial railway, at Wickliffe, Kentucky.

Delaware and Hudson Railroad — industrial railway system, approach railway to plant, studies, at Ticonderoga, New York.

Soo Line — studies of alternate industrial railways, studies of mainline railway to plant, in Upper Michigan.

POLAND

Polish National Railway (BPK) — design and project management of major rail terminus; coal, wood, pulp and paper, 24 km of rail, all materials storage and handling, at Kwidzyn, Poland.

BRAZIL

Brasilian Railway System — appraisal of railway capacity and plans for extension and industrial rail facilities, at Joinville, Brazil.

Independent rail system — conceptual design of locomotives and car repair facility, commodity transfer ship to rail, marshalling yards, at Monguba, Brazil.

PERU

Peruvian Railways — railway station facilities and commodity transfer facility, value \$2 million, related to 85 km rail extension, near Yauri, Peru.

ECUADOR

Ecuadorian Railways — evaluation of alternative rail yards and related materials handling, at Esmeraldas, Ecuador.

KOREA

Korean Railways — marshalling yards and facility for major industrial import-export activity, at Onsan, Korea.

SWAN WOOSTER ENGINEERING CO. LTD.

Contact: H. A. Mann, Vice-President, International
1525 Robson Street
Vancouver, British Columbia, Canada
V6G 1C5
Tel: (604) 684-2351
Telex: 04-51275
Cable: SWANCO

Swan Wooster Engineering is a Canadian consulting firm of professional engineers and economists specializing in the planning of transport systems for the movement of dry bulk commodities such as coal, iron ore, potash, sulphur, urea, salt, cement, rock, metal concentrates and bulk food grains. This planning covers the complete system including train loading at source, rail route selection, train design, port site selection and port terminal design.

In addition, the company carries out detailed design of the individual components of the system such as the railway grade (if new railway links are required), the terminal yard trackage, the loading and unloading system, the terminal storage yard or storage buildings and the complex shiploading mechanisms for loading bulk cargo into ships.

Projects have also included the selection of rail cars for

dry bulk haulage, and the preparation of rail car specifications for international tenders.

A specialty of the company is the design of port terminals for receiving bulk commodity unit trains and the automatic rotary dumping of entire trainloads at rates up to 7,000 tons per hour. The company has also specialized in the custom design of quadrant shiploaders for the loading of ships as large as 300,000 deadweight tons at rates up to 16,000 tons per hour.

Swan Wooster is particularly well qualified to provide an objective evaluation of the feasibility of rail transport proposals because it is a totally independent consulting firm that has no connection with suppliers or manufacturers. For the purchase of recommended railway or terminal equipment, plans for technical specifications are prepared for competitive bidding to ensure the best performance and price to the purchaser.

TECSULT INTERNATIONAL LIMITÉE

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Télex: 055-60122
Câble: SULTEC

Tecult International Limitée (TIL) was formed in 1962 as the international arm of Asselin, Benoit, Boucher, Ducharme, Lapointe Inc. (ABB DL), a leading Canadian consulting engineering firm.

This group now employs more than 500 — engineers, technicians, draftsmen, economists, managers — and has undertaken projects in Argentina, Botswana, Brazil, Congo, Ivory Coast, the United States, Guinea, Mexico, Pakistan, Portugal, Rwanda, Sierra Leone, Tunisia, Venezuela.

The multi-discipline staff of engineers and specialists is trained and experienced in all aspects of engineering,

economics, administration, financing and data processing. The company can provide not only technical and feasibility studies, estimates, plans and specifications, management and work supervision, but also economic, profitability and market studies, and financial analysis with the help of various computer programs.

Projects undertaken by ABB DL since its founding in 1961 and by TIL have been in the fields of hydro-electric developments, electrical transmission and distribution; nuclear and thermal power plants, transportation (roads, railways, harbour and airport installations), project management, industrial plants and municipal engineering.

COMPONENTS



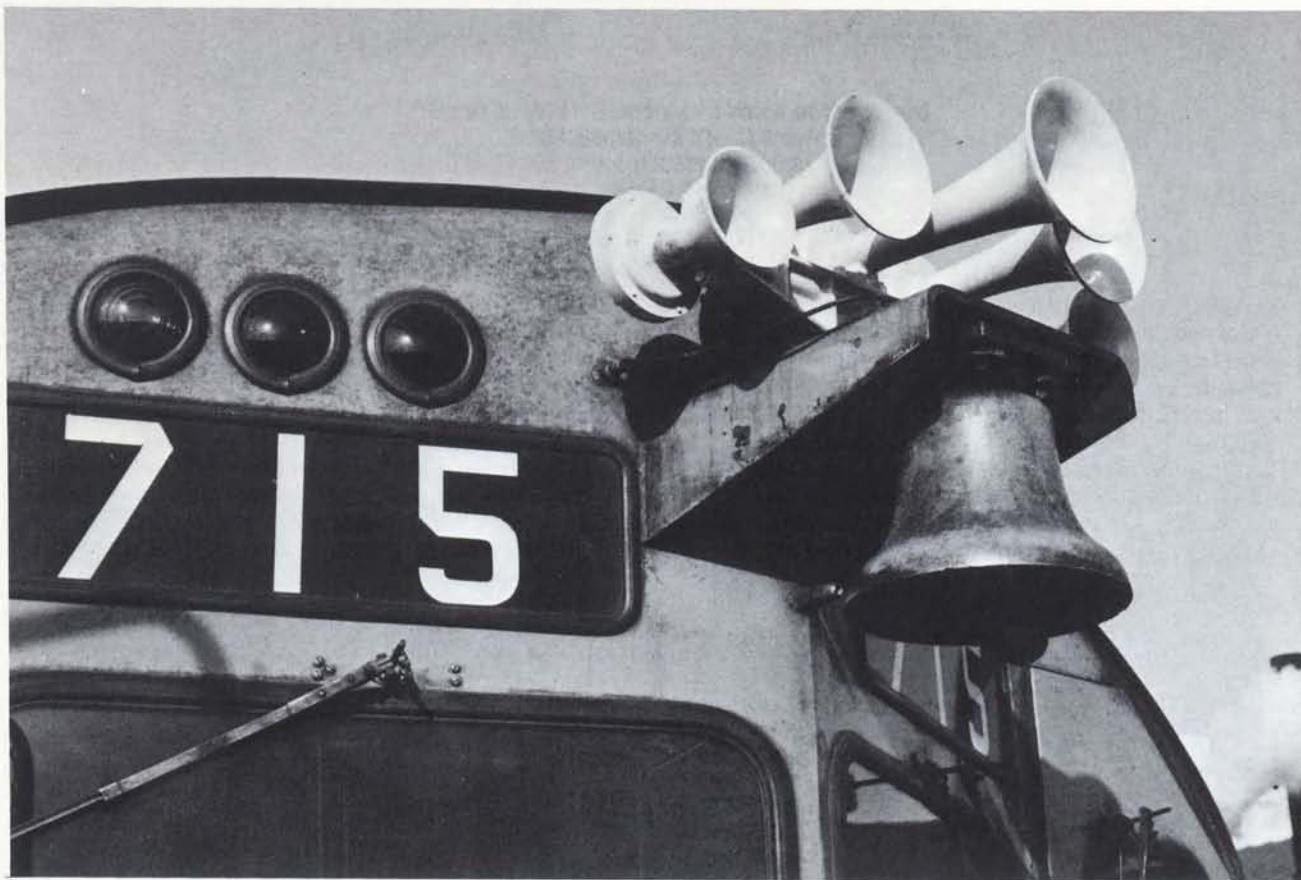
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(1) A central emergency lighting system from Chloride Systems (Canada) Limited (Montréal) which manufactures all types of battery powered lighting equipment.

(2) Simmonds Precision Canada Limited makes the rugged D6 liquid contents gauge for fuel tanks fully automatic, easy to install, and leakproof up to 15 psi operating pressure.

(3) Galt Equipment Limited (Candiac, Québec) has shipped 20 of its Thermatrol CR3000DE diesel refrigerator units to Zambia. Integral or clip-on, the reefers do not intrude into the container cargo space.

(4) First air horn to effectively copy the old steam train whistle — a modular unit of five horns on a single base — was developed by Airchime Manufacturing Company Limited (Burnaby, British Columbia).

(5) A full range of solid journal bearings are manufactured to AAR specifications, in steeple back or positive control flat back configurations, at Canadian Bronze Company Limited's automatic foundry in Winnipeg.

ABEX INDUSTRIES LTD.

Contact: E. R. Ambrose, Director, Export Department
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C.P. 370
Joliette (Québec) Canada
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Tél: (514) 756-4531

Production of trackwork for Canadian railroads was begun in 1906 by Abex Industries Ltd. in Niagara Falls, Ontario. Later the company added manufacture of brake shoes and other components for railroads. Today, the Niagara Falls plant makes and sells in domestic and many export markets these railroad products:

- Trackwork and trackwork specialties — switches, frogs, guard rails, closure rail complete turnouts, switch stands, connecting rods, crossings of all types, double slip switches, switch point guards, inert and hydraulically opened retarders and rail expansion joints, and special trackwork for subways, docks, etc.

- Brake shoes and lockeyes — regular iron; Samson high phosphorus iron brake shoes; high friction composition brake shoes and lockeyes.
- Flame hardened roller bearing adapters.
- Manganese steel car centre plates and coupler carrier wear plates.

Abex's foundries in Selkirk, Manitoba, and Joliette, Quebec, provide manganese steel, heat-resistant alloy castings, general service castings and a variety of castings for mining.

AIRCHIME MANUFACTURING COMPANY LIMITED

Contact: G. W. Piercy, President
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The first air horn to effectively copy the sound of the old steam train whistle was developed by Bob Swanson in 1948 for Airchime Manufacturing Company Limited. First step was the realization that the steam whistle sound be equated to that of a C# diminished musical chord. From there, Airchime proceeded by tuning five horns on a single base.

Today's horn has been refined, although it is still five horns on a single base, so that it doesn't need any tuning and cannot go out of adjustment. Using five bells of graduating length, the unit is designed so that any combination of bells will give musical balance. The whistle unit is now a modular unit. With different bases the company can make single, dual, three, four and five tones to suit the many industrial applications for these horns.

Railways mainly use the multi-tone (K5), three tone (K123) and dual tone (K12). All three give the required sound; the K5 is the original and best, the other two follow closely.

The horns are constructed of rugged cast aluminum with stainless steel diaphragms and fasteners. They feature a three-piece hermetically sealed diaphragm assembly that is in balance with all bell frequencies and therefore is common to all models, and that helps to eliminate undesirable harmonics and increases purity of tone. The diaphragms are stress-relieved to give exceptionally long life, and the horns are low in air consumption but high in sound intensity.

Airchime makes air horns for every conceivable application from mine shaft safety whistles to large 10 hp. piston horns for supertankers. The company has exported to many countries and can meet stringent local requirements (such as those of the United States Navy), and provide fast efficient service.

In addition to design and manufacture, Airchime provides a complete service which includes recommended spares, field support data, installation techniques and specialty engineering for unusual applications.

BG CHECO ENGINEERING LIMITED

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More than ten years work in the rail transit field in Canada and overseas has developed the expertise that BG Checo Engineering Limited offers in the design, supply and installation of wayside and cab signalling, automatic train stops, passenger control and fare collection and power supply systems.

Equipment and systems designed by the company's Transtec Section and manufactured by its subsidiaries Bédard Girard Industries Limited/Limitée and Automatec Inc. are:

- Automatic train control (cab-signal/ATP/ATO) — modular system permitting implementation in stages from cab-signal to automatic train protection then automatic train operation with programmed stopping; schedule regulation; door-opening controls; brake assurance; other features added as required.
- Traction electrification — AC or DC, third rail or catenary, any voltage; rectifier equipment; switchgear and protection.
- Passenger services — ticket printing, issuing and reading equipment; turnstiles with ticket, coin and token accepters; passenger information systems.
- Supervision systems and DTS — centralized train control and traction power supervision systems and associated data transmission systems; annunciators.

- Lighting and inverters — inverter ballasts for vehicle lighting; self-contained fluorescent emergency lighting units, DC-DC converters, inverters.
- Control and display consoles, desks and boards.

BG Checo supervises installation and manages projects for its customers, and offers preventive maintenance, planned modifications and emergency repair services on a 24-hours a day basis.

Formed in 1974 by the merger of two long-established Canadian companies, Bédard Girard Limited/Limitée and Checo Engineering Limited, the company's main activities are electrical and electronic equipment. Outside Canada, BG Checo has performed construction work in or supplied equipment to Iran, Bangladesh, Guyana, Niger, Tunisia, Botswana and other countries.

It has undertaken many projects for metropolitan subway systems, including: for the Montreal Metro, the wayside colour-light signal system with automatic train stops; for the Mexico City and Santiago Metros, installation and commissioning of signal systems. At present, in joint venture with a French firm, BG Checo is carrying out a multi-million dollar contract to equip existing and new lines and cars of the Montreal Metro for automatic train operation.

BUFFALO BRAKE BEAM CO.

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Buffalo Brake Beam was a leader in the development of the steel truss type brake beam that replaced earlier types made of wood and suspended from the car body. Later the company originated and developed the unit brake beam system that is the standard today for freight cars in many areas of the world.

At its Hamilton plant, Buffalo Brake Beam produces No. 18 AAR and No. 24 AAR brake beams for rail freight cars and can meet any special metric or gauge size.

Production includes the unit solid truss brake beam, the original hangerless type, and the truslock beam, both with models for iron or composition shoes. Four different kinds of metal are used in the manufacture because there are four separate wear problems to be solved — one piece forged solid steel truss, steel wear plates heat treated and hardened for long usage, malleable brake heads, hardened steel bushing inserted at wear point in the malleable strut.

CANADIAN BRONZE COMPANY, LIMITED

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R3E 2X7
Tel: (204) 786-6821
Telex: 07-57225

A full range of solid journal bearings are manufactured to AAR specifications, both in steeple back and positive control flat back configurations, at Canadian Bronze Company's Winnipeg plant.

The company, dating back to before the turn of the century and the largest of its kind in Canada, is a subsidiary of CAE Industries Ltd., the Canadian owned and operated holding and management company. Its up-to-date automatic foundry has casting capacity of approximately 2,000,000 pounds (907,184 kg) a month.

While railway journal and support bearings are Canadian Bronze's primary product, the company is engaged in all types of non-ferrous production: one-off, job lot, or production line castings in a wide variety of weights. Despite its name, a substantial part of the company's production is in aluminum alloys. Motor support bearings are cast and machined to customer specifications and can be supplied with either a poured or electroplated liner.

CHLORIDE SYSTEMS (CANADA) LIMITED SYSTÈMES CHLORIDE (CANADA) LIMITÉE

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Chloride Systems (Canada) Limited manufactures all types of battery powered emergency lighting equipment. In addition to designing, engineering and manufacturing this equipment, the company can offer technical guidance and after sales service on a worldwide basis because of its close technical association with the other Chloride Group companies.

Chloride Systems emergency lighting units operate from standard (AC) current and provide lighting and standby power from the battery pack when the AC source fails. All units include batteries, chargers, transfers and distribution circuits in self-contained packages from 3.6V to 120V. DC and 120V-347V AC (incorporating inverters).

All charging equipment manufactured by Chloride Systems is of the highest quality and holds CSA electrical

approval. In addition, most of the emergency lighting unit systems 3.6V to 24V DC conform to CSA unit equipment standard C22.2 No. 141.

Batteries for this equipment are long life, sealed or vented nickel cadmium or lead. In most cases they are equipped with automatic chargers with transistorized circuitry that reduces the need for maintenance to little or none, depending on the model. The self-powered sealed models are guaranteed for 5 to 10 years, and their life expectancy is in excess of 10 years.

Chloride Systems (Canada) Limited has plants in Montreal and Toronto, a warehouse in Vancouver, and export facilities in Montreal. Recent sales include batteries to Bolivia and emergency lighting equipment to Denmark and Iran.

ESB CANADA LIMITED

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Cable: ESCAN

Delivering 25 per cent more power, without an increase in the nominal 8 amp-hr capacity, the new Exide-Ironclad diesel battery from ESB Canada Limited has never been matched for starting ability. This means:

- Longer starting time — this battery will keep a hard to start engine turning over for at least a 25 per cent longer period.

- Higher reserve for starting — even when partially discharged, the Exide Ironclad will have enough capacity to start the engine.
- Higher reserve for operating equipment — after the engine is started this battery still has ample reserve capacity for dependable operation of auxiliary equipment.

Significantly longer service can be expected from the new Exide model because it can start a diesel engine without deep discharging, and because of its basic tubular construction and patented corrosion-resistant grid alloy.

One of the unique characteristics of Exide-Ironclad batteries has always been the tubular construction of the positive plates, round in cross section. In the new battery the tubes are square, presenting a larger surface area to the electrolyte, containing a greater volume of positive active material, and thus providing 14 per cent more initial capacity.

ESB's new battery has two more advantages. Maintenance is reduced because the battery uses 54 per cent less water than flat plate batteries of equal capacity, the result of the thicker, stronger, heavier negative plates, beefed up to match the positives. The same compact size, the same exterior dimensions have been maintained: the new battery comes in just two capacity ratings, 420 and 280 amp-hr. The MS-420 fits into the same space as a 280 amp-hr flat plate battery, which means that Exide batteries can be used interchangeably in road locomotives and switchers.

ESB Canada Limited, incorporated in 1920, manufactures primary and secondary batteries for all types of commercial, military or space applications at seven plants throughout the country. ESB competes in world markets, and its products are included as original equipment in diesel locomotives and railway cars made and exported by Diesel Division, General Motors of Canada Limited, and MLW Industries, a division of MLW Worthington Limited.

FREDERICK ELECTRONICS CANADA LIMITED

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Télex: 05-825558

Products oriented to the telecommunications industry are researched, developed and manufactured by Frederick Electronics Canada Limited in its modern plant where highly developed testing techniques and quality control are applied.

At present, the company manufactures the Canadian-designed Universal Terminal Controllers, the Eltex switching systems, the VuSet CRT display terminal and the Plantronics Starset® headsets. Frederick Electronics Canada markets these and RF equipment, data equipment Telex Control Units/Auto-Dialer and message switching systems (Telecontroller). In addition, it designs and develops such systems to meet advanced and sophisticated telecommunications systems requirements.

The Canadian-design Model 7500 Universal Terminal Controller fulfills a longstanding need in the data communications industry for a single controller that is easily adapted to any of the many polling schemes currently in use on automatic polling systems. It provides line and terminal interfacing for practically all known interface requirements by selection of the applicable interface module, such as the EIA to EIA, EIA to high/low level, high/low level to EIA, etc. A total of three different interface modules provide for these configurations.

Model 1260101 Telex Control Unit enables various types of teleprinter equipment to interface to the telex network.

The basic unit contains a control unit, timebase circuits and power supply. Plug-in options available are a 20 character answerback, figures-D recognition, ten sequence autoselector/auto-dialer.

ELTEX telex/data switching system — used in more than 60 locations throughout the world — serves as a concentrator, local exchange, trunk transit exchange, international gateway, or any combination of these. The newest model, ELTEX III can handle up to 32,000 lines, or as few as 16.

The desk top VuSet data terminal uses the dial-up telephone network. The terminal connects directly to an existing push button telephone or available keyboard. The telephone serves to establish communications with the computer and then becomes the entry keyboard for data.

The Telecontroller is a programmable minicomputer based communications processor that controls a wide variety of data transmission rates, circuit characteristics, line conventions and terminals. The system directs the transmission and reception of data over dedicated and dial-up circuits. It operates in data collection, concentration and base inquiry application environments. And, as a front end, it provides for efficient interface to large-scale information processing centres.

GALT EQUIPMENT LIMITED

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Candiac (Québec) Canada
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Télex: 05-268633
Câble: GALTEQUIP MONTREAL

Specializing in design and manufacture of refrigeration and environmental control equipment, Galt Equipment Limited produces a varied line to meet the requirements of the transport and marine, food and fish, and petrochemical industries.

Galt's packaged Shell Ice-Maker produces a configuration and quality of ice ideally suited to icing rail cars carrying fresh produce. Shell-ice is clear, extremely solid and hard, cools faster and has greater lasting qualities. It can be bagged, or blown by hose, shovelled or conveyed, and it will not freeze or solidify into bulky lumps, even after storage. There is absolutely no hazard to personnel or products because Galt uses non-toxic Freon refrigerants. The ice-maker is available in a wide range of sizes capable of producing from 5 to 20 tons a day.

Containerization introduced a new concept in the transport scene. To meet the challenge of container environmental control, Galt's Thermotrol Division invented the cartridge unit that permits a standard container to act as a heater unit, a chilled fresh produce carrier, a dehumidified dry box for shipment of cargoes critically susceptible to condensation damage, or a simple mechanically ventilated unit.

Thermotrol cartridges are designed to slot into a tunnel constructed transversely at the front end of a container. Entry is from the right-hand side, the cartridge is equipped with low friction slides for easy handling, and is locked into the container by two lever-type latches mounted on the face plate. Powered either by diesel or electricity, all cartridges have identical dimensions and therefore are interchangeable between containers.

Galt's Cr 3000 DE integral or clip-on container refrigeration unit does not intrude into the container cargo space: available cargo volume is some 8 per cent greater than with conventional units.

The company's Thermotrol CO₂ clip-on unit provides carbon dioxide refrigeration to sustain frozen loads in containers detached from a central (shipboard) system. These units provide reliability with low initial investment and minimal operating costs. An original Galt Equipment development, the prototype unit was extensively tested in the field and at Canada's National Cold Research Laboratory.

The Thermotrol CO₂ clip-on features a pneumatic control system (no electric power necessary) which uses the natural pressure of the dry CO₂ vapour always present within the storage tank. Temperature set point is readily adjustable and thermostatically controlled. Maintenance of container temperature is precise, the injected CO₂ in the form of a mixed, high velocity gas and fine particle dry ice snow, readily spans the full container length. The clip-on structure and support system is designed to survive a 15 G impact.

With side-inserted and end-mounted cartridges for 6 or 12 metre (20 or 40 foot) insulated containers, the Thermotrol division's production meets both national and international requirements. Galt now offers complete package deals with insulated containers and refrigeration plants. All equipment is produced to such standards as MIL, Lloyd's, ABS, CSA, and others, and fully qualified field supervisory and service staffs are available.

GLENAYRE ELECTRONICS LTD.

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Telex: 04-352520

Glenayre, a Canadian-owned company, has developed a vehicle location, identification, control system (LICS) with particular application to fixed route systems such as railroads and subways, and also to buses and trucks.

First field installation was in 1972 over the 150-mile Squamish Sub-Division of the British Columbia Railway, which covers areas with temperatures ranging between -40 and +50 degrees C and proved the success of the LICS. By providing Central dispatch with mile-by-mile location and identification of locomotives on a real-time basis, track usage can be increased almost 300 per cent with improved safety margins in some instances.

The system is based on passive transponders placed every mile along the main track and at siding switches.

The transponder is a hermetically sealed, unpowered unit which is mounted on the tie midway between the rails and is powered by inductive coupling with the interrogator mounted underneath the road engine unit. When powered, the transponder transmits its unique identification to the interrogator coil which accepts the information for further processing. Glenayre has developed a unique method of secure inductive coupling (U.S. patents granted) that has a broad application in vehicle identification and control.

A locomotive control unit (LCU) processes the data, adds engine number and status and transmits all data to a nearby Microwave Site Unit (MSU) which accepts and stores up to five such messages. At Central Control, the

Microwave Interrogator Unit (MIU) polls each site in turn and presents the collected messages to a Nova 1210 computer for interpretation. The computer checks the validity of each message and displays train location and identification on a large mimic track diagram. A CRT is used for additional information about train status and progression.

To realize the full benefits of train location and identification it is necessary to provide a data communications link from the central dispatcher to the engineman operating the train. Glenayre has continued to enlarge the capabilities of its LICS, and is now completing installation of phase II on the Squamish Sub-Division line. This incorporates in-cab signalling, remote braking and a full set of operating rules into the existing phase I system.

Phase III now being developed will include evaluation of the operational experience gained during phase II, plus incorporation of three major features — end-of-train indication, power switching by radio control and colour CRT graphics at the dispatcher's console.

Among other products, Glenayre also produces a range of lightweight locomotive DC-DC converters designed for service on railroad rolling stock. They supply a well regulated 13.6 VDC from the 72 VDC (24V or 36V) supply to power mobile radios and all other electronic equipment. The clean DC output is suitable for driving sensitive electronic accessories.

HAWKER SIDDELEY CANADA LTD. CANADIAN STEEL WHEEL DIVISION

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Câble: STEELWHEEL

Canada's only manufacturer of wrought steel railway wheels, Canadian Steel Wheel Division of Hawker Siddeley Canada Ltd. produces forged and rolled steel wheels for all types of railway rolling stock and motive power equipment.

Wheel production can reach 160,000 units a year at a rate of more than one per minute at the company's highly automated plant. The operation is completely integrated from steel making in electric arc furnaces to forging and rolling, heat treating, machining, inspection and testing.

Only high carbon steel ingots of forging quality are used in the manufacture of Canadian Steel Wheel's wrought steel railway wheels. At the first stage in this automated process, each ingot is broken into three or four blocks, which are continuously charged into a furnace rotating through six controlled temperature zones.

When ready for forging, the block goes under a 6,000-ton press which forms the hub and part of the plate of the wheel. The forged blank is transferred to a 1,000-ton punch press and then to the rolling mill. An electronically controlled 1,500 hp horizontal-type wheel rolling mill expands the wheel rim to the required size and at the

same time forms the tread and flange profile. The rolled wheel is then dished in a 3,000-ton press and charged directly into the heat treating furnace. These hot-working operations, all carried out in the space of a few minutes, are used to develop a dense homogeneous steel structure which improves toughness and ensures optimum performance under the most severe conditions.

Three heat treating furnaces provide controlled cooling and rim quenching and tempering. The rim quenching operation is carried out with automatically sequenced radio controlled equipment. The process is closely regulated and monitored with closed circuit television.

Next, the wheels are machined to the dimensions and tolerances required; many of the machine tools used were specially designed to handle this tough material. All railway wheels are finish machined on the tread, flange, rim and hub faces and rough bored. Many plates are also machined before the wheels are shot peened as required by Association of American Railroads specifications.

Finally Canadian Steel Wheel Division inspects wheels visually, dimensionally, and with Magnaglo and ultrasonic equipment.

HAWKER SIDDELEY CANADA LTD. TRENTON WORKS DIVISION

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Cable: HAWSIDTREN

Trenton Works is the only plant in Canada making axles for railway equipment. Using special forging, heat treatment, and automatic machining equipment, the company is capable of production of approximately 40,000 units per year. Railway axles are supplied to customer specifications, either rough machined, semi-finished, finish machined, or as wheel and axle assemblies.

In addition to the railway axle forging operations, Trenton Works has furnaces and other equipment necessary to produce open die forgings ranging in weight from a few pounds to 40 tons or more. The 7,000-ton capacity hydraulic forging press is serviced by its own 75-ton manipulator. Extensive machine shop facilities enable the company to rough machine or completely finish its forgings.

Railway car specialties and components manufactured and sold as separate components are:

'Equipo' load dividers	Car body ladder rungs and grabs
Pressed steel ends	Uncoupling rods
Pressed steel roofs	'Creco' brake beams
Freight car trucks	Hopper gates
Coupler Yokes	Miscellaneous car parts
Wheel and axle assemblies	Roof hatch covers
'Superior' car doors	Spring planks and plates
'Freightmaster' end-of-car cushioning devices	Air dump car parts
Coupler draft keys	

THE HEADHUNTERS (DIESEL HEADS) LTD.

Contact: Terry Dewhurst, General Manager
16720 - 110 Avenue
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Tel: (403) 484-5521
Telex: 037-3907

Remanufactured diesel cylinder heads for locomotives, tractors and earthmoving equipment are the principal product of this all-Canadian company with 20 years experience in the repair of iron castings. The cylinder heads are chiefly for engines manufactured by Caterpillar, Alco, General Motors, Cooper-Bessemer, Ingersoll-Rand, Clark, Werkspoor, Waukesha, White-Superior, and International Harvester. However, The Headhunters' remanufactured cylinder heads are used for almost every type of diesel and natural gas engine available.

The remanufacturing process can incorporate both fusion welding and cold welding methods. When the basic repairs are completed, the cylinder head is machined to meet the manufacturer's specifications. New parts, such as valve seats, valve guides, water directors, frost plugs, etc., are installed and then tested and inspected to confirm that they meet the manufacturer's specifications.

The coolant chambers of the final product are pressure tested to values equivalent to a minimum of three times normal operating pressures.

The cost and the warranty are the principal benefits of the remanufactured cylinder heads — they sell at approximately 60 per cent of the price of new heads; the warranty period is six months, equalling or bettering most manufacturer's warranty periods.

The Headhunters (Diesel Heads) Ltd.'s other services include complete rebuilding and repair of all types of engine blocks; grinding, polishing and repair of diesel engine crank shafts; in shop or on site repair of any type or size of iron casting — the company's chain lock repair is the fast, economical and permanent way to put equipment back into production; hard chrome plating of hydraulic rams, pins, arbors, chipper plates.

MOTOR COILS MFG. CO. LTD.

Contact: Jim McDonald, President
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Tél: (514) 487-7430
Câble: MAC SUPPLY

Motor Coils Mfg. Co. Ltd. has been involved in the repair and remanufacture of diesel electric traction motors and generators for 20 years. The company's facilities are primarily geared to service General Motors and Alco diesel equipment. Work on diesel engine components has been done for customers in Australia, the United States, Latin America and Pakistan.

Motor Coils Mfg. Co. manufactures generator and armature rewind kits for railways and railway service shops as well as offering rewinding services at its own plant. The company has experience in all phases of the remanufacture of rotating electrical equipment. Traction motor field coils are repaired, upgraded or manufactured new in Motor Coils' plant.

The company offers either "epoxi-mica" or "Kapton-varnish" insulation systems.

Motor Coils' remanufactured rotating equipment, when properly maintained, has demonstrated outstanding operating characteristics in even the worst oil, water or heat affected environments. The implementation of the most modern insulation materials enables the company to manufacture armature and field coils with as much copper content as physical space will permit. Vacuum/Pressure impregnation virtually eliminates the possibility of electrical failures due to carbon contamination and at the same time considerably increases the mechanical integrity of the remanufactured unit.

All the work that leaves Motor Coils Mfg. Co.'s plant is fully tested to ensure that each unit meets all industry mechanical and electrical standards and specifications. All new and upgraded equipment is fully warranted.

NTN BEARING-CAE LTD.

Contact: B. R. Murphy, President
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Tel: (416) 826-5500
Telex: 06-97597

NTN Bearing-CAE Ltd. is the only Canadian manufacturer of railway journal roller bearings. This joint venture company was established in 1973 by NTN Toyo Bearing Co. Ltd., Osaka, Japan, and CAE Industries Ltd., Toronto, Canada, to manufacture precision industrial ball bearings and railway journal roller bearings.

At NTN-CAE the emphasis is on quality and reliability, competitive prices, on-time delivery and continuous after-sales support. Journal roller bearings, for outboard or inboard application, are designed to comply with the rigid standards set by the Association of American Railroads for use on cars in interchange service, and are AAR approved.

While the bearings manufactured at NTN-CAE are designed to meet North American standards, a number of other countries use the same or similar standards, e.g., Africa, Australia, Latin America. These bearings are used on various types of freight cars, cabooses, passenger/transit cars, and to a lesser degree in industrial applications such as steel mills.

The following sizes of journal roller bearings are now being produced at NTN-CAE:

Class	Journal Size	Bearing Capacity Dynamic	Bore Size	OD Size
	inch	lb. (kg)	inch +.0010 -.0000	inch +.0050 -.0000
B	4 1/4 x 8	67,500 (30,645)	4	6 8/16
C	5 x 9	108,000 (49,000)	4 11/16	7 11/16
D	5 1/2 x 10	110,000 (50,000)	5.1870	8 3/16
E	6 x 11	123,000 (55,842)	5.6870	8 11/16
F	6 1/2 x 12	161,000 (73,000)	6.1870	9 15/16

Life expectancy depends on application. For North American freight car service, the company's design is based on a minimum B10 life of 805,000 km (500,000 miles).

RAILTECH LIMITED

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Railtech Limited manufactures fibreglass gearcases for railway diesel locomotives, temperature indicator bolts, Met-L-Wood panels for interior finishes of passenger cars, doors for container trucks and other applications, and steam generator and heat exchanger coils for railway generator cars and industrial plants. The company is also the sole sales agent for the Domeq scraper hoists.

Features of the Railtech products are:

- Fibreglass traction motor gear cases — lightweight 50 lb (22.68 kg) approximately, compared with 175 lb (79.38 kg) in steel, easily installed and maintained by one man: no need for two men and a crane to handle the gear case on and off axles. Durable against high impact and constant vibration, it withstands extreme temperature variations and is impervious to chemicals including hydrocarbons, acids and alkalies. All steel supporting hardware is stamped, no welds, and the upper and lower halves are identical in size and therefore interchangeable. The fibreglass design offers much safer operating performance.
- Temperature indicator bolts — protection for journal roller bearings, the indicator bolt with a memory is a reliable accurate and unmistakable indication of overheat. A large indicator on the head of the bolt

changes colour when the temperature designated on the head is reached. Single and multiple temperature sensing areas are available; sizes to fit all roller bearings available; AAR approved for interchange.

- Met-L-Wood panels — a structural laminate consisting of a plywood (or other) core and metal facings of steel and/or aluminum (or other facings) permanently bonded together by an exclusive Met-L-Wood process. The result is a "stress-skin" panel that offers an astounding strength-to-weight ratio — the rigidity of steel or aluminum plate at fraction of the weight and cost. Ideal for doors for containers, piggyback trailers, etc., and partitions, floors, computer housings, pallets, etc.
- Steam generator and heat exchanger coils — conform to every specification required by the ASTM and ASME, and are certified as to material, construction and workmanship; particular application to heating of passenger trains. Steam coils available for 4625, 4740, 4630, 4635, 4616 steam generators; heat exchanger coils for all steam generators. Manufactured with electric resistance welded carbon steel boiler tubing, forged steel fittings; stamped with dry weight; inspected to ensure perfect fit.

JOSEPH ROBB & COMPANY, LIMITED

Contact: W. D. Bradley, Manager, Metal Products Division
5600, rue Philippe Turcot
Montréal (Québec) Canada
H4C 1V7
Tél: (514) 937-9151
Télex: 05-25220

To fill the demand for piston rings able to withstand rising thermal and mechanical loads, Joseph Robb & Company, Limited produces a wide range of cast iron alloys which resist corrosion and retain their original properties under extreme conditions of heat.

Alloys are available to suit any requirement or application, from standard grey irons, through chromium-molybdenum-copper and high nickel-alloyed iron, up to spheroidal

graphite (nodular) irons. Robco piston and sealing rings are also produced from various grades of stellite, nimonic and several types of inconel alloys.

The company has developed much of the sophisticated, specialized equipment and techniques to produce the extreme accuracy, flatness and finish necessary for top quality piston rings.

SAFT BATTERIES LIMITED

Contact: R. Pearce, Marketing Manager
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Toronto, Ontario, Canada
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Tel: (416) 752-3030
Telex: 06-963628

Saft Batteries Limited manufactures pocket plate nickel-cadmium batteries and has supplied batteries for both the Toronto and Montreal subway systems in Canada. It has test facilities to demonstrate charge and discharge performance of its product, and it can also repair and rebuild pocket plate cells. With decades of transit experience, the sales and engineering staff can respond quickly to customers' inquiries.

Type of batteries produced by Saft are:

- KP Nickel-Cadmium — from 10 to 520 amp-hours capacity in both steel and plastic containers; pocket plate construction; long life and extra electrolyte for reduced maintenance; up to 14C high rate discharge.
- GPX Nickel-Cadmium — from 35 to 200 amp-hours capacity in steel containers; exceptional charge and discharge performance; best performance at very low or high temperatures; up to 30C peaks.

Saft also makes solid state regulated battery chargers and control circuits for transit applications. Unique solid state ampere-hour meter charging system minimizes maintenance while ensuring rapid and complete recharge over a wide temperature range.

Saft's recent exports have gone to the United States, Pakistan, Peru, the Caribbean, the Middle East and Britain.

SIMMONDS PRECISION CANADA LIMITED

Contact: Ronald G. Baldock, Managing Director
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Mississauga, Ontario, Canada
L4T 1G3
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Originally designed for heavy railroad service, the rugged D6 liquid contents gauge by Simmonds is now provided on the fuel tanks of many mobile units. Easy to install, it is fully automatic in operation, requires virtually no maintenance, and will not leak either liquid or vapour — even if the glass is accidentally broken — up to 15 psi operating pressure. The D6's conservative design and absence of delicate parts enables it to withstand the shock and vibration of mobile service.

The easy-to-read dial indicates contents in litres or gallons. A rolled-on bezel holds the heavy quarter-inch plate glass lens permanently in place. The housing is anodized aluminum and the float-arm is made of brass tubing. The solid unsinkable float is made of epoxy and is designed for use in oil as well as water. The vertical motion of the float-arm is transmitted to the indicator pointer through a unique metal bellows seal which prevents the passage of liquid or vapour.

Simmonds' D6 gauge can be side or top mounted. An extended fulcrum is used when the tank configuration requires it.

Other Simmonds' products are the BDL heavy duty liquid contents gauge specially designed for direct mounting on locomotive fuel tanks.

The company also manufactures a range of float type liquid level switches (either micro-switch or reed-type) (EA 750 and 96961 Single or Multi Point) for locomotive or rolling stock applications.

Established for many years, Simmonds Precision Canada Limited (SPCL) is a chartered Canadian company selling a wide variety of products to the industrial, railroad, marine and aerospace markets and government agencies.

UNITED WELDING PROCESSES (CANADA) INC.

Contact: Patrick Champigny, President
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Montréal (Québec) Canada
H1G 5R6
Tél: (514) 321-3320

United Welding is an experienced and qualified repairer of diesel and gasoline engine castings, iron, steel or aluminum. Using various special processes, the company can restore cracked or damaged engine castings to newly-made condition and guarantees their performance will be equal or superior to that of the brand new product. Exchange castings carrying the same guarantee are available to customers on request.

All castings are tested before and after repairs by magnaflux and hydrostatic methods. The company does not dismantle or repair engines, but its repair facilities cover —

- Cylinder heads — any make and model of diesel or gasoline engine, no size or quantity limitations.

- Engine blocks — cracks, fractures or holes; all makes and models of diesel and gasoline engines.
- Crankshaft and camshafts — repair, weld or restore to standard; no size limitation.
- Bell housings, gear carriers, transmission casings — cracks, fissures, breaks; all makes and models, no material limitations.
- Oil pans — no limitations of make, model or material.

United Welding's service is fast, it will pay land transport one-way, and it will buy cylinder heads that a customer does not want repaired.

WHITING EQUIPMENT LIMITED

Contact: E. Hamilton, Sales Manager
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Tel: (416) 732-7585
Telex: 061-5187

Imaginative engineering by Whiting Equipment Limited has created systems for locomotive and car maintenance that provide significant savings in cost and time. They include:

- Mobile and cable type car pulling equipment — including the company's ROBOT Remote Control System, a technical breakthrough. Using endless rope car pullers and wheeled devices in double channel track, it features robot arms that raise to contact axle or journal of cars to be moved. Robot advantages include remote control of entire progression system from central console, automatic cycling of progression sequences, no cables to handle or hooks to slip loose, puller rope completely enclosed for safety, automatic car indexing.
- Portable electric jacks in 10, 25, 35 and 50-ton capacities, with an exceptionally high safety factor of 5. Interlocking controls permit operation in unison in series of two or four from portable push button station.
- Train washers designed to meet specific requirements, with a variety of brush arrangements to handle all types of equipment including the new lightweight trains, dome cars and diesel-electric locomotives with car contour.
- Interior washers for covered hopper cars — at the washing station, underhung crane lowers into the car a washing wand equipped with a roto jet nozzle that sprays 140 gallons (630 litres) of water per minute through four jet outlets at 400 pounds (180 kg) pressure.
- Drop tables for use in removing trucks from under locomotives, coaches or freight rolling stock. Designs adaptable to every service requirement; installations now serve pits from 4 to 26 feet wide (1.2 to 7.9 m); capacities range from 20 to 150 tons. Electrical power controls all operations.
- One Spot car repair system — expedites riptrack work, slashes labour costs, reduces bad order delays, all but eliminates switch engine hours. Design and layout, variety of equipment available to suit specific requirements.
- Transfer tables — to move railway rolling stock from one parallel track to any of a number of other parallel tracks without the use of switches and excess property requirements. Has application for carrier loading at plants, reducing damage to such products as automobiles.
- Sand bridges — one man can service five locomotives with four sand boxes each in 18 minutes. Sanding gantry rides on parallel tracks straddling two rail spurs. Push button controls move platform vertically and horizontally. Hoses of various lengths from the hopper enable the operator to fill sand boxes in any location.
- Hoisting equipment — a variety of arrangements to speed maintenance and reduce costs and down time. Electric motor operated multi-hoist units can be arranged to lift coupled cars. All units synchronized and interlocked to maintain minimum elevation variations.

or the nearest Canadian Trade Office

DATE DUE - DATE DE RETOUR



(aussi publié en français)

