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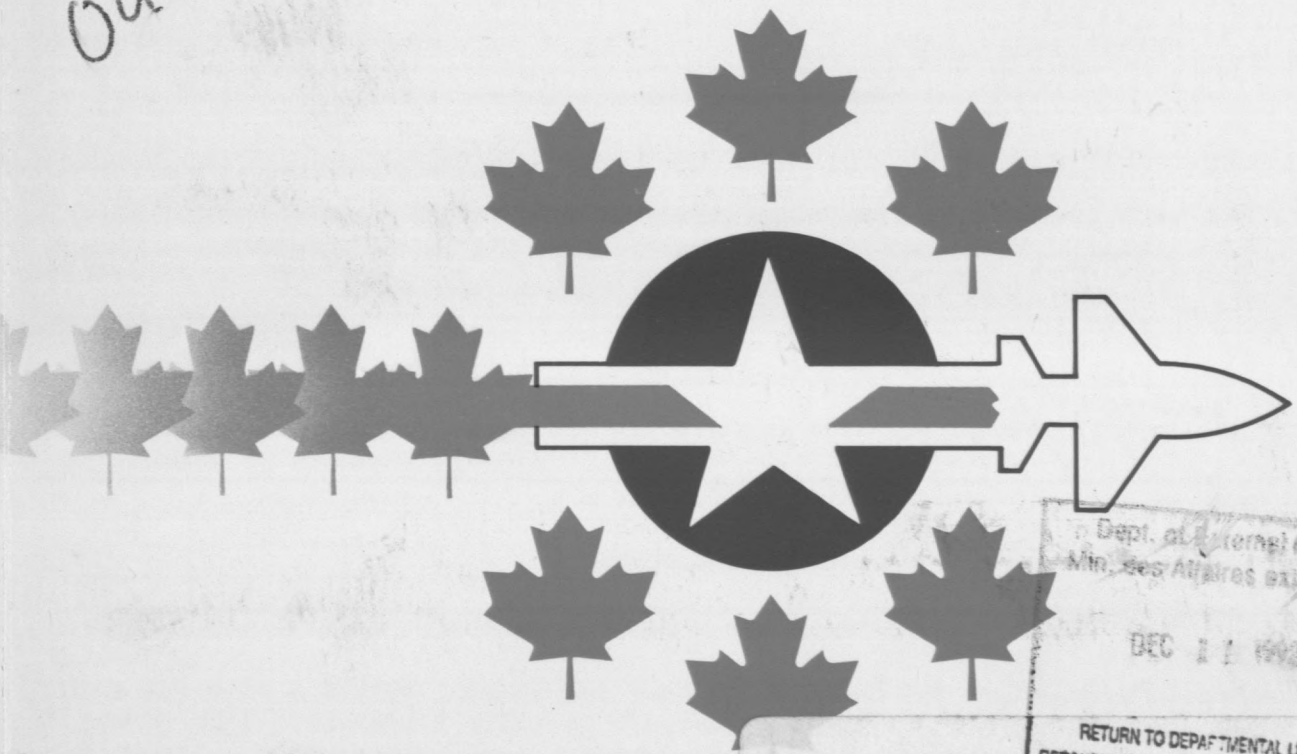
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GUIDE TO CANADIAN AEROSPACE RELATED INDUSTRIES

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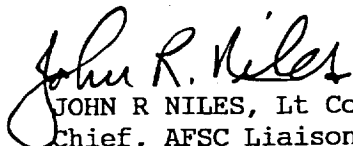
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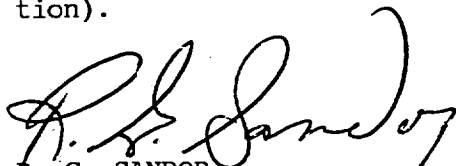
**USAF SYSTEMS COMMAND
LIAISON OFFICE
OTTAWA, ONTARIO
CANADA K1P 5M9**

This report has been reviewed by the USAF Systems Command Liaison Office (Ottawa) and is approved for publication and release to the National Technical Information Service (Unlimited Distribution).



JOHN R NILES, Lt Col, USAF
Chief, AFSC Liaison Office (Ottawa)

This report has been reviewed by the Canadian Government and is approved for release to the National Technical Information Service (Unlimited Distribution).



R. G. SANDOR
Director, US Division
Defense Programs Bureau
Department of External Affairs

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19. ABSTRACT (Continue on reverse if necessary and identify by block number) This guide is a contracting source list of Canadian aerospace related industries to be used by USAF procurement offices, program managers, project engineers, and scientists. It provides company profiles, a company keyword index, and contact points for each company.						
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PREFACE

This Guide to Canadian Aerospace Related Industries presents a compilation of descriptive data on 236 companies located in Canada that have expressed interest in doing business with the United States Air Force. This Guide has been prepared with three main objectives in mind:

- a. To encourage Air Force Systems Command Project Officers to take advantage of the industrial capability of Canada.
- b. To engender interest within AFSC for participating in the US/Canada Defense Production and Development Sharing Programs.
- c. To encourage Canadian aerospace industry to take a more active role in presenting their capabilities to the USAF.

The companies profiled in this Guide represent a cross-section of Canadian industry and research facilities with capabilities that may be of interest to the USAF research & development and logistics communities.

Comments and/or suggestions concerning the format or content of this Guide are solicited. Questions concerning the US/Canada Defense Production and Development Sharing Program or the subject matter of this Guide should be directed to Lt Col Thomas H Burleson, or Mr Donald J Pearson, AFSC Liaison Office; 110 O'Connor St, Suite #202; Ottawa, Ontario, Canada; K1P 5M9. Telephone contact can be made at (613) 993-7725 (commercial), or Autovon 843-7725.

The cooperation and assistance of the Canadian Department of External Affairs in the printing and distribution of this report is greatly appreciated.

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Section I

INTRODUCTION

One of the functions of the Air Force Systems Command Liaison Office in Ottawa is to stay current on Canadian industrial capabilities and trends, and to make this information available to the USAF R&D community. This Guide was prepared in pursuit of that objective. It presents descriptive data on 236 companies that have expressed interest in doing business with the USAF. All information was provided by each of the respective companies. Leads to new entries were obtained through newspapers, magazines and through contacts with various departments of the Canadian Government. This Guide presents a representative cross-section of the Canadian aerospace and defense industry.

Canada has a very large industrial commitment to the aerospace, communications, electronics, and space areas. As one might expect, these industries are primarily concentrated in the Ontario-Quebec corridor, extending from Windsor through Toronto and Ottawa to Montreal. Other locations with expanding industrial bases are the Winnipeg (Manitoba), Edmonton-Calgary (Alberta), and Vancouver (British Columbia) areas. Substantial contributions to the Canadian industrial capability are also afforded by the Quebec City (Quebec) and Halifax (Nova Scotia) areas.

As in the other editions of this Guide, this fifth edition does not attempt to group companies into specific categories such as aerospace or electronics. Neither does this Guide attempt to differentiate R&D capabilities from pure product lines. While most companies have product lines, some are very R&D oriented and seem eager to engage in R&D contracts. For those companies that appear primarily product oriented, it is assumed that they do have an R&D capability within their area of expertise.

Section II of this Guide presents Canadian industrial capabilities as a compilation of individual company profiles. The general format for the company profiles include the following subsections: NAME, ADDRESS, CONTACT POINT, HISTORY, CAPABILITY, AVERAGE WORK FORCE, GROSS SALES, PLANT SIZE, EQUIPMENT, EXPERIENCE, KEYWORDS and the DATE of the material.

Section III (Company Keyword Index) relates company capabilities in the form of keywords. The specific keywords are presented in columnar form in alphabetical order. The second column lists the company associated with the keyword. The company index forms Section IV.

Defense economic cooperation between the United States and Canada has deep roots. In the late 1950s, the governments initiated an agreement that has come to be called the Defense Production Sharing Arrangement (DPSA). The DPSA was historic in that it became US defense procurement policy to consider Canadian defense contractors as an integral part of the US industrial/mobilization base. The terms of this arrangement remains valid today. Canadian contractors are to be considered the same as domestic American suppliers. The Buy American Act is waived for all defense supplies made in Canada. US customs duties are waived on most Canadian supplies entering the US for defense programs. The specifics of the arrangement are valid for both Canadian prime contractors and for Canadian sub-contractors to US primes. AF Regulation 400-34 and AFSC Supplement thereto, apply to this program as well as DFAR and AF FAR Supplements 25.71. The letter agreement itself is contained in DAR Appendix T.

Under the procedures of the DPSA with Canada, the US buyer contracts with the Canadian Commercial Corporation (CCC). CCC is 100% government-owned; a Crown Corporation, basically an arm of the Canadian Government. CCC wholly sub-contracts the work to be performed to the Canadian defense

contractor. In the process, CCC guarantees the performance of the Canadian contractor, and if necessary, will re-procure at their expense to get the job done. The DPSA also provides US acceptance of all Canadian government contracting and contract management procedures. CCC and their associates with the Canadian Department of Supply and Services certify all pricing data supplied by the Canadian contractor. There are indeed intergovernmental arrangements for quality assurance, in-plant inspection, and industrial security for classified programs.

There is a second special arrangement with Canada called the Defense Development Sharing Arrangement (DDSA). The DDSA was signed by both governments in November 1963. The Development Sharing Program enjoys all the benefits of the Production Sharing Program. In addition, projects under the DDSA receive financial assistance from the Canadian government. Project Agreements are negotiated for each effort and generally reflect a 50/50 cost sharing ratio. The joint projects must be in support of a US defense requirement, and the US project office remains the design authority throughout the effort. Use of the DDSA can really stretch your R&D dollars; an important consideration in the face of declining defense budgets.

The DPSA and DDSA have received highest level support from all administrations. The joint declaration by the Prime Minister of Canada and the President of the US at the Quebec Summit on 18 May 85 stated that "... To provide for an effective use of resources and to aid both our countries in bearing our share of the Allied defense burden, we reaffirm the Canada/United States Defense Development and Production Sharing Arrangements and agree to strengthen our North American defense industrial base". Similar expressions of support have come from subsequent summit meetings.

USAF/AFSC project officers are encouraged to take full advantage of these arrangements with Canada and to submit Canadian sources for their projects. We at the AFSC Liaison Office in Ottawa, Canada, can assist you in locating sources or in other aspects of the arrangements. Please feel free to contact us at the address noted in the preface to this report. The ICR&D focal point located at your organization can also provide insight in the process of doing business with Canada.

Information on the DPSA and DDSA, and Canadian sources can also be obtained from the US Division of the Canadian Department of External Affairs at (613) 996-1814 or Autovon 846-1814. Their mailing address is:

Defence Programs Division (TDP)
Defence Programs and Advanced Technology Bureau
Department of External Affairs
125 Sussex Dr
Ottawa, Ontario, Canada
K1A 0G2

The Government of Canada also maintains Trade Counselors at many locations in the US. Please feel free to contact these individuals as well for more information on Canadian Industry.

For the most part, Canada's high-technology industrial capability is on an even par with that of the United States, but on a smaller scale. It may certainly be considered another source base for USAF R&D procurements, as well as for commodity buys. It is hoped that this Guide will help provide the user with some insight into the Canadian system and encourage its use if deemed appropriate. Increased competition and "new blood" can only reduce USAF procurement costs and hopefully lead to better products.

Section II

COMPANY PROFILES

AASTRA AEROSPACE Inc

ADDRESS: 1685 Flint Road
Downsview, Ontario, Canada
M3J 2W8

CONTACT: Mr Hugh Scholaert, Director, Business Development –
(416) 736-7070

HISTORY: Aastra Aerospace Inc was originally incorporated in 1969 as H Aass Aero Engineering Ltd. Until 1983, most company activities focused on aeronautical engineering services. In 1983, the company began operating under the name of Aass Aerospace. This reflected corporate activity in spacecraft systems design and technology development. In order to better market itself on an international level, the company name was formally changed to Aastra Aerospace Inc in January 1988. The company head office is in Toronto, Ontario, and a small field office operates from Ottawa, Ontario.

CAPABILITY: The company provides engineering services to the aerospace and defense industries. These services are divided into three distinct sets of activities:

- Engineering Design Services – Aastra serves the aviation sector and aerospace industries with expert engineering services in the fields of structures, mechanical and control systems design. Emphasis is placed on the system design and implementation of advanced sensors, remote sensing, and surveillance equipment onboard aircraft, spacecraft and land vehicles.
- Advanced Technology Development – Aastra performs contract research and development mostly for government agencies in Canada and abroad. Emphasis is placed on space systems, microgravity processing technology, materials research, advanced structures ("smart" structures), and structural dynamics.
- Software Sciences – Aastra provides systems engineering services for the implementation of advanced simulation technology. Most work encompasses event simulation of C² and operations for space-based and airborne activities.

The company facility and personnel have Secret security clearances.

AVERAGE WORK FORCE: Graduate Engineers – 3
Post Graduate Engineers – 12

GROSS SALES: 1986 – \$800K
1987 – \$1.4M (Est'd)

PLANT SIZE: 5,000 Sq Ft (Office & Light Manufacturing)

EQUIPMENT: Computer facilities include – MicroVax, Sun workstations, and IBM PC compatible equipment; access to a variety of major software packages which have become industry standard or which have been developed in-house; and a small well-equipped materials laboratory for ceramic composites research.

EXPERIENCE: Aastra has served a majority of aviation and aerospace industry clients in Canada and around the world. Major development activities have been undertaken for Canadian government agencies. This includes – Defense Research Establishment (Ottawa), Director General Aerospace Engineering and Maintenance, National Research Council – Space Division, Transport Canada – Flight Services, RCMP – Flight Directorate, and Canada Center for Remote Sensing.

KEYWORDS: Systems Engineering; Structural Dynamics; Mechanical Systems; Control Systems; Simulation Facilities; Aeronautical Engineering; Aerodynamics Analysis; Software Development; Materials Research; Smart Structures; Flight Dynamics; Stability and Control; Flight Testing; Remote Sensing; Space Based Radar; Laser Applications; Ceramic Composites; Radar (Space).

REVISED: February 88

ADGA GROUP

ADDRESS: 116 Albert St, Suite #400
Ottawa, Ontario, Canada
K1P 5G3

CONTACT: Mr J Kevin Burke, PEng – (613) 237-3022

HISTORY: The ADGA Group was established in 1969 to serve the needs of clients throughout the world. ADGA is privately owned with over two hundred professional and technical employees.

The head office is located in Ottawa, Canada's capital, with branch offices in Montreal and Toronto. Associate offices are located in Halifax, Vancouver, England, and Switzerland, which enables ADGA to offer a broad range of services on an international basis.

ADGA is without direct ties to any specific supplier, government or fiscal agency, and offers truly independent and objective consulting services to its clients.

CAPABILITY: The Group possesses wide and proven experience in consulting, design, installation, operation and maintenance of technical facilities for the support of a wide range of domestic and international projects in the electronics and computer systems areas.

Major areas of company expertise include data/voice communications, navigation aids, air traffic control, satellite systems, marine vessel traffic management security system design and software development.

More recently, the company has expanded its in-house capability in the design of Integrated Logistics Support (ILS) systems, Automated Configuration Management and AQAP-1 Quality Assurance consulting. The company works under a variety of business arrangements including industrial development and joint-venture projects and major subcontracts.

AVERAGE WORK FORCE: Professional – 50
Technologists/Technicians – 120
Others – 30

GROSS SALES: No Data

EQUIPMENT: Electronic R&D and test facility, and in-house computer systems.

EXPERIENCE: Present customers include all major departments in the Canadian Government, as well as numerous departments of the provincial governments and industries in both Canada and the US. The company is interested in developing business with DOD in its areas of technical expertise.

KEYWORDS: ATC; Communications; Consulting (Nav/Comm); Fire Control; ILS; Radar; Radio Communications; Satellite Communications; Secure Communications; Software Services; Systems Engineering (Nav/Comm).

REVISED: February 88

AEA ELECTRONIC Ltd

ADDRESS: 6270 Perth St
P. O. Box 850
Richmond, Ontario, Canada
K0A 2Z0

CONTACT: Ms Ginger Knox, Manager of Sales Administration -
(613) 838-2554

HISTORY: AEA Electronic Ltd is a Canadian-owned company founded in 1971 as a consulting service to the data communications industry. During this consulting work, certain products were identified to be marketable. This resulted in the development of various instruments to be used for testing data communications devices and systems. The company has representation in most major countries, maintains a sales office in San Jose, CA, as well as having representatives in other locations throughout the United States.

CAPABILITY: AEA Electronic Ltd is primarily involved in the design and manufacture of computer controlled test systems for data modems. The company has a comprehensive capability to provide both hardware and complete systems for the testing of voiceband data modems, and wireline simulators to serve the needs of the growing ISDN industry. The projects are used by modem manufacturers, telephone companies, financial institutions, training and educational facilities, as well as a large variety of end users. All engineering, software design and development, production, and quality assurance is located at the main plant in Richmond, Ontario, Canada. Full documentation is provided to the customer, as well as extensive customer service and support. Training is provided at various locations including the main plant and representatives areas, or can be provided at the customer's facility. Consulting services are also available and the company often produces specialized systems designed to meet a customer's requirements.

AVERAGE WORK FORCE: Engineers - 11
Technicians - 8
Others - 20

GROSS SALES: 1986 - \$2.2M
1987 - \$2.3M

PLANT SIZE: 10,000 Sq Ft

EQUIPMENT: Extensive electronics production facilities. The Engineering Department is supported by CAD drafting equipment and other PC-based tools.

EXPERIENCE: AEA Electronic's customers include various departments within the Canadian Government such as Transport Canada, as well as telephone companies in Canada, the US and other worldwide locations. Telco customers include Bell Canada, AT&T, Pacific Bell, and the Swiss PTT. Major modem manufacturers include Paradyne, Microcom and Ark.

KEYWORDS: Data Communication Test Equipment; Test Equipment (Data Communications); Computer Controlled Systems; Engineering Design; Software Development; Manufacturing Consulting Services; ISDN/DDS; Telephone Channel Simulators, Wireline Simulators.

REVISED: February 88

AERO MACHINING Ltd

ADDRESS: 5411 Industrial Blvd
Montreal-North, Quebec, Canada
H1G 3H7

CONTACT: Mr Bruno Julien, Marketing Director - (514) 324-4260

HISTORY: Aero Machining Ltd is a small machining company incorporated in 1963 in the Province of Quebec. There are no other Canadian or US locations.

CAPABILITY: Aero Machining Ltd provides services in tool design, production, maintenance, sub-assemblies, die and mold development, and fabrication. They specialize in precision machining, three axis profiling, four spindle profilers, CNC lathes and machining center, high tensiles, titanium, and D-6-AC material. Their quality control is governed by the "Aero Machining Ltd" quality control manual in accordance with MIL-Q-9858A and MIL-C-45662A. The company is approved for the manufacture of aircraft hydraulic servos, landing gear components, and missile and airframe machined parts. Accumulative quality control records are kept to provide necessary traceability of inspection data. Their quality control policy is approved to meet the requirements of various US DOD QC specifications, as well as the Canadian DND 1016 (AQUAP-4) specification, for the manufacture of aircraft mechanical parts and mechanical and hydraulic assemblies.

AVERAGE WORK FORCE: Total - 70

GROSS SALES: 1986 - \$3.0M
1987 - \$4.0M

PLANT SIZE: 27,000 Sq Ft

EQUIPMENT: Their equipment includes CNC lathes, borers, milling machines, machining centers (3 & 4 axis), profilers, drills, honing machines, and grinders. They have a hydraulic assembly and test facility for all hydraulic assemblies and parts manufactured by the company. CNC equipment is integrated to a 5 axis CAD/CAM system.

EXPERIENCE: Aero principal customers include McDonnell Douglas Corp, Grumman Aerospace Corp, Pratt & Whitney, Cleveland Pneumatic, Canadian Marconi, Versatile Vickers, GE, Rolls Royce, Fleet Industries, Canadair, USAF and Heroux.

KEYWORDS: Actuators; Airframe Parts; Die Fabrication; Hinges; Hydraulic Servos; Landing Gear Components; Machining; Missile Parts; Precision Machining; Titanium; Tooling.

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AEROTECH INTERNATIONAL Inc

ADDRESS: 100 Eagle Drive
Winnipeg, Manitoba, Canada
R2R 1V5

CONTACT: Mr Paul R Sigurdson, President - (204) 633-1999

HISTORY: Aerotech International Inc is a privately Canadian-owned Winnipeg based manufacturer and supplier of portable heaters and other ground support equipment for the aerospace industry.

CAPABILITY: Aerotech International Inc supplies and manufactures portable heaters and ducting, and aerospace ground support equipment for commercial as well as defence applications.

The company offers a comprehensive line of heaters specializing in the BT400 series, the ultra-efficient go anywhere pre-heater capable of handling the toughest cold weather jobs. Tested from pole-to-pole, the light weight (250 kg) portable heaters withstand temperatures to - 54 Celsius and provide instant heat output to 400,000 BTU per hour. The heater is designed to burn gasoline or diesel fuel and operate as a totally self-contained unit, or as a slave type heater using an electric motor power package.

The company also manufactures its own line of canvas ducting. It also supplies spare parts for all series BT400 heaters and other ground support equipment.

Aerotech International Inc has a dealer/distributor network covering the US and Canada as well as Europe and the Pacific Rim. Among its many customers are the Department of Defence of most NATO nations, as well as most major commercial airlines worldwide. The company's products are also in use by the oil and mining industries. Wherever clean, instant heat is required, Aerotech portable heaters will do the job.

AVERAGE WORK FORCE: Total - 20

GROSS SALES: \$2.5M (Avg last 3 years)

PLANT SIZE: 24,000 Sq Ft (on 8 acres)

EXPERIENCE: Aerotech International Inc's customer list includes - The Departments of Defence, in the governments of Canada, the US, the UK, Italy, Turkey, and Australia. Customers also include most major airlines including Air Canada, Canadian International, United Airlines, Northwest Airlines, Finnair, Korean Air, Federal Express, and numerous regional and national carriers. Major oil and mining companies such as Gulf, Esso, Pan Canadian, Dome Petroleum, and Nova, round out an impressive customer list.

KEYWORDS: Aircraft Heating; Heating (Aircraft); Portable Heaters; AGE.

REVISED: January 88

AIRCRAFT APPLIANCES AND EQUIPMENT Ltd

ADDRESS: 150 East Drive
Bramalea, Ontario, Canada
L6T 1C1

CONTACT: Mr W J White, President - (416) 791-1666

HISTORY: Aircraft Appliances and Equipment Ltd (AAE) was founded in 1949 and was incorporated (Ontario Chapter) the same year. The principal operation of the company at first was the repair and overhaul of aircraft accessories and the distribution of US built aircraft electrical product accessories in Canada.

AAE commenced their design and manufacturing of fuel filters and coalescers in the year 1959. In 1966, they commenced to design and manufacture aircraft tachometer generators and this was followed in 1973 by the design and manufacturing of ground power AC/DC generators and generator sets. These products were sold in 1984. The principal market for AAE services and their products covered all aircraft manufacturers in Canada and US military requirements, which include US and Canadian Navy requirements, commercial ship builders, etc. The generator division, which has been sold, also catered to industrial, agricultural, and the export market. AAE is a privately-owned Canadian company.

CAPABILITY: Presently AAE operates three basic divisions:

- **Repair and Overhaul and Service Division (R&O)** - For over 39 years, this division has been overhauling military and commercial components and products produced by leading manufacturers in the US and Canada. Some of the products handled by this division are automatic flight controls, aircraft controls, electrical power sensing devices to ground power units, motor generators, test stands, search lights, etc. This division is also capable of rewinding AC and DC air or oil cooled generators and stators. It has manufacturing and design capabilities for various power and test equipment for aircraft support.

- **Fluid Power Division (FP)** - This division is involved in design and manufacturing of a wide variety of filtration equipment. It has now over 30 years of research and development in filtration and coalescing equipment (water separators). The major filtration systems are being supplied to all US built frigates and destroyers, as well as Canadian frigates.

- **Technical Sales and Service Division (TSSD)** - This division is stocking distributor for other manufactured products. It has catered to the Canadian aerospace industry now for over 34 years. It has distribution rights for aircraft electrical, avionics, and fuel accessories produced by LSI division, such as AC/DC generation systems, pitch trim actuators, controllers, heading reference units, land navigation, muzzle velocity radar, radar antenna, display and transceivers, fuel booster and lube and scavenge pumps. It also has a supply of RFI/EMI filters. For industrial application, it handles ground air conditioning systems for commercial and military aircraft. It also represents Ramco Inc and manufactures water pollution equipment and

water recovery systems for municipal, industrial, recreational use, fish farming, etc.

AVERAGE WORK FORCE: Engineers - 12
Engineering Technicians - 18
Others - 90

GROSS SALES: 1986 - \$14.5M
1987 - \$15.6M

PLANT SIZE: 80,000 Sq Ft

EQUIPMENT: Numerous NC equipment in manufacturing areas, avionics and flight control testing equipment, various electrical test stands, hydraulic and coalescing test stands, and in-house Qantel computer system.

EXPERIENCE: AAE has 39 years of experience in R&O and TSSD catering to Canadian and US government agencies, commercial aerospace industry i.e., deHavilland, Canadair, Beech, Cessna, Piper and the airlines. Fluid Power Division has catered for over 20 years with their filters and coalescing equipment to major US ship builders, i.e. Ingalls Shipyards, Bath Iron Works, Todd Shipyards, etc. It has also exported its equipment to Spain, Australia, commercial marine companies, etc. In Canada, they supply their equipment to DDH 280 and new Canadian built patrol frigates. Various aircraft filters are supplied to aircraft industries in Canada, i.e. Pratt & Whitney, deHavilland and Canadair.

KEYWORDS: Coalescing Filters; Distribution (Aircraft Parts); Filters; Fuel Filters; R&O (Aircraft Components); R&O (Avionics); R&O (Ground Power); Separators (Oily Water).

REVISED: January 88

AIRTECH CANADA (371892 Ontario Ltd)

ADDRESS: Peterborough Municipal Airport
P. O. Box 415
Peterborough, Ontario, Canada
K9J 6Z3

CONTACT: Mr John O'Dwyer, President - (705) 743-9483

HISTORY: Airtech Canada is a Canadian-owned private company established in 1977. Airtech Canada and PZL, Poland, have entered a joint venture agreement to undertake the manufacture and marketing of an advanced turbo-prop trainer - the Turbo Orlik.

CAPABILITY: Airtech Canada is involved in the assembly, manufacture and marketing of aircraft and aircraft components. Airtech Canada has full facilities for aircraft and engine maintenance and for the design, manufacturing, and testing of aircraft modifications. Airtech Canada has particular experience in providing Medevac installations for all makes of aircraft. Airtech Canada holds Canadian (STA) and USA (STC) approval for the replacement of the original Pratt & Whitney radial engines on the deHavilland Beaver and Otter, with radial engines manufactured by PZL factories of Poland. Airtech Canada assembles and markets the PZL Wilga '80, Jantar and Puchacz gliders, and manufactures and markets an Airtech designed ultralight - the Skylark. Airtech Canada assembles and markets a new, high performance trainer aircraft known as the Turbo Orlik.

AVERAGE WORK FORCE: AME - 5
Engineers - 3
Test Pilot - 1
Others - 5

GROSS SALES: 1986 - \$611,000
1987 - \$785,000

PLANT SIZE: 8,600 Sq Ft

EQUIPMENT: Their equipment includes: complete aircraft assembly, repair and maintenance facilities, and aircraft component static test frame.

EXPERIENCE: Present customers are aircraft operators in North and South America. Discussions are currently being held with a number of foreign governments with view to sale of Turbo Orlik.

KEYWORDS: Aircraft; Trainer (Aircraft); Modification (Aircraft); Medical Evacuation Installations; R&O (Aircraft); Re-Engining (DHC-2 & 3).

REVISED: February 88

AIT ADVANCED INFORMATION TECHNOLOGIES

ADDRESS: AIT Building
9 Auriga Drive
Nepean, Ontario, Canada
K2E 7T9

CONTACT: Mr Don McKinnon, Director, Technology Applications
- (613) 226-7800

HISTORY: AIT Advanced Information Technologies Corp is a Canadian-owned electronic systems company founded in 1986. It was formerly known as Hitech Canada Ltd, founded in 1973 as an Ottawa based computer hardware and software consulting firm.

CAPABILITY: AIT Corporation Products Division is primarily involved in the design and manufacture of security document issuance and inspection systems based upon optical character recognition technologies. Their machine-readable passport systems are in use by government agencies in Canada, the US, Australia, the UK and Finland. They also design and manufacture word counters for translation bureau billing, and typescript page readers.

AIT Corporation Systems Division is involved in civilian and military radar systems clutter analyses and simulation studies, and is the prime contractor for development of a Wind-Imaging Interferometer (WINDII) which will remotely sense the temperature and velocity of selected ionic species in the upper atmosphere from its station aboard NASA's Upper Atmosphere Research Satellite (UARS) in the early 1990's. Their Network Management System is used by all Canadian telephone operating companies and their major clients to monitor and maintain public data communications facilities from coast-to-coast. They are developing an expert correspondence entry and filing system.

Their capabilities cover systems analysis, electrical, mechanical, and optical engineering, software design and development, systems project management, systems integration and verification, product assurance (including reliability and maintainability analysis), production, quality assurance, documentation, training, installation and service.

AVERAGE WORK FORCE: Phd - 2
Engineers - 47
Others - 43

GROSS SALES: 1987 - \$ 7.7M
1988 - \$12.0M (Est'd)

PLANT SIZE: 28,000 Sq Ft

EQUIPMENT: In-house computer systems include - Apple Macintosh, DEC PDP, an Intel 80386 PC, variants of the IBM PC/AT and Personal System/2 Model 30s and Model 60s.

EXPERIENCE: AIT's present foreign customers include - Computer Sciences Corp for the US Immigration & Naturalization Service, the Bank of Finland Security Printing House, and Software Sciences Ltd of England for the UK home office. Present domestic customers include - the Canadian federal government departments of Communications, External Affairs, National Defence, National Research Council (Space Research), and Transport (Air Traffic Control & Coast Guard).

KEYWORDS: Optical Character Recognition; Data Acquisition; Data Processing; Systems Analysis; Network Management Systems; Atmospheric Monitoring; Satellite Subsystems; Radar Systems

Analysis; ATC; Vehicle Training Simulators; Secure Identity Documents; Radar Signature Analysis; Expert Systems; Remote Sensing; Space Mission Planning; Program Management; Systems Integration.

REVISED: January 88

ALBERTA LASER INSTITUTE

ADDRESS: 9924, 45th Avenue
Edmonton, Alberta, Canada
T6E 5J1

CONTACT: Dr V E Merchant, Program Director - (403) 436-9750

HISTORY: The Alberta Laser Institute was founded in 1985 as a wholly owned subsidiary of the University of Alberta in Edmonton. It has received grant money from the Government of Alberta and from the Department of Regional Industrial Expansion of the Government of Canada. The mandate of the institute is to encourage the use of lasers in Alberta and Western Canadian industry.

CAPABILITY: The Alberta Laser Institute offers a variety of material processing applications for industry. They include laser welding heat treating, cutting and overlaying or cladding. The institute offers the services of job shop work, development of materials processing procedures, evaluation of technical and economic feasibility of laser processing, and design and fabrication of specialized laser processing equipment. The Alberta Laser Institute has the capability to design, prototype, and manufacture specialized sensors for on-line analysis of industrial products and processes.

AVERAGE WORK FORCE: Phds - 2
Engineers - 2
Others - 5

GROSS SALES: FY 1987 - \$125,000

PLANT SIZE: 7,500 Sq FT

EQUIPMENT: Equipment includes: CE-5000 LASER and LPC-8 five axis CNC workstation from Combustion Engineering Industrial Lasers, Somerville, MA.; CE-1000 LASER with a flat-bed CNC Workstation; Computer Aided Design workstation hard-linked to laser processing stations; Zimmer 600/10 Proximeter for in-station applications; and HP Laser Measurement System.

EXPERIENCE: The Alberta Laser Institute has been involved in:

- The manufacture of metal optics for Lumonics Inc, Leitz Canada Ltd and Applied Physics Specialties Ltd.
- Applying corrosion resistant coatings for a variety of manufacturers of oil field equipment.
- Heat treating feasibility study for Atomic Energy of Canada Ltd.
- Feasibility study and consulting for a variety of manufacturing industries investigating the use of lasers in their operations.

KEYWORDS: Lasers; Precision Parts; Welding; Heat Treating; Weld Overlaying; Cladding; Cutting; Sensors; Inspection; Corrosion Control; Optical Systems; Quality Assurance Instrumentation.

REVISED: January 88

ALBERTA RESEARCH COUNCIL

ADDRESS: Executive Offices
250 Karl Clark Road
P. O. Box 8330, Sta F
Edmonton, Alberta, Canada
T6H 5X2

CONTACT: Ms Dorothy M Hollands, Corporate Secretary & Dir of Public Relations (403) 450-5111

HISTORY: The Alberta Research Council is a provincial Crown Corporation founded in 1921 to advise the Alberta Government on scientific affairs and to promote the economic growth of Alberta through scientific and engineering research. It has over 500 employees at offices and laboratories mainly in Edmonton, and at offices in Calgary, Red Deer, Nisku, Devon and Lethbridge.

CAPABILITY: The Research Council has established six major areas of research - industrial technologies, oil sands and hydrocarbon recovery, coal and hydrocarbon processing advanced technologies, natural resources, biotechnology, and advanced technologies. The industrial technologies program provides service to industry through an assistance program for small business. Oil Sands and hydrocarbon recovery includes geology studies, heavy oil cracking, and in-situ recovery. Coal and hydrocarbon processing includes geology studies, agglomeration, combustion, pyrolysis, coal property definition, and gasification. Natural resources research activities include geological survey, terrain sciences, civil engineering, and resource technologies. Biotechnology includes microbiology, fermentation technology and pilot level scale up. Advanced technologies include computer-based automation, expert systems and robotics for application and transfer to industry.

The Research Council also operates the Electronics Test Center which provides evaluation, testing and consultation services to electronics and telecommunications manufacturers to meet Canadian and international requirements. In 1987, the test center obtained formal accreditation from the Department of National Defence.

AVERAGE WORK FORCE: Scientists, Engineers, & Research Technologists.

GROSS SALES: The Research Council operates on a \$40 million budget, half of which comes in the form of an annual provincial grant, and the other half which comes from contracts with provincial government departments, federal government and private industry.

PLANT SIZE: 505,250 ft² (47,000 m²) (1984)
580,500 ft² (54,000 m²) (1987)

EQUIPMENT: The Research Council has a range of equipment for carrying out studies on oil sands and coal technology from fundamental science to bench scale pilot work, sophisticated chemical analytical instruments, and distributed computing equipment. The biotechnology pilot plant for scale-up of micro-organisms to pre-production quantities is considered one of the finest of its type in North America. With the completion of a 15,000 liter fermenter this year, the pilot plant will have a scale-up capacity of more than 20,000 liters.

EXPERIENCE: Details on their experience in areas of natural resources research and in research on oil sands, coal agglomeration, and liquefaction; biotechnology; advanced technologies; and industrial and engineering areas is available on request.

KEYWORDS: Air Pollution; Biotechnology; Coal Liquefaction; Coal/Oil Agglomeration; Computer Graphics; Digital Data Processing; Environment; Expert Systems; Forest Products Testing; Geographic Information Systems; Geology; Ground Water; Industrial Engineering; Materials Testing; Microbiology; Numerical Modelling; Oil Sands; Robotics; Soils; Statistical Analysis; Surface Water; Testing/Test Equipment; Transportation; Water; Weather Forecasting.

REVISED: January 88

ALCAN INTERNATIONAL Ltd (Kingston R&D Centre)

ADDRESS: P. O. Box 8400
945 Princess Street
Kingston, Ontario, Canada
K7L 4Z4

CONTACT: Dr David M Moore, Program Director, New Aluminum Materials (613) 541-2167

HISTORY: Alcan International Ltd is the technology arm of its parent company, Montreal-based Alcan Aluminum Ltd. Incorporated in 1902,

Alcan Aluminum Ltd is an integrated aluminum company, engaged worldwide in all phases of the aluminum business including bauxite mining, alumina refining, aluminum smelting, semi-fabrication and finished product manufacture and sales. Alcan is the largest aluminum company in the world as well as being one of the largest multinational companies based in Canada. Alcan Aluminum Corp with its head office in Cambridge, MA, is the US subsidiary operating numerous plants in various states.

CAPABILITY: Alcan International Ltd operates three R&D centers (two in Canada, one in the UK). The Kingston Research and Development Centre (KRDC) is involved in research and development associated with most aspects of aluminum fabrication processes and products in support of the existing mainstream businesses; as well, considerable effort is being devoted to developing new products in the areas of metal matrix composites, ceramics, advanced polymeric materials and laminates, catalysts, batteries, electronic products and bioengineering products.

KRDC is especially well equipped with a full range of equipment for microstructural, mechanical property, surface analytical evaluations. It also has the capability to set up pilot-scale manufacturing of new products. It is recognized as one of the leading materials laboratories in Canada.

AVERAGE WORK FORCE: Phd's - 46
Other graduate scientists & engineers - 60
Other Staff - 189
Total Staff - 295

GROSS SALES: (Alcan Aluminum Ltd)
1986 - \$6.1B
1987 - \$6.9B

PLANT SIZE: (KRDC) - 220,000 Sq ft

EQUIPMENT: Electron Optics (STEM, SEM, EPMA); Surface analysis (XPS, SAM, FTIR); Optically metallography; Mechanical property (tensile, fracture toughness, fatigue, etc.); Corrosion testing; Coating and finishing (organic, anodizing, sputtering); Aluminum foundry; Aluminum rolling and extrusion; Machine shop; Chemical analysis (ICP and OES); Non-destructive testing (x-ray, ultrasonic, thermographic); Structural test bed; Ceramics manufacture; and Can and heat exchanger manufacturing test lines.

EXPERIENCE: Present clients for the most part are the various operating companies of Alcan worldwide. Work is also carried out on behalf of the various Alcan-owned new start-up businesses, such as Epitronics (CaAs), DAAC (Al-SiCMMC's) and Alupower (Al-air batteries).

KEYWORDS: Aluminum; Materials; Composite Components; Ceramics; Structures; Testing (Materials); Aluminum-Lithium.

REVISED: February 88

THE AMTEK GROUP

ADDRESS: 9 Slack Road
Nepean, Ontario, Canada
K2G 0B7

CONTACT: Mr T R Canning, VP Operations - (613) 727-5040

HISTORY: AMTEK was formed in January 1981 to provide services to government and industry in Integrated Logistic Support (ILS), Automatic Test Equipment (ATE), and contract/program/proposal management.

CAPABILITY: The AMTEK Group consists of four small wholly Canadian-owned companies engaged in various fields of support to the government and industry defence sectors (principally aerospace):

- AMTEK Management Inc
- AMTEK Testware Ltd
- AMTEK Engineering Services Ltd
- LODAY Project Management International Ltd

The lead company of the group is AMTEK Management Inc, providing professional engineering and management services to both government and industry. The company specializes in the application of advanced management techniques in the fields of Integrated Logistics Support (ILS) and project/proposal management. Services offered include:

- Full range of ILS Services
- Proposal Preparation and Assistance
- Program and Procurement Management
- Configuration Management
- Technical Publications
- Training
- Data Management Systems
- Logistics Support Monitoring
- Life Cycle Support Management

AMTEK Testware is a new Edmonton-based company created to provide engineering services in sophisticated Automatic Test Equipment (ATE) and software development. It will cross-fertilize with Alberta companies and assist in the diversification of Western industries.

LODAY is a dynamic company applying advanced project management techniques and systems. LODAY provides a full business management approach to the development of systems and procedures for project management, system engineering, configuration management, data management, CPM network planning and control and program management requirement preparation.

AVERAGE WORK FORCE: 100 (Professional Engineers, Technologists and support staff)

GROSS SALES: 1986 – \$2.8M
1987 – \$3.2M

PLANT SIZE: 32,000 Sq Ft

EQUIPMENT: No Data

EXPERIENCE: AMTEK clientele includes the Department of National Defence, Department of Supply and Services, Canadian Marconi, Hughes Aircraft, British Aerospace, Paramax, Oerlikon Aerospace, Bendix Avelex, European Helicopter Industries, Vickers Shipbuilding and Engineering Ltd, Frontec, Canadair and NRC.

KEYWORDS: Automatic Test Equipment; Configuration Management; Contract Management; ILS; Level of Repair Analysis; Logistic Support Analysis; Program Management; Training.

REVISED: February 88

ANDREW ANTENNA COMPANY Ltd

ADDRESS: 606 Beech Street
Whitby, Ontario, Canada
L1N 5S2

CONTACT: Mr John Lawson, Business Development Manager, Government Products Group – (416) 668-3348

HISTORY: Andrew Antenna Company Ltd was incorporated in 1953 being granted a Dominion Charter by the Government of Canada, and is a subsidiary of Andrew Corporation of Chicago, IL. Andrew has grown and expanded with the dynamic communications industry. The design and manufacturing efforts of the company have been centered on antennas (earth stations, terrestrial microwave, radar and navaid), transmission lines (waveguides and coaxial cables), and related equipment. Through the years, Andrew engineers have paced the industry in these specialties. From its first directional broadcast arrays, to its current satellite earth station antennas, Andrew has grown in physical size and technical knowledge.

CAPABILITY: Andrew can supply all of the elements for microwave, broadcast, earth station, VHF, UHF, HF, cellular, special application, military and tactical antenna systems – including antennas, waveguide and cable, towers, equipment shelters, transportation, installation and project management. The company has also developed a wide variety of custom antenna systems for applications as varied

as radar, navigation aids, telemetry, command and control, and tactical HF communications, in frequencies ranging from VLF to millimeter wave.

AVERAGE WORK FORCE: PhD – 2
Engineers – 10
Others – 200

GROSS SALES: 1986 – \$23.0M
1987 – \$22.4M

PLANT SIZE: 8,036 Sq Meters

EQUIPMENT: The Canadian operation includes: metal spinning, punching, forming, an extensive machine shop with a number of automatic machine tools, a welding shop with equipment for tungsten/inert gas, silver brazing and soldering, complete facilities for metal finishing and painting, assembly and fitting shops, and packing facilities. Andrew uses an on-line Manufacturing and Production Information Control System, commercially available structural analysis software, including FAPMAT (an interactive program which interprets windloading), and RMSDISP (a post processor program which manipulates ASAS displacements to interpret antenna performance). The company's facilities include a fully equipped model shop, a 19-meter near field anechoic chamber and an antenna pattern test range with unobstructed sources, ranging from 200 to over 5,000 meters from the main test tower.

EXPERIENCE: Andrew's present customers include: military and government agencies as well as prime contractors in Canada, the US and abroad. Recent contract awards include the manufacture of 23-foot reflector antennas, feed systems and waveguide for the Next Generation Weather Radar (NEXRAD) system to determine wind speed, wind direction and storm configurations. Raytheon Co, under the contract to the Electronic Systems Division of the USAF, awarded Andrew a contract for the manufacture of dual-space diversity 9.5 ft parabolic antennas and waveguide feeds for AN/TRC-170 (V2) tactical digital troposcatter equipment. Raytheon Co has also awarded Andrew a contract for the production of 35-ft L-Band antennas for the Radar Modernization Program (RAMP) to replace and modernize ATC primary and secondary enroute and terminal radar systems. The company is manufacturing 98 earth station antennas for CANAC/Microtel to be used in the North Warning System. Andrew is also producing munition lockers and launchers for the Plessey Shield II Chaff and IR Decoy System being sold by Plessey Naval Systems to the Brazilian Navy, the Canadian Patrol Frigate Program and the Tribal Class Update and Modernization Project (TRUMP).

KEYWORDS: Antennas; ATC; Radar Weather; Radar Navigation Aids; Tactical Communications; Earth Stations; Terrestrial Microwave Antennas; Special Purpose Antennas; HF Antennas; Broadcast Antennas; Fabricated Aluminum Structures; HELIAX Coaxial Cable; Elliptical Waveguides; Waveguide; Towers (Antenna); Equipment Shelters.

REVISED: January 88

APPLIED MICROSYSTEMS Ltd

ADDRESS: 2035 Mills Road
Sidney, British Columbia, Canada
V8L 3S1

CONTACT: Mr M duPlessis, President – (604) 656-0771

HISTORY: Applied Microsystems Ltd is a Canadian-owned, high-technology manufacturing company, incorporated in British Columbia in 1976. It specializes in the manufacturing of high-technology sensors and data logging instrumentation.

CAPABILITY: Applied Microsystems' primary business is design and manufacture of standard and custom electronic instruments for use underwater. The products are reliable, high-precision, data recording instruments built for long term deployment based on battery power. The company designs and manufactures its own sensors, electronics and pressure housings, and is well known for its oceanographic engineering and customized products. Approximately 33% of its sales are in Canada, 33% in the US and 33% throughout the remainder

of the world. Although a number of products are sold directly by the factory, the company is represented in most countries through an agency structure. In the US, agents in Florida, Texas, Massachusetts, California and Virginia represent all of the standard products manufactured by Applied Microsystems Ltd.

AVERAGE WORK FORCE: Engineers - 4
Others - 12

GROSS SALES: 1986 - \$630K
1987 - \$670K

PLANT SIZE: 17,500 Sq Ft

EQUIPMENT: Applied Microsystems has machine shop facilities, an electronics assembly and production facility, a research and development division, an environmental test chamber, a deep ocean testing, and a sea water test tank.

EXPERIENCE: Past customers include nearly every oceanographic and hydrographic Government Research Institution around the world.

KEYWORDS: Conductivity Sensors; Current Meter Systems; Data Acquisition; Data Logging; Depth Systems; Geophysical Instrumentation; Meteorological Instruments; Oceanographic Instrumentation; Sound Velocity Systems; Temperature Sensors; Underwater Acoustics; Underwater Instrumentation.

REVISED: April 88

APREL Inc

ADDRESS: 38 Antares Drive
Nepean, Ontario, Canada
K2E 7V2

CONTACT: Dr Jacek J Wojcik, PEng, President - (613) 727-0334

HISTORY: APREL Inc is a privately owned, independent, Canadian, commercial laboratory which provides confidential certification testing, applied research and development, engineering and related services to a wide range of government departments and agencies, and major corporations in the telecommunications, military and computer industries. APREL Inc was incorporated on 2 Nov 1982 under the name Aprel Industrial Acoustics Ltd. With a broadening in the scope of activities, the name of the company was changed to APREL Inc in July 1985. APREL is located 5 minutes from Ottawa International Airport and 45 minutes from the New York state border in prestigious Rideau Height Business Development Park.

CAPABILITY: APREL Inc is the most advanced independent certification testing, R&D laboratory in Canada featuring a large floating Anechoic Chamber, Open Area Test Site, two Shielded Rooms, various environmental test facilities, and electronic and acoustic labs. APREL Inc is involved in the testing of telecommunications equipment, computers and military equipment for Department of Communications, Federal Communications Commission, Canadian Standards Association, Military and Industrial Standards. APREL Inc also actively participates in the development of National and International Standards. APREL's scope of activities and capabilities encompass - electromagnetic interference/compatibility; electrostatic discharge (simulated lightning); DOC, FCC, JATE and CSA certification; voice and data terminal performance; electroacoustics and acoustics; reliability and environmental engineering; product engineering and re-engineering; product design and manufacture; independent R&D contracting; and marketing capability

AVERAGE WORK FORCE: Engineers & Scientific Staff - 20

GROSS SALES: 1987 - \$1.9M
1988 - \$2.5M (Est'd)

PLANT SIZE: 21,000 Sq Ft

EQUIPMENT: See discussion under CAPABILITY above

EXPERIENCE: APREL Inc has provided confidential services to a wide range of organizations in the telecommunications, computer,

electronics and high-technology fields. Among those organizations are - AECL, AT&T, Bell Canada, BELL Northern Research, Convergent Technologies, Gandalf, General Electric, IBM, Litton, Mitel Northern Telecom, Plessey, Racal, Raytheon, TIE/Communications, Xerox, Yamaha, and Zenith.

KEYWORDS: Certification Testing; Environmental Testing; Electro-magnetic Compatibility; EMI; Testing (Certification); Acoustic Testing; Engineering Sciences.

REVISED: February 88

THE ARMSTRONG MONITORING Corp

ADDRESS: 215 Colonnade Rd South
Nepean, Ontario, Canada
K2E 7K3

CONTACT: Mr David Robinson, Sales/Marketing Department Manager (613) 225-9531

HISTORY: The Armstrong Monitoring Corp is a Canadian-owned electronic hazardous gas and vapor detection systems manufacturing firm founded in January 1981. The company has offices across Canada, throughout the Pacific Rim and the US.

CAPABILITY: The Armstrong Monitoring Corp is primarily involved in the manufacturing of fixed and portable hazardous gas detection systems, in addition to vapor detection for the petroleum industries fuel storage facilities. In the fixed gas detection, they offer both rack and wall mount systems incorporating a remote calibration sensor/transmitter that produces a time saving factor. In the area of sensors, they range from electrochemical, catalytic and solid state. Offered in the solid state type is a specific poison proof H2S sensor with a five year warranty and a ten year life expectancy. On the portable side, units range from hand-held amc 1100 series to the amc 3000 series. In the amc 3000, AMC offers their exclusive three meter, three sensor concept in a compact portable unit which allows three separate conditions to be monitored simultaneously (oxygen, toxic, and combustible gases).

The other major product line developed for the petro-chemical industry is the amc vapor detection system. A solid-state poison proof sensor specific to petroleum distillates such as gasoline, yet not recognized by methane (CH4), is used in conjunction with a wide range of monitors. These monitors are packaged as single channel or four to twelve channel units. The vapor system offers the owners of petroleum storage facilities both underground and above ground twenty-four hour surveillance of their tanks, in the event that leakage should occur.

AMC's human resources allows them to comprehensively maintain all levels of manufacturing from in-house R&D (consisting of engineering staff and product technician), to Quality Control, Quality Assurance, right through to their training programs.

AVERAGE WORK FORCE: Engineers - 4
Degrees - 7
Others - 25

GROSS SALES: No Data

PLANT SIZE: 14,000 Sq Ft

EQUIPMENT: Calibration chambers, environmental chamber (1 ton), Litton 8820 computers, full line of instrumentation devices for alignment and testing capability, 210 unit TRX 12 volt power burn-in panel, 4 unit 115 volt monitor burn-in panel, and a 600 volt transformer power supply.

EXPERIENCE: Customers countries include Canada, the US, South America, Singapore, Malaysia, India, the Netherlands, Australia, Thailand and Taiwan. Applications range from heavy water plants (H2S), coal mining (CH4), pulp and paper industry (H2S, CO), offshore rigs (H2S, CH4), commercial properties (CO), underground vehicle tunnels (NO2, CO), to marine and navy ships (CH4), and now petro-

leum storage facilities (gasoline), plus many other institutions throughout the world.

KEYWORDS: Calibration Equipment; Carbon Monoxide Gas Detection; Catalytic Sensors; Chemistry; Chlorine Gas Detection; Combustible Gas Monitors; Data Acquisition; Electrochemical Devices; Electronic Gas Detectors; Environment; Gas Detectors; Hazardous Gas Detection; Hydrogen Sulfide Sensors; Leak Detectors; Monitors (Gas); Pollution Monitoring Equipment; R&O (Environics); Safety Equipment; Sensors; Solid State Devices; Thermal Conductivity Devices; Toxic Gas Detectors.

REVISED: February 88

ATLANTIS AEROSPACE Corp

ADDRESS: 951 Rowntree Dairy Road
Woodbridge, Ontario, Canada
L4L 4E4

CONTACT: Mr Chris Lehman, Sr Marketing Representative -
(416) 851-8531

HISTORY: Atlantis is a wholly owned Canadian company incorporated in 1978. There are no other Canadian divisions or US subsidiaries.

CAPABILITY: Atlantis manufactures simulators/computer assisted training systems, avionics test equipment and specialized aerospace instrumentation and control systems.

Atlantis Aerospace Corp has firmly established itself in the international military and commercial marketplace with an excellent reputation for quality and performance.

The Simulation/Training Group offers total training systems capability that spans the complete range of training aids including: maintenance trainers, part-task trainers, operational trainers, computer-based training systems and hardware-in-the-loop trainers.

Atlantis has produced simulator systems for use by the US, Australian and Canadian Forces which include a complete suite of maintenance trainers for the F/A-18 aircraft, the H-46 helicopter and the E-6 aircraft. Each of these systems offers "O-level" maintenance training in a free-play environment and feature free-play systems simulation, interactive laser video disk technology, mathematically modelled test equipment and instructor selected faults.

The Avionics Test Equipment Group offers a complete line of commercial and military avionics support equipment including a full range of ARINC testers designed to support the new digital commercial aircraft such as the Boeing 757/767. MIL-STD-1553/A bus testing capability is provided by the DCM-1553 Digital Bus Communicator. Designed as a user-friendly interface to the digital busses of aircraft such as the F/A-18, the DCM-1553 has been ordered by the US, Australian and Canadian Air Forces.

The Instrumentation/Control Group specializes in developing custom microprocessor-based technology such as Autopilot/Guidance Systems for remotely piloted vehicles and target drones.

AVERAGE WORK FORCE: Engineering - 115
Manufacturing - 35
Others - 40

GROSS SALES: 1986 - \$7.0M
1987 - \$8.0M

PLANT SIZE: 27,000 Sq Ft (expanding to 60,000 Sq Ft in 1988)

EXPERIENCE: Atlantis has supplied equipment to the following companies: McDonnell Douglas, the US Air Force, Canadian Department of Defense, Boeing Helicopter Co, Boeing Military Airplane Co, Boeing Aerospace Co, the US Navy and Marine Corps, and the Royal Australian Air Force.

KEYWORDS: Animated System Trainers; Avionics; Cockpit Voice Recorders; Computers; Engine Component Simulator; Flight Data Recorders; HF Transceivers; Radio/Radar Altimeters; Simulators;

Software Development; Software Services; Systems Simulation; Test Equipment (Digital 1553); Testing/Test Equipment; Training Aids; Training Simulators; VHF Navigation Systems.

REVISED: February 88

ATOMIC ENERGY OF CANADA Ltd

ADDRESS: 275 Slater St
Ottawa, Ontario, Canada
K1A 1E5

CONTACT: Dr S R Hatcher, President, AECL Research Co -
(613) 236-6444

HISTORY: AECL was formed as a crown corporation in 1952 with a mission to develop nuclear energy and associated technologies for the benefit of Canada.

The company has recently redefined its strategic direction and now emphasizes innovation and the development of non-nuclear products and services based on traditional enterprises.

CAPABILITY: The AECL Research Co operates two world-class research & development facilities - the Chalk River Nuclear Laboratory (CRNL) at Chalk River, Ontario, and the Whiteshell Nuclear Research Establishment (WNRE) at Pinawa, Manitoba. They represent one of Canada's top multi-disciplinary teams of technical professionals with expertise in almost every branch of science and engineering, including such fields as electronics, computer science, metallurgy, environmental management, design, construction, material physics, thermalhydraulics, wear & inspection, instrumentation, heat transfer, safety, etc.

AVERAGE WORK FORCE: Professional experts - 897
Technical Non-Production - 776
Production - 1,027
Administrative - 539
Others 63

GROSS SALES: FY 1986/87 - \$25.9M
FY 1987/88 - \$31.7M

PLANT SIZE: 2 World-Class Laboratories (Chalk River, Ontario & Pinawa, Manitoba)

EQUIPMENT: Major facilities at CRNL and WNRE include - research reactors, TASCC (Tandem Accelerator Superconducting Cyclotron), drop-test facility, thermalhydraulic loops, hot cells, radio-isotope production facility, heavy water upgrading facility, physical security systems, tritium removal facility, computerized tomography equipment, neutron radiography equipment, corrosion testing equipment, fretting-wear test facility, material characterization equipment, fracture & failure analysis equipment, catalyst lifetime test facility, computer aided design facilities, machining, welding & sheet metal facilities, a wide array of research analytical equipment, underground research and storage facility, tow-phase flow & gas dynamics equipment, combustion test facility, etc.

EXPERIENCE: Atomic Energy's present customers include - the Canadian Government, major electric power utilities, Canadian and international industries, and Canadian & foreign research institutes & associations.

KEYWORDS: Nuclear; Testing; Process Control; Optics; Electro-Optics; Environmental Control; Robotics; Structural Dynamics; Chemical Analysis; Ceramics; Spectrometric Technology; Heat Energy; Steam Quality Stack-Gas Scrubbing.

REVISED: February 88

(ATS) AERONAUTICAL TRAINING SYSTEMS Inc

ADDRESS: 3163 Harvey
St Hubert, Quebec, Canada
J3Y 3T7

CONTACT: Mr R C Edgar, Manger ATC Systems - (514) 676-6259

HISTORY: ATS (Aeronautical Training Systems Inc) is a high-technology aviation services company, founded in 1983 as a wholly owned subsidiary of Ballistech Systems Inc (BSI). BSI is a Canadian-owned high technology engineering company, servicing the Canadian Department of National Defence and other NATO Government defence agencies. A US subsidiary is currently being formed in North Troy, VT. ATS and BSI are co-located at the above address and the capabilities described below cover both companies.

CAPABILITY: ATS is primarily involved in the design and manufacture of air traffic control training and operational equipment. Other specialties of the ATS/BSI group includes computer aided learning systems, digital recorders (data acquisition and data processing), high "g" electronics and instrumentation/field experiment support services. ATS radar environment simulators developed by ATS personnel are presently in service in the Middle East, Africa and South America. A mobile ATS control tower designed and fabricated by ATS is in service with Transport Canada (Ontario Region). ATS Signal Light Guns (Aldis Lamps) are in service with Transport Canada and the Canadian Air Force. Two new ATS radar environment simulators are presently being installed at the Transport Canada ATS Training centers in Montreal and Toronto. Digital Stand-Alone (DIGISTAR) recorders and data acquisition systems developed by ATS have been used at White Sands Missile Range by DND, DOD/DNA and the Government of Norway. DND and NDCS (Norway) have recently procured DIGISTAR digital recorders. The company has also developed RPV's and mobile computerized ground control station facilities for DND which are currently in use at the Defence Research Establishment Suffield. General capabilities include ammunition and weapons systems design, RPV systems, aerial targets, ATC aviation equipment development support and training, software development, instrumentation development.

AVERAGE WORK FORCE: PhD - 1
Engineers - 8
Others - 16

GROSS SALES: 1986 - \$1.6M
1987 - \$2.0M (Est'd)

PLANT SIZE: 4,000 Sq Ft (St Hubert, Quebec)
4,000 Sq Ft (Medicine Hat, Alberta)

EQUIPMENT: IBM AT/PS-2 compatible microprocessors, electronic and mechanical CAD, digital electronics development facilities. The company operates test facilities, including a 1.8m x 50m FAE blast wave tunnel for DND/DRES at Suffield, Alberta.

EXPERIENCE: Customers include - DND (Canada), DOT (Canada), US Army (BRL), Defence Nuclear Agency (DNA), Government of Norway, Government of West Germany (BWB), ICAO (International Civil Aviation Agency), Government of Greece (Civil Aviation and Navy). The company is interested in doing business with the US Military.

KEYWORDS: ATC; Simulators (ATC); Mobile Control Towers; Digital Recorders; Data Acquisition; RPV; Ground Control Stations; Computer Aided Learning; Ammunition Design and Testing; Aerial Targets; Radar Augmentation Devices; Software Development.

REVISED: March 88

AVCORP INDUSTRIES Inc

ADDRESS: 4999 St Catherine St W, Suite #435
Westmount, Quebec, Canada
H3Z 1T3

CONTACT: Mr David Adamson, President & CEO - (514) 485-6508

HISTORY: Avcorp Industries Inc was formed in 1986 to provide an integrated design, engineering, manufacturing and servicing capability to the aerospace industry. The company has brought together a number of established aerospace companies that collectively share more than a century of experience in the production and servicing of an extensive range of metal, composite and specialized plastic components used in the aerospace industry, as well as aircraft turbine engine repair and overhaul.

CAPABILITY: The following categories describe Avcorp's capabilities:

- **Plastics** - Window facings and interior trim elements, lighting diffusers, windshields and dashboards, armrests and other self-skinning foam products, aircraft interior panels, ground support equipment, fairings, moldings, doors, nose and tail cones for surveillance aircraft, flight simulator bodies, wing tip lenses, cockpit glare shields, aircraft ducting, fighter aircraft canopies, satellite earth station & ship antennae, and specialized containers (Also see Flexibulb Inc & Plastal Inc).

- **Composites** - Tail section components for deHavilland Dash-8 and Canadair Challenger, components for McDonnell Douglas DC-9, fuselage & auxiliary fuel tanks, wing-tip floats, engineering detailed design, design modifications, certification, destructive and non-destructive testing, composite and hybrid characterization analysis, and cyclotron accelerator components (also see Canadian Aircraft Products Ltd).

- **Metals** - Canadair Challenger spars, splices, caps, weights; deHavilland Dash-7 & 8 hinges, fittings, ailerons, machine parts; auxiliary fuel drop tanks for McDonnell Douglas F15; aircraft ground support equipment, engine overhaul tooling, airframe overhaul tooling, detailed design of commercial and military jet engine handling and transportation systems, non-destructive testing, precision landing gear components, engine stands and containers, watertight doors and hatches, skuttles, and bollards (also see AWSM Enterprises Ltd & Decade Industries Ltd).

- **Turbine Repair and Overhaul** - Allison T63/250 series - all turboshaft models, Allison T56/501 series turboprop engines, Allison 501 series industrial engines, Lycoming T53 series turboshaft engines, Lycoming T55 series turboshaft engines, General Electric T58 series turboshaft engines, Pratt & Whitney Canada PT6A series engines, Sundstrand/Turbomach APUs, and related accessories (also see Standard Aero Ltd).

AVERAGE WORK FORCE: Total - 1,182 (All locations)

GROSS SALES: 1986 - \$ 4.7M
1987 - \$52.6M

PLANT SIZE: 550,000 Sq Ft (All locations)

EXPERIENCE: Customers include: Government of Canada, US DOD, Air Canada, Canadian Pacific Air Lines, Northwest Orient, Oerlikon Aerospace Inc., Bendix Avelex Inc., Okanagan Helicopters Ltd, Bombardier Inc., Atomic Energy of Canada, Menasco Aerospace Ltd, Canadair Ltd, deHavilland Canada Ltd, McDonnell Douglas Canada Ltd, Boeing of Canada, Pratt & Whitney Canada, Morse Controls Ltd, Flying Tigers Inc., and Raytheon Canada Ltd.

KEYWORDS: R&O (Engines); Airframe Components; Airframe Structures; Aluminum Components; Camera Systems Components; Cargo Handling Equipment; Composite Components; Electrical Test Equipment; Engineering Services; Flaps; Ground Support Equipment; Helicopter Subsystems; Isotope Dispensing Equipment; Jig Fabrication; Machining; Metalworking; Modification (Aircraft); Non-Destructive Testing; Pipeline Control Components; Plastic Molding; Plastic Fabrication; Precision Tooling; R&O (Aircraft Components); R&O (Equipment); Radioactive Waste Containment; Rudder Assemblies; Software Services; Structural Analysis; Structural Design; Tooling.

REVISED: February 88

AVIATION PLANNING SERVICES Ltd

ADDRESS: 800 Dorchester Blvd, W, Suite #1420
Montreal, Quebec, Canada
H3B 1X9

CONTACT: Mr C E B McConachie, President & Director - (514) 878-4388

HISTORY: Aviation Planning Services Ltd (APS) was formed in 1967 as a Canadian branch of R Dixon Speas Associates of New York. In 1971, it was incorporated under the authority of the Canadian Corporation Act. Since its inception, the company has performed approximately 360 projects for over 100 clients both domestic and in 28 countries outside of Canada.

CAPABILITY: APS was formed to provide professional consulting services to all sectors of the aviation industry. Major activities are directed toward commercial air transportation, airport planning, general aviation, product analysis for aerospace manufacturers, maintenance base planning, equipment procurement, and aviation system planning and development programs for industry and government.

The multi-disciplinary staff consists of specialists in engineering, flight operations, airline economics, aircraft maintenance, aircraft noise impact, and aviation products marketing. APS project supervisors average more than 25 years of aviation experience, both in industry and consulting services. The firm is dedicated to keeping pace with the latest developments in all facets of the industry and maintains an up-to-date library of research reports and aviation statistics.

APS developed a technique for the use of aircraft flight simulators equipped with computer generated imagery for the evaluation of prospective airports. The firm is currently working on behalf of Canadair in the market assessment of a stretched CL-601 Regional Jet (48 seat derivative of the corporate aircraft). As consultants to the airline industry, the firm has also developed a number of procedures in the sizing of new maintenance and overhaul facilities which have been utilized on both domestic and overseas projects. The clientele of APS consist of international airlines, business aircraft operators, foreign, federal, provincial and local governments, financial and industrial organizations, and aircraft manufacturers. The high ratio of repeat business is an indication of the confidence these diverse groups have in the capabilities of the company.

AVERAGE WORK FORCE: Professionals - 9
Outside Consultants - 5 - 20
Support Staff - 5

GROSS SALES: 1986 - \$400K
1987 - \$900K

PLANT SIZE: 3,400 Sq Ft

EQUIPMENT: One PC/AT computer, 3 PC/XT computers, and two word processors.

EXPERIENCE: The firm has provided professional consulting services to organizations including: major air carriers, international agencies, overseas government agencies, Canadian government agencies, aerospace manufacturing and sales organizations, and financial & business organizations.

KEYWORDS: Consulting; Master Planning; Traffic Forecast; Economic Analysis; Site Selection; Equipment Procurement; Route Analysis; Maintenance & Overhaul Facility Planning; Market Surveys; Aircraft Performance Analysis; Equipment Selection; Business Plan Preparation; Navigational Aids; New Product Development; Operational Studies; ATC Analysis.

REVISED: February 88

AVTECH ELECTROSYSTEMS Ltd

ADDRESS: (Mailing)
P. O. Box 5120, Station F
Ottawa, Ontario, Canada
K2C 3H4

(Location)
15 Grenfell Crescent, Suite #205
Nepean, Ontario, Canada
K2G 0G3

CONTACT: Dr W J Chudobiak, President - (613) 226-5772

HISTORY: Avtech Electrosystems Ltd is a small, private Canadian, high-technology company incorporated in 1975. There are no other branches or affiliates in Canada or the US. The company is represented in France, W. Germany, Japan, Austria, the UK, and Italy.

CAPABILITY: Avtech was established for the purpose of designing and marketing nanosecond waveform instrumentation. Since its start, it has become recognized as a leading supplier of nanosecond waveform generators and accessories with over 150 models. Their product line includes pulse generators, impulse generators, monocyte generators, pulse amplifiers, samplers, transformers, power splitters, bias insertion units, and scope probes.

The all solid-state waveform generators are available as stand-alone lab instruments, or as miniature DC powered modules. The amplitude and the voltage rate of rise for some of their units are at least an order of magnitude higher than those provided by standard tunnel diode pulse generators. The combination of some aspects of micro-wave integrated circuit technology with ultra-fast semiconductor device switching technology (including SRD, hot carrier diodes, avalanche, VMOS and bipolar switches), has yielded 100 psec rise and fall times, PRF beyond 250 MHz, amplitude to 350 volts, peak currents to 100 amperes, and single cycles of RF to 1500 MHz. They can design, develop and build to customer requirements.

Avtech's inverting and impedance transformers are designed to be used with general purpose laboratory pulse generators, with subnanosecond risetime pulse generators and circuits, and other units. They provide inverted output pulse with a magnitude equal to the input signal magnitude, and can match to other impedance levels or can obtain higher output currents.

Avtech's power splitters provide two outputs which are either both in phase (non-inverted) with the input signal, or with one output non-inverted and with one inverted. They are designed for use with nanosecond speed laboratory pulse generators, with CW signals, or with other units to frequencies as high as 1.0 GHz. Their bias insertion unit is designed for both CW and subnanosecond risetime baseband pulse applications. The scope probe was designed to be used with a 50 ohm sampling oscilloscope, to allow probing of test points in microstrip structures and in discrete RF circuits and subnanosecond pulse circuits, operating at frequencies as high as 5 GHz and with risetimes as low as 100 psec.

AVERAGE WORK FORCE: Total - 7

GROSS SALES: 1986 - \$1.1M
1987 - \$1.1M

PLANT SIZE: 3,500 Sq Ft

EXPERIENCE: Approximately 98% of Avtech's sales are export. Their products have been supplied worldwide to companies, universities and government agencies, e.g., USAF, Sandia National Labs, Los Alamos Scientific Laboratories, Hewlett Packard, Honeywell, Hughes Aircraft, Lawrence Livermore Laboratories, Martin Marietta, Bell Northern Research, etc.

KEYWORDS: Bias Insertion Units; DC Powered Modules; High Speed Pulsers; Impedance Transformers; Impulse Generators; Inverting Transformers; Linear Pulse Amplifiers; Monocyte Generators; Nanosecond Devices; Power Splitters; Pulse Amplifiers; Pulse Generators; Scope Probes; Solid State Devices; Transformers; Waveform Generators; Waveform Instrumentation.

REVISED: January 88

AWSM ENTERPRISES Ltd

ADDRESS: 3905 Leman Blvd
St Vincent de Paul
Laval, Quebec, Canada
H7E 4V7

CONTACT: Mr Raymond Dery, President and CEO - (514) 661-9140

HISTORY: AWSM Enterprises Ltd is a wholly-owned subsidiary of Avcorp Industries Inc, Montreal, Canada. It was originally founded in 1952 as Aircraft Welding Sheet Metal Co Ltd.

CAPABILITY: AWSM fabricates a wide range of systems and assemblies involving close tolerance machined parts, sheet metal work, stamping, fusion welding, resistance welding, airframe structure; hydraulics and pneumatics, for Air Force, Navy, Army and commercial customers.

The company's products include: precision aircraft structural components, pilot and passenger seats, exhaust and ventilation systems, auxiliary fuel drop tanks, oil tanks, engine stands and containers, towbars, slings, precision marine components, watertight doors, hatches, skuttles, bollards, fairleads, cleats and more.

AVERAGE WORK FORCE: Engineers - 2
Technicians - 70

GROSS SALES: 1986 - \$4.2M
1987 - \$4.2M

PLANT SIZE: 40,000 Sq Ft

EQUIPMENT: CNC computerized machines.

EXPERIENCE: AWSM's customers include US Air Force, McDonnell Douglas Canada Ltd, Menasco Aerospace Ltd, General Electric Co (Marine Div), Canadian Armed Forces, all major Canadian dry docks, Canadair Ltd, Rolls Royce Canada Ltd, Pratt & Whitney Canada Ltd, the Boeing Co, Dowty Canada, and Morse Controls Ltd.

KEYWORDS: Aircraft Parts; Airframe Components; CNC Machining; Detailed parts; Sheet Metal Fabrication; Welding; Welding (Sheet Metal); Welding (Stainless Foils).

REVISED: March 88

BACHAN AEROSPACE OF CANADA Ltd

ADDRESS: 300 East Pike Creek Road
P. O. Box 39 Emeryville, Ontario, Canada
NOR 1C0

CONTACT: Mr Keith Branston, Director of Marketing -
(519) 727-6666

HISTORY: Bachan Aerospace of Canada Ltd was incorporated in the Province of Ontario in 1975 as a division of Bachan Aerospace Corporation. The company is owned by Talon Inc, Detroit, Michigan.

CAPABILITY: Bachan Aerospace is a modern manufacturer engaged in the design, fabrication and test of gears, gear boxes and precision assemblies for the aerospace and defense industries. Bachan maintains a complete gear facility for design, manufacture and test of gear boxes, precision spur, helical and bevel gears. This facility includes CNC machining, gear grinding, and gear inspection equipment. Bachan operates to MIL-Q-9858A.

AVERAGE WORK FORCE: 75 (Total)

GROSS SALES: 1986 - \$4.5M
1987 - \$5.0M

PLANT SIZE: 35,000 Sq Ft

EQUIPMENT: CNC machining and turning centers, gear cutting, grinding and lapping equipment, OD grinding, ID grinding, surface grinding, milling, lathes, cutting, computer co-ordinate measuring machine, gear checking equipment, NDT testing, copper plating and complete inspection facilities.

EXPERIENCE: Bachan has manufactured flap actuator gears for the Boeing 767, pump gears for Pratt & Whitney's JT 15, PT 6 and PW 100 engines, gas turbine disks for United Technologies Power Systems Group, cable and shaft assemblies for the Bendix FJ-A fuel

control system, and Radar Azimuth Drives for Norden systems. Bachan has been surveyed and approved by Avco Lycoming, Bendix Energy Control, Cleveland Pneumatic, General Dynamics, Hamilton Standard, Hawker Siddeley, McDonnell Douglas, Norden, Pratt & Whitney, Plessey Dynamics, Rolls Royce, Sunstrand Aviation, TRW Power Accessories, Boeing, Menasco, and Bell Helicopter.

KEYWORDS: CNC Machining; Cable Assemblies; Gear Boxes; Gears; Landing Gear Components; Machining; Missile Components; Precision Machining; Radar Drives; Shaft Assemblies.

REVISED: February 88

BARON COMMUNICATIONS Ltd

ADDRESS: 717 E Hastings Street
Vancouver, British Columbia, Canada
V6A 1R3

CONTACT: Mr Harry Baron, President - (604) 254-0577

HISTORY: Baron Communications was formed in 1981 as a wholly owned Canadian Corporation with representatives in Washington, Oregon, California, Arizona, and Illinois.

CAPABILITY: Baron specializes in the manufacture, design, and development of various types of tone signalling, alarm & status, and control systems, radio, and telephone interconnect terminals and associated mobile control heads.

AVERAGE WORK FORCE: 8

GROSS SALES: 1986 - \$0.225M
1987 - \$0.118M

PLANT SIZE: 2,000 Sq Ft

EQUIPMENT: Baron's equipment consists of Exorcisor II - Computer Development System 96K RAM, 1M Disc Capacity Development Module for 6800-6802 & 6801 Processors, PROM Programmer, and EPROM Programmer with Exorterm 150 console & Model 703 printer. They also have the usual assortments of oscilloscopes, VTVMs, spectrum analyzers, temperature environment chambers, transmission test sets, etc., necessary for the design and development of advanced circuitry.

EXPERIENCE: Baron is a recognized and accredited supplier of tone signalling equipment and systems (DTMF, in band, singletone, two-tone simultaneous or sequential) to Motorola, GE, Pacific Northwest Bell Telephone Co, Michigan Bell Telephone Co, General Telephone & Equipment, Getty Oil Company, ALASCOM, AT & T, US Army Corp of Engineers, and the RCMP.

KEYWORDS: Alarm Systems; Based Tone Signalling; Communications; Computers; Microprocessors; Microwave Systems; Mobile Control Heads; Status Systems; Telephone Communications; Telephone Interconnect Terminals; Tone Signalling.

REVISED: May 88

BARRINGER RESEARCH Ltd

ADDRESS: 304 Carlingview Drive
Rexdale, Ontario, Canada
M9W 5G2

CONTACT: Mr John Davies, President - (416) 675-3870

HISTORY: Barringer Research was founded in 1961 to develop geophysical and geochemical techniques and instrument systems relating to mineral exploration. Barringer Resources Inc (formerly Barringer Research Inc) was incorporated under the laws of the State of Delaware on 7 Sep 67 for the purpose of acquiring all of the issued and outstanding voting stock of Barringer Research Ltd, an Ontario (Canada) corporation.

CAPABILITY: Barringer has undertaken research projects primarily in the earth sciences in the disciplines of geology, geochemistry, electro-optics electromagnetics, magnetics and atmospheric physics. As a result of such projects, they have developed instrument systems and techniques in the fields of airborne and ground mineral exploration and environmental and process monitoring. They have, during the past five years, devoted a substantial portion of their efforts toward adapting for oil and gas exploration instrument systems and technology that they initially developed for mineral exploration. Recently, emphasis has been placed on military equipment for trace gas and liquid detection, and on rapid detection of drugs, explosive vapors and counterfeit bullion.

- Airborne Electromagnetic Systems – INPUT™ (INduced PUlse Transient), the most widely used airborne EM system in the western world for over 20 years; COTAN™ (CORrelation of TRANsients), an improved EM system offering greater depth penetration; and TIVAC, an adaptation for hydrocarbon exploration.
- Metal Detection Systems – Adaptation of above EM systems to specialized applications; and counterfeit bullion detector systems.
- Reflectance Spectroscopy for Remote Sensing – Hand-held Ratiometer Radiometer (HHRR); Field portable reflectance spectrometer (REFSPEC); and airborne laser fluorosensor systems.
- Trace Gas Detection – SO2 or NO2 remote sensor, COSPEC™; Gas filter correlation spectrometer for passive infrared remote sensing, GASPEC™; Drug and explosive vapor detection by ion mobility spectrometry; Mercury and its compounds in the environment; and microwave emission detection for gas chromatographic studies of pesticides and organics in the environment.
- Collection Systems for Analytical Geochemistry Studies – AIRTRACE™ helicopter or fixed-wing collection of aerosol samples; SURTRACE™ helicopter or ground-based collection of surface samples; and LASERTRACE, a rapid, inexpensive multi-element analysis of samples.
- On-line Process Stream Analysis – Heavy water analysis for CANDU nuclear reactors and heavy water manufacturing.

AVERAGE WORK FORCE: Engineers & Scientists – 26
(Canada Only)
Technical Support – 27

Barringer Research retains on staff a diverse group of scientists and engineers in the physical sciences. Barringer Magenta retains expertise in analytical chemistry, geochemistry, radon monitoring, and microbiology. The professional and supporting technical staffs shown above are for the metropolitan Toronto location only. The total US and Canadian professional strength is 40 scientists and engineers.

GROSS SALES: 1986 – \$8.4M
1987 – \$9.2M

PLANT SIZE: Barringer Resources Inc, Barringer Research Ltd, and Barringer Magenta Ltd lease the following office and laboratory space:

Location	Sq Ft	Purpose
15000 West 6th Ave, Suite 300 Golden, Colorado 80401	13,000	Office, Laboratory
304 Carlingview Dr Rexdale, Ontario	28,700	Office, Laboratory, & Mfg
1455 Deming Way, Suite 15 Sparks, Nevada 89431	7,200	Laboratory
3750 19th St, N. E. Calgary, Alberta	2,900	Laboratory
Field Aviation Hangar Malton (Toronto), Ontario	1,000	Avionics Workshop

EXPERIENCE: Barringer experience is world-wide. Recent R&D clients include British Petroleum, Petro-Canada Explorations Inc; TRW Systems Group (USA); National Research Council of Canada; Canadian Department of National Defense; Ontario Hydro; Department of Supply & Services (Canada); Rexnord Inc (USA); Atomic Energy of Canada Ltd; NASA Ames Research Center (USA); and Transport Canada. US DOD clients include Wright-Patterson AFB, OH – “Remote Detection of Chemical Vapors using Correlation Interferometric Techniques”, and AMCCOM – “UV Surface Sampling for Explosives”.

KEYWORDS: Airborne Electromagnetic Sensor; Airborne Laser Fluorosensor; Airborne Surveys; Data Analysis; Electro-Optics; Environmental Analysis; Geographic/Geologic Analysis; Hazardous Gas Detection; Infrared Instrumentation; Instrument Manufacture; Metal Detection; Remote Gas Detection; Remote Sensing; Signal Processing; Spectroscopy; Trace Gas Detection.

REVISED: February 88

BENDIX AVELEX Inc

ADDRESS: Mailing:
P. O. Box 2140
St Laurent, Quebec, Canada
H4L 4X8

Plant:
200 Laurentien Blvd
St Laurent, Quebec, Canada
H4M 2L5

CONTACT: Mr John Beaven, Director, Marketing – (514) 744-2811

HISTORY: Bendix Avelex Inc is a unit of Allied-Signal Aerospace Company. From its beginning in Montreal, Quebec, Bendix Avelex has grown into a world class supplier of high-technology defence electronics and aerospace products and services. Products include thermal imaging systems, night vision goggles, vehicle navigation systems, artillery gun alignment and control systems, 3-dimensional gun alignment and positioning systems, high fidelity video interactive gunnery simulators, operational tactical training simulators, and aircraft engine control systems and accessories. Services include repair and overhaul and comprehensive after sales services and product support.

CAPABILITY: Bendix Avelex has established solid expertise in a wide range of engineering disciplines which include digital/analog electronics, software development, electro-optics, thermal imaging, lasers, simulation, communications, geo-magnetics, pneumatics, and fluid dynamics and hydro-mechanics.

These broad engineering skills are applied to the design of highly reliable products meeting stringent specifications in the fields of defense, aerospace, and general aviation for national and international customers.

The Electronics Manufacturing facility is equipped with latest generation continuous flow soldering and conformal coating equipment, environmental test cells which includes sinusoidal and quasi-random vibration systems, burn-in chambers, automatic test equipment for PCB diagnostics and repair; and a class 100 clean room. The Precision Machining Facility reflects the latest advances in metal removal technology, capable of consistently achieving tolerances of 50 millionths of an inch. High performance machines include 3 and 4 axis CNC and DNC machining centers, CNC lathes, programmable precision grinders and many other sophisticated machine tools.

The Bendix Avelex total quality concept ensures that reliability and dependability are designed in the product. This philosophy is an essential requirement when meeting the stringent demands of the aerospace and defense market place. This quality control system meets Canadian, US and NATO standards (AQAP-1) and is approved by the Canadian airworthiness authorities.

The Support Services Division of Bendix Avelex provides a diverse range of Integrated Logistic Support services. These include complete life cycle management and systems engineering support services,

technical publications, training programs, as well as the traditional repair and overhaul of Bendix Avelex proprietary aerospace and defence products. In addition, support is provided for the products of more than 300 different Original Equipment Manufacturers. With this wide range of capabilities and expertise, Avelex is a competitive alternative source for US DOD repair and support programs. The company is a major supplier of support services to the Canadian Department of National Defence, the Department of Transport and to aerospace and defence contractors. The following "customer oriented" organization structure illustrates the company's commitment to provide responsive, timely and cost-effective support:

- Three specialized operations groups, each equipped with dedicated management, logistic and test engineering resources as well as independent Quality Assurance staff. The groups specialize in Electronic Systems, Gas Turbine Engine Controls, and Electro-mechanical components.
- A dedicated, technically component Customer Support department which provides Integrated Logistic Support planning and analysis, engineering support services, and bilingual technical publications.
- The whole operation is supported by an integrated configuration control and data management group.

Bendix Avelex' support capabilities span 64 NATO stock classes, the most prominent being - 1630, 1650, 1660, 1680, 2915, 2925, 2995, 4320, 4810, 4920, 5826, 5855, 6125, 6610, 6615, 6620, 6665, 6680, and 6685.

AVERAGE WORK FORCE: Engineering - 125
Production - 325
Marketing - 20
Others - 325

GROSS SALES: 1986 - \$59M
1987 - \$66M

PLANT SIZE: 220,000 Sq Ft (Montreal, Que)
32,000 Sq Ft (Vancouver, BC)
21,000 Sq Ft (Cornwall, Ont)

EXPERIENCE: Bendix Avelex Inc's present customers include the Canadian Department of National Defense (Gun Alignment and Control systems, Electro-optics, Night Vision Systems, Video Interactive Gunnery Simulators, Operations Tactical Training Simulators, repair and overhaul of aircraft instruments, accessories, navigation aids and airborne radar), The Canadian Department of Transport (Position Adjustable Range Reference Orientation Transponders), Pratt and Whitney Canada (engine control systems), Air Canada (wheel and brake parts and instruments), Boeing Vertol (V 22 Thermodynamic Fuel Flow Monitoring systems), de Havilland (avionics equipment, flight and engine instruments and accessories), Canadair (electrical connectors, drone alignment systems and aircraft accessories), General Electric (USA) (engine fuel control systems), Martin Marietta (Optical Encoder).

KEYWORDS: Artillery Alignment & Control System; Avionics; Brake Parts; Compass Systems; Drone Alignment Systems; Electro-Optics; Engine Fuel Control Systems; Fuel Control; ILS; Image Intensification; Instruments; Machining; Navigation; Navigation Systems; Night Vision; Precision Machining; R&O (Avionics); R&O (Components); Radar; Simulators; Thermal Imaging; Training; Wheel Parts.

REVISED: February 88

THE BERCHA GROUP

ADDRESS: 1220 Kensington Road N W, Suite #250
Calgary, Alberta, Canada
T2N 3P5

CONTACT: Dr Frank G Bercha, President - (403) 270-2221

HISTORY: The company was incorporated in 1980 in Calgary, Alberta, and currently has a branch office in Ottawa, Ontario. The company is 100% Canadian-owned.

CAPABILITY: The Bercha Group specializes in providing an integrated remote-sensing service. The company has developed an in-house professional capability to carry out any remote sensing project which involves the use of satellite, spaceborne, or airborne remote sensing systems. The familiarity of corporate personnel with remote sensing operations and systems has enabled the group to complete studies ranging from feasibility analysis of sensors or specific applications to development and testing of state-of-the-art remote sensing systems. Corporate personnel have extensive experience in both analogue and digital interpretation techniques. The staff is familiar with the DIPIX Aries II and III systems extensively used for image analysis throughout the world, PC-based image analysis systems and custom designed image analysis systems developed by the Bercha Group in support of projects. Methods used by the group for analysis include both manual techniques such as the use of the zoom transfer scope and densitometers, to application of various algorithms on image analyses systems for edge enhancement, scale rectification, core registration of data, and thematic mapping. The company has over five years real-time airborne operational support experience in ice populated waters, both in the Beaufort Sea and Hibernia/Grand Banks areas; and three years experience in completing international projects including resource surveys, data acquisition programs and topographic mapping programs in Australia, Papua New Guinea, Fiji, Brunei, and Indonesia.

AVERAGE WORK FORCE: Total - 15 (including executive, engineering staff, sensor technicians and support staff)

GROSS SALES: 1986 - \$2.0M
1987 - \$1.5M

PLANT SIZE: 2,500 Sq Ft (Office Space)

EQUIPMENT: PC-based image analyses systems.

EXPERIENCE: The Bercha Group has carried out work for most of the major US oil companies, including Exxon, ARCO, Amco, Mobil, Chevron, Sohio, and Phillips, as well as selected projects for Burlington Northern and a number of mining companies. Its principal clients in Canada constitute the Federal Government, Dome Petroleum, Petro-Canada, Gulf Canada Resources, Husky-Bow Valley, and Mobil Canada. Internationally, the company has completed data acquisition in Australia, Fiji, Papua New Guinea, and Indonesia.

KEYWORDS: Airborne Surveys; Environmental Analysis; Mapping; Remote Sensing.

REVISED: March 88

BOEING OF CANADA Ltd (Arnprior Division)

ADDRESS: Arnprior Airport
Arnprior, Ontario, Canada
K7S 3M1

CONTACT: Mr Jim Sawyer, Vice President & General Manager - (613) 623-4267

HISTORY: Piasecki Helicopter Corporation of Canada Ltd was formed in 1953 as a repair and overhaul base for R.C.A.F. H-21 helicopters. In 1956, Piasecki was changed to Vertol Aircraft Company (Canada) Ltd, and in 1959, it was renamed Canadian Vertol Aircraft Ltd. In 1960, Boeing purchased Vertol and the name was changed to Boeing of Canada Ltd. Boeing of Canada Ltd, Arnprior Division, is a subsidiary of The Boeing Company located in Seattle, Washington.

CAPABILITY: The following is a breakdown of some of the programs Boeing of Canada Ltd, Arnprior Division, is currently involved in:

- Boeing Commercial Airplane Program: Manufacture of machine shop and sheet metal shop detail parts in support of 727/737/747/757/767 Boeing Commercial Airplane programs. Includes manufacture and assembly of all 757/767 electronic trays and shelves and is the key supplier of major components for the Engine Strut.

- **Lag Damper Program:** The Arnprior Division is the principal manufacturer under license of the 107 type helicopter lag damper. The lag damper is a sophisticated hydraulic component which forms part of the helicopter rotor hub assembly. This product is distributed world-wide.

- **Pedal Box Program:** This program consists of the manufacture, assembly and modification of Chinook 47D Model pilot and copilot flight control pedal box.

- **Search and Rescue Helicopter Program:** The Arnprior Division carried out a major modification program to update fourteen CH113/113A Search and Rescue helicopters for the Canadian Forces. The program included changes to the utility hydraulic system, integrated rescue hoist system, auxiliary power unit, fuel capacity, cockpit instrumentation and flight display, radar communication/navigation systems and electrical systems.

- **Depot Level Inspection and Repair Program:** This program includes airframe repair and overhaul for CH113/113A/147 helicopters.

- **Component Repair and Overhaul Program:** A repair and overhaul program for dynamic and non-dynamic components for the CH113/113A/147 helicopters.

- **Technical Publications:** Provides revisions and updates for Technical Publications in support of CH113/113A/147 helicopters.

- **General Helicopter Support Programs:** Boeing of Canada Ltd, Arnprior Division, is extensively involved in Technical Investigations and Engineering Services, Manufacture of Airframe Parts, Tooling and Ground Support Equipment, Painting of Aircraft and Detail Parts, Flight Test Equipment and Logistics Support.

AVERAGE WORK FORCE: Production Workers – 373
Engineering & Technical Support – 46
Administration & Management – 97

GROSS SALES: 1986 – \$38M
1987 – \$42M

PLANT SIZE: 25,000 Sq Ft (Aircraft Overhaul Facility)
80,000 Sq Ft (Manufacturing Facility)
150,000 Sq Ft (Total Facility)

EQUIPMENT: Complete range of sheetmetal and machine shop capabilities including support facilities for Process, Heat Treat, NDT and Paint. Intergraph CAD/CAM System is now installed and a DEC based MRP system will be up and running in 1988 using PMS software.

EXPERIENCE: Present customers include Canadian Forces, Boeing Commercial Airplane Company, Boeing Vertol Company, US Navy, US Marine Corp, and Swedish Navy.

KEYWORDS: Electrical/Electronic Modification; Engineering Services; Flight Test Equipment; Ground Support Equipment; Heat Treating; Helicopters; ILS; Logistic Support; Machining; Modification (Helicopters); Painting (Aircraft); Precision Machining; Publication Service; R&O (Aircraft); R&O (Components); R&O (Helicopters); Sheet Metal Detailed Parts; Technical Investigations; Tooling.

REVISED: February 88

BOEING OF CANADA Ltd (de Havilland Division)

ADDRESS: Garratt Blvd
Downsview, Ontario, Canada
M3K 1Y5

CONTACT: Mr John Wilson, Director, Government Sales –
(416) 633-7310

HISTORY: The de Havilland Aircraft of Canada Ltd was established in 1928 as a sales outlet, assembly plant, and maintenance facility for aircraft of the British parent company's design and manufacture. Now owned by The Boeing Company, the de Havilland Division is located in Downsview, Ontario, with other offices in Ottawa.

CAPABILITY: Boeing Canada, de Havilland Division, is a leader worldwide in the design and manufacture of new-generation turboprop aircraft for civil and military applications. During the time period 1939 – 1945, the company built over 3,000 Mosquito bombers, Tiger Moths, and Anson trainers. In 1946, the British-designed Fox Moth was manufactured at Downsview, as the Canadian division prepared to launch its own design, the DHC-1 Chipmunk trainer. That was followed by the DHC-2 Beaver, which was designed for northern Canadian bush operations and found a home in civil and military roles worldwide. Nearly 1,700 of this type were manufactured between 1947 – 67. The Beaver pioneered in short take-off and landing (STOL) technology, and played a vital role in developing regional air transport in more than 70 countries.

The Beaver was followed by a large version, the DHC-3 Otter, which in turn was followed by the large military STOL, twin-engine DHC-4 Caribou.

In the 1960s, de Havilland combined turbine technology with STOL experience and began to manufacture the remarkable twin-engined Buffalo and Twin Otter aircraft. Market interest in a larger capacity transport made it possible for de Havilland to develop a quiet four-engined STOL aircraft, the Dash 7. As a strong regional air transport market evolved, de Havilland utilized the advances in turbine technology to design and manufacture the Dash 8, a new generation twin-engined turboprop introduced to service in late 1984. In military applications, the Dash 8 provides multi-mission capability in transport, navigation training, maritime patrol/ASW/ASV (Triton), medevac, search and rescue and flight calibration versions.

de Havilland's R&D activity typically divides into powered lift, propeller refinements and advance composite structures. Powered lift focus has been upon ultra STOL capability and has been supported by an augmentor-wing flight test program and by extensive wind tunnel testing both in the National Aeronautical Establishment tunnels in Ottawa and the 40 ft x 80 ft tunnel at NASA Ames. This research program has extended progressively to STOL and VTOL research and currently concentrates upon an ejector lift/vectored thrust concept in a program sponsored by NASA and supported by General Dynamics.

Propeller development, motivated by company concentration upon smaller turboprop transports has investigated thin, rear-loaded blade sections. Wind tunnel test modelling techniques have been developed and have led to propeller/nacelle combinations testing in the National Aeronautical Establishment 30 ft x 30 ft tunnel at Ottawa at Reynolds Numbers close to full scale.

Advanced composite structural development has been directed to both Kevlar/Nomex sandwich design and manufacture, and more recently, to carbon structures for primary application.

AVERAGE WORK FORCE: 5,700

GROSS SALES: No Data

PLANT SIZE: 2,000 Sq Ft (Plant & Office)

EQUIPMENT: For many years the de Havilland plants have been engaged in the production of stressed skin aluminum alloy airframes, and in doing so, utilize equipment normally found in a well-equipped aircraft manufacturing complex. Their present shop equipment includes milling machines; engine, turret, and pre-programmed automatic lathes; drill presses; drop hammers; punch, hydro and stretch presses; magneform; shapers & rolls; jogglers; tube bending and swaging machines; precision grinders; planers; multi-spindle routers; spot and heli-arc welders; vertical and jig borers; and broaches and shears. In addition, heat treat, foundry, plating, painting, sandblasting, and other treatment equipment is available. Hydraulic, instrument, radio, plastic, and upholstery shops also form part of the complete facility. The plastic shop manufactures fiberglass and polycarbonate parts in a temperature and humidity-controlled environment. It is also fully equipped with autoclaves, ovens, bonding and decorative appli-

cator presses for the manufacture of structural kevlar composite parts and aircraft interiors. Numerically controlled equipment consist of drafting and digitizing machines, several multi-spindle profile mills which include a pair of dual gantry 3-spindle 5-axis vertical profilers, a wire marking machine and a pipe bender complete with a tube data center.

The company uses the CADAM system of Interactive Computer Graphics in support of both CAD and CAM functions. Availability of this system has permitted an integration of the design/manufacturing function.

de Havilland also maintains an Engineering Library, Metallurgical Laboratory, an Aerodynamics Laboratory, a Structural Testing Department, a Materials Research Laboratory, Environmental Chambers, and an Engineering Computer Center. In addition, an Engineering Development Shop, housed in a separate 11,000 sq ft building, consists of 100 skilled tradesmen experienced in working directly with the Engineering staff. The Data Center is equipped with an IBM 3031AP and an IBM 4341/12. The 4341/12 is dedicated to Engineering. In addition, the Engineering Department has a VAX 11/780 Computer used primarily for structural analysis.

EXPERIENCE: Contracts for both aircraft purchases, and research & development programs have been negotiated with the USAF, NASA, US Department of Interior, USAF Academy, Alaska National Guard, Canadian Forces, Canadian National Research Council, and the Canadian Department of Transport. In addition to the above, the deHavilland product line is presently being operated in over 70 countries worldwide and on all seven continents. Previous DOD contracts include:

- 981 L20 DHC-2 Mkl Beaver aircraft to the USAF/US Army.
- 165 DHC-4 Caribou aircraft to the US Army.
- CV7A Buffalo aircraft development.
- SC8A Air Cushion Landing System.
- 6 UV18A DHC-6 Twin Otter aircraft to Alaska Army National Guard.
- 2 UV18B DHC-6 Twin Otter aircraft to USAF.
- 2 E9-A Dash 8 platforms to USAF (through Sierra Research)

KEYWORDS: Air Delivery Systems; Aircraft; Aircraft Control; Airframe Components; Airframe Structures; Augmentor Wing; Cargo Handling Equipment; Cockpit Displays; Composite/Fiberglass Components; Engine Components; Engine Controls; Engine Systems; Environmental Control; Extended Length Machining; Fuel Research; Fuel Systems; Hydraulics; Instruments; Landing Gears; Machining; Navigation; Performance Measuring Devices; Personnel Survival/Restraint; R&O (Aircraft); Simulators; STOL Aircraft Manufacture; Training; Tubing; Wiring.

REVISED: June 88

BOEING OF CANADA Ltd (Winnipeg Division)

ADDRESS: 99 Murray Park Road
Winnipeg, Manitoba, Canada
R3J 3M6

CONTACT: Mr E M Sloane, Director, Marketing - (204) 888-2300

HISTORY: The Boeing Winnipeg plant was established in 1971 and is a wholly owned subsidiary of The Boeing Company of Seattle. There are two other Canadian divisions, one located in Arnpprior, Ontario, and one in Toronto, Ontario.

CAPABILITY: Boeing of Canada Winnipeg is a Canadian leader in the design and manufacture of space high-strength/weight ratio fiber composite plastic components for aircraft, space, and other advanced technology applications. The company has the engineering, manufacturing and development expertise to design and build solid laminate or sandwich panel components. Glass, high-modulus graphite and organic fibers, and thermosetting resin systems, including epoxies, polyesters, phenolics or polyimides, bismaleimides, are used with state-of-the-art capability. Structural and non-structural glass fiber,

and advanced fiber composite components are currently produced for a diversified range of products covering a technological spectrum from aircraft to satellite components.

A stated objective of the company's management team is to establish Boeing of Canada as a center of excellence for composites manufactured within the Boeing Company, and as the Canadian leader in the composite industry. To achieve this objective, an expanded research and development program and increased engineering tool design and fabrication capabilities have been initiated.

Diversification into aerial and surface target systems, including their design, development, test and supply has resulted in the assembly of a Boeing of Canada target family which is available internationally.

The Winnipeg Division's Quality Assurance Program operates to one standard of quality which is in conformance with the requirements of the Ministry of Transport Engineering and Inspection Manual (FAR Part 21, Subpart G), NATO Quality Control Systems Requirements for Industry AQAP-1 (equivalent to MIL-Q-9858A), and with the Boeing Company Corporate Document DI-8000A. Quality is maintained throughout the manufacturing process by inspectors appointed by the Manager of Quality Assurance who in turn is approved by the Ministry of Transport. Complete laboratory tests are carried out on process test panels as required by customers and/or pertinent authorities. All raw materials are purchased from qualified suppliers and incoming shipments are subject to Quality Control receiving inspection to ensure that all requirements are met.

AVERAGE WORK FORCE: Engineering Design - 54
Quality Assurance - 75
Production - 746
Admin - 263

GROSS SALES: 1986 - \$50M
1987 - \$69M

PLANT SIZE: 228,000 Sq Ft (Manufacturing Space)

EQUIPMENT: Boeing's major equipment includes:

- An autoclave 15 ft in dia, 35 ft long, capable of 95 psi pressure and 625°F ambient temperature.
- An autoclave 10 ft in dia, 30 ft long, capable of 95 psi and 625°F ambient temperature.
- An autoclave 4 ft in dia, 10 ft long, capable of 95 psi pressure and 625°F ambient temperature.
- Air-heated oven with two compartments 8 ft wide, 13 ft long and 8 ft high, with a maximum ambient temperature of 800°F.
- An air-heated oven with compartments 7 ft wide, 9 ft long, 7 ft high, with maximum ambient temperature of 800°F.
- 44 inch vertical and horizontal core cutting bandsaw.
- Traverse saw capable of cutting up to 16 ft wide material with variable cutting speed.
- Core milling machine capable of handling core sheets 10 ft long, 6 ft wide and up to 6 inches thick, and capable of milling from 0 to 15 degrees ± a tenth of a degree.
- Special taper core milling machine capable of handling sheets 6 ft long, 1.5 ft wide and 2 inches thick, and capable of milling from 0 to 15 degrees.
- Hydraulic core forming press with 4 ft x 4 ft platen.
- One 8 ft x 22 ft and one 8 ft x 15 ft waterfall spray painting booth.
- An 8 ft x 20 ft flame spray booth and apparatus capable of hard and soft ferrous and non-ferrous metal spraying.
- Assorted saws, routers' drills, punches, shears, finishing equipment, etc, equipped with tungsten carbide and diamond cutters.

- Automated through transmission, water jet scanning ultrasonic system with C-scan data acquisition (10 ft x 30 ft part size capacity).
- Assorted ultrasonic bond, thickness and flaw detection equipment.
- A McLean Anderson, Explorer Model D, Filament Winding Machine, capable of producing a part approximately 150 inches long and nine (9) inches in diameter.
- 4-axis Entech NC Filament Winding Machine (20 ft length x 4 ft diameter capacity).

EXPERIENCE: Boeing-Winnipeg produces composite components for the majority of all Boeing commercial aircraft. Significant contracts for graphite composites for Satcom and Anik D satellite programs and missile components for AVCO have been secured. A technology transfer program, including establishment of a tool design group and upgrading of tooling and part fabrication capability, was initiated in preparation for increased graphite and hybrid work on the new Boeing 757/767 aircraft programs. Major sub-assembly work packages include the 747 wing-to-body fairing and 767 engine strut packages.

Some of Boeing-Winnipeg customers include:

- Pratt & Whitney – composite air inlets for turbine engines.
- deHavilland – panels, fairings, DHC-8 nose equipment bay and tail cone.
- SPAR Aerospace – graphite epoxy plates, and waveguides & satellite components.
- Boeing Vertol – 737 flap track fairings.
- Boeing – 707, 727, 737, 747, 757, and 767.
- Dept of National Defence – design & development of fixed & rotary wing, towed and rocket boosted aerial target systems, and sea/land surface targets.
- US Army – aerial target systems.

KEYWORDS: Advanced Composites; Aerial Targets; Airframe Components; Airframe Structures; Composite Components; Fiberglass Filament Winding; Components (Aircraft); Graphite Epoxy Components; Laminates (Solid & Sandwich); Materials Development; RPV; Systems Engineering; Sandwich Components; Space Systems (Composites).

REVISED: February 88

BOLRIET TECHNOLOGIES Inc

ADDRESS: P. O. Box 53 – 150 Mill Street
Carleton Place, Ontario, Canada
K7C 3P3

CONTACT: Dr Andrew Nellestyn, Vice President, Marketing & Gov't Relations (613) 257-7131

HISTORY: BTI is a Canadian owned high-technology microwave electronics company founded in 1982, with another office located at 13873 Park Center Rd, Suite #160, Herndon, VA, (703) 437-9400.

CAPABILITY: BTI produces an extensive array of passive and active microwave and millimeter wave components. The company's proprietary, state-of-the-art technique for metallizing soft substrates coupled with developments in thin film/soft substrate technology and surface deposition of thin film resistors, capacitors, etc., directly onto microwave and millimeter wave circuits, has positioned it as a major supplier to the defense industry. Recent developments in the metallization of light weight composites as well as developments in stripline/microstrip transitions, have solidified BTI's reputation as a competitive, reliable, and innovative R&D and production facility. The company's activities have been directed successfully to programs such

as GPS/NAVSTAR, EHF/SatCom, Olympus, MILSTAR, PGMs, Airborne and Space-Based Phased Array Radars, etc. In addition to the design, development and manufacturing of systems, subsystems and components, BTI also offers design and custom manufacturing services.

AVERAGE WORK FORCE: PhD – 6
Engineers – 6
Others – 34

GROSS SALES: 1987 – \$1.5M
1988 – \$3.0M

PLANT SIZE: 20,000 Sq Ft

EQUIPMENT: Most modern microwave and millimeter wave equipment including an HP 8510 Network Analyzer with millimeter wave extenders up to 75 GHz.

EXPERIENCE: Present customers include various industries and governments in both Canada and the US, including most US prime contractors.

KEYWORDS: Microwave Components; Millimeter Wave Components; Antennas; Radomes; Planar Circuits; Power Dividers; Filters; Phase Shifters; Couplers; Thin Film Resistors; Electronic Warfare; Airborne Radars; Satellite Communications; Composite Structures; Waveguide Structures; Microwave Substrates; Microwave Packaging; Phased Array Radar; High Speed Digital Circuitry; Microwave Printed Circuits.

REVISED: February 88

BRISTOL AEROSPACE Ltd

ADDRESS: 660 Berry St
P. O. Box 874
Winnipeg, Manitoba, Canada
R3C 2S4

Rockwood Propellant Plant
Stony Mountain, Manitoba, Canada (20 miles from main plant)

CONTACT: Mr Keith Burrows, Marketing VP – (204) 775-8331

HISTORY: Bristol was founded in 1930 and incorporated in Canada in early 1947. It is a wholly owned subsidiary of Rolls Royce Holdings Canada Ltd. Bristol owns and operates the Rockwood Propellant Plant at Stony Mountain, Manitoba.

CAPABILITY: Since inception in 1930, Bristol has moved from manufacturing and repairing seaplane floats (1930-1943) to a company with many distinct products and areas:

- Bristol manufactures "Hot End" gas turbine components and remanufactures afterburner assemblies under contract to General Electric, Pratt & Whitney, Rolls Royce, and AVCO Lycoming.
- Bristol manufactures light alloy aircraft structures for major aircraft such as DHC-7, DHC-8, 767 & the P3/CP140. They also manufacture small structures including the Wire Strike Protection System for helicopters.
- Bristol offers repair and overhaul of military and commercial fixed wing and rotary wing aircraft.
- CANDU nuclear in-core reactor components are produced at Bristol.
- Engineered products manufactured by Bristol include rocket engines and propellants, electronic data instrumentation for payloads and satellites, and electronic data instrumentation for remote site applications. They also provide services in mechanical, electrical, aeronautical and propulsion design and development engineering. Other services include precision weldments of high temperature stainless steel alloys, titanium and corrosion resistant materials, and a helicopter component test cell for transmissions and gear boxes.

- Bristol also manufactures the Black Brant sounding rocket, and CRV7 Rocket Weapon System.

AVERAGE WORK FORCE: Salaried – 451
Hourly – 759
Technical – 175

GROSS SALES: 1986 – \$100.0M
1987 – \$106.0M

PLANT SIZE: Production – 561,000 Sq Ft
Warehouse – 95,000 Sq Ft
Office – 121,000 Sq Ft
Acreage – 3,000 Acres

EQUIPMENT: Complete facilities and equipment for metal forming, welding, machining and metal treating. They have a complete range of Computer Numerical Control (CNC) Machining Equipment such as Sandstrand S80/S60/OM2A, 5 axis machining center, Mazak V20/V5, 3 axis machine center (4) Giddings Lewis 48" swing CNC Vertical Turning Lathes (VTL), (3) Mori Seiki CNC Horizontal Turret Lathes and a Mazak CNC Horizontal Mill Center with Robot loading. They also have (2) Raycon CNC EDM machines, (2) Electron Beam Welders (EBW) – one of which is a Sciaky CNC machine with 54" x 50" x 54" chamber.

Also included is a McAuto CAD/CAM system with (3) VAX 11/750 computers, (14) design terminals, and Calcomp Platten – a masterlink DNC system to the CNC machines.

Special facilities include a Helicopter Test Cell, Non-Destructive Test Laboratory, Electronic Test Laboratory and a CNC (4) axis Co-ordinate Measuring Machines (CMM).

EXPERIENCE: Approximately 60% of Bristol's sales are exported – with over 50% of these sales to the US military.

Canadian customers includes DND, National Research Council, Pratt & Whitney of Canada Ltd, Atomic Energy of Canada, Boeing Canada Ltd, Canadair Ltd, the dehavilland Aircraft of Canada Ltd, and others. International clients include Dornier GmbH (Germany), Royal Netherlands Air Force, the Swedish Space Corporation, and the Romanian Government.

Bristol has been approved by the Canadian Ministry of Transport for Canadian Aircraft maintenance, and the Canadian Forces for manufacturing testing and overhaul. The quality requirements of MOT and FAA and the Canadian DND 1015 or MIL-Q-9858A are met for manufacturing, repair and overhaul.

KEYWORDS: Airframe Components; Airframe Structures; Coatings; Data Acquisition; Die Fabrication; Engine Components; Engine Systems; Gas Turbine Components; Gear Boxes; Heat Treating; Helicopter Subsystems; Helicopter Wire Strike; Hydraulics; Instrumentation; Machining; Metalworking; Meteorological Stations/Equipment; Non-Destructive Testing; Nuclear Reactor Components; R&O (Aircraft); R&O (Engines); R&O (Helicopters); Remote Inspection Systems; Rocket Engines; Rocket Propellant; Rockets; Spin Forming; Stamping; Titanium; Tooling; Transmissions.

REVISED: February 88

BRITCO BUILDING SYSTEMS Ltd

ADDRESS: 20626 Mufford Crescent
Langley, British Columbia, Canada
V3A 4P7

CONTACT: Mr J M (Jack) Gin, Director, Marketing – (604) 530-2324

HISTORY: Britco Building Systems Ltd is a Canadian-owned British Columbia based company founded in 1977.

CAPABILITY: Britco Building Systems Ltd is a leading manufacturer of rigid portable buildings. They specialize in the following applications:

- EMI Shielded Equipment Shelters
- Helicopter Transportable Structures
- Hercules Transportable Structures
- Military Personnel Shelters
- Mobile Test Facilities

Britco offers a complete engineering, procurement, quality controlled manufacture, transport and installation service of portable and modular buildings.

Britco products are custom engineered for extreme environments and include electrical and mechanical systems. All-welded EMI shielded shelters providing 120 db attenuation have been applied to the North Warning Systems (NWS). Modular camps have been transported by Hercules aircraft to remote Northern locations complete with furnishings, kitchens and wash facilities.

Britco's specifications and compliances include: NATO AQAP Quality Assurance Specifications, MID-STD-285 Shielding Effectiveness, USAF Class 1 Shielding Effectiveness, and NSA 65-6 Shielding Effectiveness.

The company's disciplines include – EMI shielding systems, MIG welding, structural steel and sheet metal work, wood framing and finish carpentry work, electrical systems, and mechanical systems.

AVERAGE WORK FORCE: Management/Technical – 23
Direct Labor – 65

GROSS SALES: 1986 – \$ 7.0M
1987 – \$12.0M

PLANT SIZE: 42,000 Sq Ft (Expandable as required)

EXPERIENCE: Britco Building Systems Ltd's major customers include: Canadian Department of National Defence, Transport Canada, Raytheon Canada, Canac/Microtel, and Telesat Canada.

KEYWORDS: RF Shielding; EMP Shielding; Shielded Rooms; Screen Rooms; Building (Portable).

REVISED: February 88

BRUCE D. VALLILLEE ELECTRONICS Ltd (Marketing Consultants)

ADDRESS: 36 Trawley Crescent
Ajax, Ontario, Canada
L1S 5X8

CONTACT: Mr Shawn D Vallillee, Vice President, Finance & Marketing (416) 427-7968

HISTORY: Bruce D Vallillee Electronics Ltd was established in 1971 and is a wholly-owned private Canadian Corporation. The company has two divisions also located in Ontario, M & T Management and S C Investments. The firm was formed by Mr Bruce Vallillee who has extensive background in the Canadian, US and European electronic and military component market. Mr Vallillee was formerly VP of Marketing & Sales, ITT Cannon Connector Division with previous equivalent positions with Erie Technological Products, Amphenol Canada and J R Longstaffe.

CAPABILITY: Bruce D Vallillee Electronics Ltd, Marketing Consultants, was established to create a market research, advisory and consulting function capable of developing timely and significant information useful in determining short and long range technical marketing strategies within the Canadian/US electronics industry. The company specializes in the investigation of market opportunities relative to military offset requirements and major programs as well as identification and pursuit of cross licensing, technology transfer arrangements. We provide an advisory and consulting service to both industry and government on electronic components and systems. The variety of our services include business planning and quality control programs, R&D funding, sourcing, industry surveys, export analysis, "in-house" training programs, audio visuals and professional presentations.

AVERAGE WORK FORCE: Engineers - 1
Finance - 1
Others - 2

GROSS SALES: 1986 - \$250K
1987 - 500K

Note: These figures represent consulting figures only.

PLANT SIZE: N/A

EQUIPMENT: Complete computer capabilities relative to consulting requirements.

EXPERIENCE: Present and past client list as follows:

- Government of Canada
- Dept of Regional & Industrial Expansion
- Connector Standardization Program
- BOSS Trade Shows
- NEI Ferranti Packard Electronics Ltd
- DGW Compar Connectors (Canada)
- RD Associates (Canada)
- Carma Industries (Canada)
- Numet Engineering (Canada)
- Inducon Design/Build Consultants and M/H Systems (Canada)
- IBM (Canada)
- Lakeview Publications (Canada)
- Andrew Antenna (Canada)
- Arrow Electronics Canada Ltd
- High Technology Shows (Canada)
- Matrix Science Corporation (USA)
- Struthers Dunn (USA)
- Oak Switches (USA)

A number of clients shown above are currently doing business with the Canadian Armed Forces, the USAF and the USN. We are actively positioning several clients in the military market and wish to do business with the USAF. Please note that our clients above have R&D capabilities and manufacturing capabilities and that information on their capabilities is available through our office.

KEYWORDS: Marketing; Business Planning; Quality Assurance Programs; Surveys; Analysis; Sourcing; Training; Audio Visuals; Presentations; Government Relations; Marketing Research; Consulting.

REVISED: January 88

CAD/CAM GRAPHICS Ltd

ADDRESS: 700 Industrial Avenue
Ottawa, Ontario, Canada
K1G 0Y9

CONTACT: Mr A H Jarvis, General Manager - (613) 526-0620

HISTORY: CAD/CAM Graphics Ltd is a small Canadian-owned high-technology company incorporated in Jan 1984. There are branches in Toronto (Markham & Mississauga) and Montreal, and the company is incorporated in the US as CAD/CAM Graphic Systems Inc.

CAPABILITY: CAD/CAM Graphics is an engineering design group specializing in computer aided graphics design and artwork generation for printed circuit boards and/or hybrid microcircuits. They also offer consulting services to assist clients in the development of design standards/criteria to suit their special needs. Their product services include: (1) Design from schematic to color-coded layout, (2) Digitizing of color-coded layouts for single, double or multilayered boards (prepared by either the customer or CAD/CAM), (3) Photoplotting of the following artwork masters - component and solderside, drill graphics, solder resist mask, silk screen and assembly, (4) Numerical control drill tapes to suit either Excellon or Digital Systems format, (5) Documentation packages and, (6) Prototype and production quantities of printed circuit boards.

AVERAGE WORK FORCE: Total - 20

GROSS SALES: 1986 - \$1.4M
1987 - \$1.8M

EQUIPMENT: The equipment presently in use at CAD/CAM is a CALMA GDS I Interactive Graphics System that consists of: (1) Data General Eclipse CPU, (2) Four 48x60 inch digitizing tables with dual 19x11 inch CRTs, (3) Color design/edit station with tablet and CRT, (4) CALCOMP 970 pen plotter (on-line), (5) GERBER 4432 Photoplotter (off-line), (6) Kodak film processing laboratory, and (7) Racal/Redac Color Maxi Auto Tracking equipment.

PLANT SIZE: 5,000 Sq Ft

EXPERIENCE: CAD/CAM has contract experience with various departments of the Canadian Government, including the Departments of National Defense and Transportation. Canadian industrial experience includes such companies as Northern Telecom, Bell Northern Research, Litton Systems, and AES Data Ltd. US industrial experience includes ITT Aerospace and IBM.

KEYWORDS: Circuit Layout; Microcircuits (Thick & Thin Film); PC Board Design & Fabrication; Software Services; Thick Film Hybrid Microcircuits; Thin Film Hybrid Microcircuits.

REVISED: January 88

CAE INDUSTRIES Ltd

ADDRESS: 8585 Cote de Liesse
P. O. Box 1800
Saint Laurent, Quebec, Canada
H4L 4X4

CONTACT: Dr Murdoch McKinnon, Director, R&D - (514) 341-6780

HISTORY: The company was incorporated in 1947 as Canadian Aviation Electronics Ltd to engage principally in the repair and overhaul of electronics and electro-mechanical equipment and devices. The name was changed to CAE Industries Ltd in 1963 to more accurately reflect its expanding interests in many diverse fields of industry. Diversification and acquisition began in 1961 with the formation of CAE Electronics GmbH in West Germany. Other subsidiaries include CAE Electronics Ltd, Northwest Industries Ltd, CAE Fiberglass Products Division, CAE Aircraft Ltd, Canadian Bronze Company Ltd, Welmet Industries Ltd, CAE Machinery Ltd, CAE Webster Ltd, CAE Accurcast Ltd, CAE-Montupet Diecast Ltd, CAE Lubricators Division, Cleveland-CAE Metal Abrasive Ltd, USP Industries Inc, and CAE Magnesium Products Division. All are Canadian-based except the one subsidiary located in West Germany. This profile will concentrate on CAE Electronics Ltd.

CAPABILITY: CAE Electronics Ltd designs and manufactures sophisticated commercial and military aircraft flight simulators and airborne magnetic anomaly detection equipment. They have also become a major producer of computer-based data acquisition and control systems in the areas of electrical power generation and transmission, marine propulsion, air traffic control, and space.

In the simulator area, they are a leading designer and producer of flight simulators. They have produced the first FAA approved phase III commercial aircraft simulator for United Airlines. Their simulators include state-of-the-art technology such as hydrostatic six-degree-of-freedom motion, general purpose computers, and CRT-based instructor's facilities. They reproduce aircraft performance in all flight regimes and, in particular, the critical landing phase. Digital flight simulators have been developed for the A-300, A310, A320, B727, B737, B747, DC-8, DC-9, MD-80, DC-10, MD11, L1011, F-28, F-50, F-100, CL-600, and the new generation B757 and B767. A wide range of simulators has also been supplied to different countries for various types of military aircraft, including tactical jet fighters, jet trainers, antisubmarine patrol aircraft, transports and helicopters.

They selectively pursue the US military flight simulator market. CAE also designs and produces simulators for helicopters such as the Agusta AB-205 and AB-212, Bell UH-1D, Boeing-Vertol CH-47, Sikorsky CH-53, and Westland Sea King MK41. In addition to flight simulators, CAE Electronics produces training simulators for nuclear power plants. They are used to train operators to develop experience

in responding to all normal, abnormal and emergency conditions as well as to learn required operating procedures and techniques. In the avionics area, CAE Electronics develops and manufactures magnetic anomaly detection (MAD) systems used in antisubmarine warfare. Their cesium magnetometer system, which has been traditionally mounted in a stinger at the rear of the aircraft, can measure changes in the earth's magnetic field as small as one part in 5 million. The company now offers an integrated MAD system for inboard use on fixed wing aircraft and helicopters.

They have developed a "JETS" joint enroute/terminal data processing and display system for air traffic control. The system is modular and the displayed information is tailorable to user requirements. They are active in the space area as they are part of a Canadian consortium, responsible for developing and manufacturing the complete Manipulator Arm system for the NASA Space Shuttle. They have designed and are manufacturing the display and control panel, plus the rotational and translation hand controls that operate the manipulator itself. They have also designed and developed the simulation subsystem which is used as a design tool to test hardware and software modules of the system.

AVERAGE WORK FORCE: Total (CAE Electronics) - 2,850
Technical Staff - 1,500

GROSS SALES: 1986 - \$150M
1987 - \$295M

PLANT SIZE: 500,000 Sq Ft

EXPERIENCE: CAE Electronics customers include United Airlines, Air Canada, British Airways, KLM, Lufthansa, Swissair, TWA, FAA, Douglas Aircraft Co, Boeing, Lockheed California, the Canadian Forces, NASA, US Navy, and other departments of the Canadian Government. Current R&D activities include working with the USAF (AFHRL) on a joint program - Design Project for the development of a Wide Field of View, Helmet-Mounted, Infinity Display System, incorporating Area of Interest high resolution imagery slaved to the pilots eye movements; a recently completed study of the LAMARS Air-to-Surface visual system for the USAF; a study for the CAF for a Turret Interactive Crew Simulator; development of computer-based training (CBT) and computer-aided learning technique (CAL); and a recently completed NASA study and development of a six-degree-of-freedom hand controller. A modification of this device is being tested as a helicopter side arm control.

KEYWORDS: ATC Simulators; ATC; Avionics; Computer Graphics; Computers; Control Systems; Data Acquisition; Data Control Systems; Flight Simulators; Graphics; Hydraulics; Magnetic Anomaly Detection; Magnetometers; Nuclear Simulation; PC Board Design & Fabrication; R&O (Avionics); Radar; Radar Simulation; Real Time Control Systems; Real Time Graphics; Real Time Monitor Systems; Simulation; Simulation Programs; Simulators; Software Development; Software Services; Sonar Training Systems; Space Systems; Tactical Team Trainers; Tactical Training Systems; Tactical Team Trainers; Training; Training Simulators; Video Display Systems.

REVISED: January 88

CALIAN TECHNOLOGY Ltd

ADDRESS: 1755 Woodward Drive
Ottawa, Ontario, Canada
K2C 0P9

CONTACT: Mr Larry O'Brien, President - (613) 727-0606

HISTORY: Calian was founded in 1982 and sells highly specialized technical support services to the defense and aerospace sector. Calian is located in Ottawa and is 100% Canadian owned.

CAPABILITY: The company specializes in the electronics and communications support services including all aspects of quality control and assurance for advanced technology equipment as well as the operation and maintenance of Government owned facilities such as satellite ground stations and environmental testing laboratories.

AVERAGE WORK FORCE: Engineers - 4
Technologists - 15
Technicians - 35
Others - 10

GROSS SALES: Not released

EQUIPMENT: Calian's equipment includes: In-house computer systems (15 IBM PCs), complete MIL-standards microfiche system, training facilities, electronic publishing system, and electronics lab support equipment.

EXPERIENCE: The following is a partial list of current Calian clients and related projects:

- Frontec Logistics Corp - North Warning System Project (NWS). A two year contract to set up a quality control system used on the new early warning radar system located across Canada's north.
- Telesat Canada - Ministry of Defence Program. A contract to set up a software quality control system on a major systems integration project for British Aerospace of England.
- Honeywell Defence Systems - Maritime Command headquarters. A six month project to set up and operate a quality control system during the installation of a fiber optics secure communications system for the new maritime command building.
- deHavilland/Boeing - Navigational Training System. A project to plan and implement a complete qualification and test plan compliant with DOD-160 on computer equipment being installed on a Dash-8 for DND.
- Department of Communications - Test Facility Services. A three year contract to provide support services to Canada's foremost spacecraft testing labs (David Florida Lab).
- Department of National Defence - Search and Rescue Satellite. A three year contract to provide support services to DND related to the operation and maintenance of the SAR-SAT ground station.
- Energy Mines and Resources - CCRS Ground Stations. Two multi-year contracts to operate and maintain the two Canadian ground stations tracking remote sensing satellites.
- Department of National Defence - CPF/PMO. An ongoing project to provide data processing services related to tracking contract data on the Canadian Patrol Frigate Program.
- MEL SYSTEMS - Canadian Patrol Frigate Project. An ongoing project to provide trained inspectors to MEL for inspection on electronic subassemblies.

KEYWORDS: Environmental Testing; Reliability Engineering; Training; Standards and Specifications; Configuration Management; Software Quality Assurance; Quality Assurance; Engineering Services; Support Services.

REVISED: February 88

CALMOS SYSTEMS Inc

ADDRESS: 20 Edgewater Street
Kanata, Ontario, Canada
K2L 1V8

CONTACT: Mr William Woodley, Vice President, Marketing - (613) 836-1014

HISTORY: Calmos was founded in April 1983, to design CMOS (Complementary Metal Oxide on Silicon) custom integrated circuits. CMOS devices are characterized by extremely low power consumption. Privately funded entirely from Canadian sources, Calmos has expanded to provide product packaging, testing and quality assurance

services as well as a Bipolar product line. With a special interest in military, high speed digital circuit design, Calmos is supported by an extensive US sales representative and distributor network.

CAPABILITY: Calmos Systems Inc is in the business of designing and producing high quality integrated circuits for the semiconductor industry. A diversified company, Calmos seeks to meet the most demanding customer requirements with a variety of standard, custom and technology-based VLSI products and services. Calmos expertise focuses on the design, development and marketing of innovative and relatively complex products in both CMOS and Bipolar processes.

Standard CMOS products consist of the CA80C85B microprocessor, a line of high speed microprocessor peripherals and a line of communication peripherals, including SCSI and SCC devices. In the Bipolar arena, Calmos offers a line of FM receivers and codecs of data and cellular radio applications, plus a popular line of power supply supervisory circuits. Most parts can be qualified to aerospace and defense specifications.

Specialized custom design has produced a series of advanced CMOS memory devices and several digital signal processing circuits for a client base of major international corporations and government departments. A special application specific IC (ASIC) design and consulting service is available to those clients seeking low cost, fast turn-around prototype or low volume production runs. This service utilizes sophisticated E-beam technology, a substantially faster technique for processing custom designed devices.

Silicon wafer fabrication is contracted to outside wafer foundries, allowing Calmos to exploit existing capacity in the industry and take advantage of the latest in wafer fabrication technologies.

The future of the semiconductor industry lies in a systems-on-silicon philosophy, which is resulting in increasingly large and complex ICs. Such devices require a great corporate emphasis and commitment to systems and software knowledge. Future products now under development by Calmos will be supported by strategic alliances with companies already possessing significant systems and software experience. These are targeted towards such specialized fields as telecommunications, secure communications and advanced data processing.

AVERAGE WORK FORCE: PhD – 1
Engineers – 20
Others – 28

GROSS SALES: 1987 – \$2.0M
1988 – \$5.0M

PLANT SIZE: 20,000 Sq Ft

EQUIPMENT: Complete integrated circuit (IC) design CAD facility, semiconductor assembly and test equipment. Computer systems include – Valid Logic Systems, VAX System, and Apple MacIntoshes and MS-DOS compatible PCs. Test equipment includes: Phoenix Test System, LTX Tester, K360 Test System, and Environmental Test Equipment.

EXPERIENCE: Present customers include the Department of National Defense (DND) and various other departments in the Canadian Government, and major aerospace and defense industries in Canada, the US and abroad.

KEYWORDS: ASICs; CMOS; Bipolar; Solid State Devices; Semiconductors; Integrated Circuits; Radiation Hard RAM; Static RAM; Memory Devices; Digital Signal Processing; Encryption; SCSI; Microprocessors; Peripherals; Communications; FM Receivers; Power Supply Monitors; DC-DC Converters; Codecs; Controllers; High Speed Digital Circuitry.

REVISED: February 88

CAMETOID Ltd

ADDRESS: 1449 Hopkins Street
Whitby, Ontario, Canada
L1N 2C2

CONTACT: Mr D G Newman, President & General Manager –
(416) 666-3400

HISTORY: Cametoid was incorporated in 1950 and was originally owned by Dowty Equipment of Canada Ltd. In 1968, it was acquired by the Newman family of Whitby, Ontario, and is today a wholly-owned subsidiary of Newman Aerospace Inc, a Canadian company.

In 1988, Newman Aerospace incorporated Cametoid Technologies Inc of Manchester, Connecticut to acquire assets of Chromalloy Technical Services, a division of Chromalloy Gas Turbine.

CAPABILITY: Cametoid Technologies Inc in Manchester, Conn has facilities for ion vapor deposition of aluminum (Ivadizing) in chambers similar to those at Cametoid Ltd. Additionally, this company has facilities for specialized spray coatings including epoxy and metal-rich paints.

Cametoid has three divisions:

- The Chemical Coatings Division – established in 1950, produces specification anodizing (chromic, sulfuric and hard); electroplating (cadmium, copper, nickel, nickel-cadmium, silver, tin and zinc); electroless nickel; chemical films on aluminum and magnesium; phosphates on steel; passivation of stainless steel; dry film lubricants of moly disulfide; and Dupont teflon™ sprayed coatings.
- The "Vacuum Coatings Division" – established in 1981, is one of the few facilities in the world capable of ion vapor deposition of aluminum (Ivadizing™) on large parts (narrow parts up to 14 ft long, and flat parts 5 ft x 10 ft), as well as on small parts like aircraft fasteners and round and square connectors.
- The "Optical Technologies Division" – established in 1984, this division specializes in the design, production and testing of optical coatings intended primarily for infrared applications. Development is also proceeding on the establishment of facilities for the manufacture of optical components and the production of optical materials.

AVERAGE WORK FORCE: 40 to 50 persons with 12 to 15 professionals (Canadian Facility)

GROSS SALES: \$2.0 – \$5.0M (Annually – Canadian Facility)

PLANT SIZE: 30,000 Sq Ft (Canadian Facility)

EQUIPMENT: Cametoid provides complete chemical, electrochemical and vacuum coating facilities, baking ovens, exhaust systems and an in-house water treatment plant. Optical coaters include four-pocket e-beam gun and laser-monitored deposition controller. Two laboratories, one for process control and one for research and development, are also available with suitable test equipment. Strategic production and test facilities are computer-controlled.

EXPERIENCE: Cametoid has more than 30 years of active subcontract experience in dealing with the aerospace, electronic, nuclear and general defense industries in Canada and the US. It is recognized as a "Special Process" facility by both the Department of National Defense and the Department of Transport Canada. It maintains approvals with its principal customers including Air Canada, Andrew Antenna, Invar Manufacturing, Bell Aerospace, Bell Helicopter, Boeing, CAE Electronics, Canadair, General Electric Canada, Cleveland Pneumatic, Computing Devices, de Havilland, Devtek, Dowty, Fleet, Garrett, Grumman, Hawker Siddeley, Indal, ITT Cannon, Kaman Aerospace, Leigh Instruments, Litton, Magna, Martin Marietta, McDonnell Douglas, Menasco, MBB, Pratt and Whitney, Sikorsky, Spar and Unisys.

In addition, the company serves a number of precision machine shops related to the aerospace industry in the Toronto, Ottawa and Montreal regions.

KEYWORDS: Anodizing; Chemical Films; Coatings; Coatings (Optical); Conductivity Testing; Dry Film Lubricants; Electroplating; Hardness Testing; Hydrogen Embrittlement; Ion Plating; Ion Vapor Deposition; Ivadizing™; Materials Processing; Metal Coatings; Metal Finishing; Multi-Layer Coatings; Optical Coatings; Protective

Coatings; R&O (Coatings); Salt Spray (Fog) Testing; Stress Relieving; Surface Finishing; Taber Abrasion Testing; Teflon™ Coatings; Thickness Testing; Vacuum Coatings.

REVISED: April 88

CAMPAGNA ENGINEERING Inc

ADDRESS: 2783 Fenton Road
Gloucester, Ontario, Canada
K1G 3N3

CONTACT: Mr Orlando Campagna, Marketing Director -
(613) 822-1921

HISTORY: Campagna Engineering Inc was established in 1966 as a wholly-owned family operation. Campagna presently employs two shifts of production related people on numerically controlled equipment.

CAPABILITY: Dedication and commitment has established a steady growth pattern and a wealth of experience which has encouraged an expansion to include supplying the aerospace, defense and communication industries with close tolerance, high precision components and sub-assemblies.

AVERAGE WORK FORCE: Manufacturing Engineers - 1
QC Inspectors - 3
Computer Programmers - 2
Others - 45

GROSS SALES: 1986 - \$1.6M
1987 - \$2.5M

PLANT SIZE: 15,000 Sq Ft

EQUIPMENT: Campagna Engineering's equipment list includes: complete list of CNC machinery, computerized equipment for inspection and various machinery involved in the production of high precision components. For example the CNC Machine Center includes: 4th axis contouring attachment; 4th axis indexing attachment; CNC lathes; CNC lathe with milling/contouring capabilities; milling machines with 3 digital readout; lathes; chucking machine; cylindrical grinder; honing machine; surface grinder; coordinating measure machine/computer for quality control; and profile projector for quality control; and various precision drilling and curving machines and accessories used in high precision production. Future plans include acquiring sophisticated machinery with advanced capabilities, such as 5 axis contouring.

EXPERIENCE: Campagna Engineering's customers include: Government of Canada (various departments), Atomic Energy of Canada, Boeing of Canada Ltd, Bata Engineering, Bell Northern Research, Canada Bank Note, Canadian Marconi Co, Canadian Astronautics Ltd, C-Tech Inc (USA), Canadian General Electric, Digital Equipment of Canada, ElectroSpace Systems Inc (USA), Lumonics Inc, Northern Telecom (Canada & the US), Leigh Instruments Ltd, Pratt & Whitney, Raytheon Co (USA), SED Systems Inc, Spar Aerospace Ltd, and Schweizer Aircraft (USA).

KEYWORDS: CAM; CNC Machining; Components (Aerospace); Electronics (Precision Parts); Machining; Nuclear Industry (Machining); Precision Assembly; Precision Machining; Product Development; Structural Fittings (Helicopters); Turbine Engine Components.

REVISED: February 88

CANAC TELECOM

ADDRESS: 151 Front Street, Suite #514
Toronto, Ontario, Canada
M5A 2N1

CONTACT: Mr Andrew V Bransok, General Manager, Marketing -
(416) 860-2801

HISTORY: CANAC Telecom was formed in 1984 as a partnership between Canadian National Communications, the telecommunica-

tions division of Canadian National (CN), and CANAC International Inc, the international consulting subsidiary of CN. The marriage of CN Communications' vast telecommunications systems integration experience and CANAC's international expertise has shown strong results. CN Communications has been installing turnkey telecommunication systems since 1946. Since establishment in 1971, CANAC International has a record of success in over 50 countries throughout the world.

CAPABILITY: CANAC Telecom is a telecommunications systems integrator. CANAC Telecom provides customers with a single point of responsibility for the provision of complex turnkey telecommunications systems which require specialized engineering expertise to ensure successful integration. CANAC Telecom has experience in providing analogue and digital telecommunication transmission and switching systems. The transmission systems encompass cable (standard copper, coaxial, and fiber optic), satellite, microwave, troposcatter, and other radio-based systems. Along with these systems, CANAC Telecom offers a broad range of services required for the smooth integration, installation, and implementation of a system. These services include timely, cost effective feasibility studies, engineering design, procurement, installation, training, and operation and maintenance expertise.

AVERAGE WORK FORCE: Engineers - 21
Technicians - 543
Operations & Mgmt Specialists - 80
Training & Education Specialists - 5
Financial Specialists - 14
Others - 292

GROSS SALES: 1986 - \$303.4M

PLANT SIZE: Not Listed

EQUIPMENT: Not Listed

EXPERIENCE: Customers include or have included in the past, the *Canadian Armed Forces* for whom CANAC Telecom is currently integrating, installing, operating and maintaining the communication segment for the North Warning System, *USAF* for operation and maintenance of the troposcatter system for the DEW line, Thailand Ministry of Communications, Asian Development Bank, and Chinese Ministry of Railways.

KEYWORDS: Telecommunications; Microwave Telecommunications; Satellite Telecommunications; UHF Radio Telecommunications; VHF Radio Telecommunications; Fiber Optic Cable Systems; Copper Cable Systems; Coaxial Cable Systems; Systems Integration; O&M (Telecommunications).

REVISED: March 88

CANADA FORGINGS Inc

ADDRESS: P. O. Box 308
130 Hagar Street
Welland, Ontario, Canada
L3B 5P8

CONTACT: Mr N F Carpentier, President - (416) 735-1220

HISTORY: Canada Forgings Inc is a Canadian-owned custom forging producer founded in 1912. It is now a subsidiary of Toromont Industries Ltd. The company operates two plants on 8 1/2 acres of land in Welland - one for closed die forgings and the other for open die forgings.

CAPABILITY: The closed die plant occupies 60,000 sq ft of production space and is equipped with air hammers to 10,000 lbs supported by appropriate heat treating, cleaning and quality assurance facilities. There is capability for forging products up to 200 lbs in weight along with a machine shop equipped with die sinking equipment.

The open die plant occupies 117,000 sq ft under roof and it houses Canada's only seamless ring rolling facilities. This plant operates Ontario's largest open die hydraulic forging press (3300 tons), two other open die presses of 1200 and 600 ton capacity respectively,

hammers, heat treating furnaces, full machine shop and complete non-destructive testing facilities.

Canada Forgings employs a mature quality control system meeting military, nuclear and aerospace requirements and a number of qualified and experienced personnel to handle customers metallurgical, NDE and quality requests.

Our management information services are fully computerized and extend into all areas of the operation including estimating, inventory control, order processing, accounting and cost controls.

AVERAGE WORK FORCE: 160 People

GROSS SALES: Not Listed

PLANT SIZE: 177,000 Sq Ft

EQUIPMENT: See discussion under CAPABILITY above.

EXPERIENCE: Canada Forgings produces high quality, specialty forgings for the most demanding and sophisticated engineering applications – jet engines, nuclear reactors, power generation, energy exploration, pipeline, off-road transportation, mass transit and ground defence. A list of our customers features such companies as Pratt & Whitney, General Dynamics, Garrett, Avco Lycoming, Bell Helicopter, General Electric, Westinghouse, South West Engineering, Marine Industries, Linimar Machine Ltd, etc.

KEYWORDS: Forgings; Specialty Forgings; Machining; Non-Destructive Testing.

REVISED: February 88

CANADAIR Inc

ADDRESS: 1800 Laurentien Blvd
St Laurent, Quebec, Canada
H4R 1K2

Mailing Address
P. O. Box 6087, Station A
Montreal, Quebec, Canada
H3C 3G9

CONTACT: Mr John McKenzie, Vice President, Corporate Development (514) 744-1511

HISTORY: Canadair was originally incorporated in late 1944 and is a wholly owned subsidiary of Bombardier Inc. The company has a fully-owned subsidiary, Canadair Challenger Inc, in Windsor, CT, and a Challenger Service Center in Hartford, CT. Mr Doug Marshall, Vice President for Government Relations is in charge of a Government Liaison Office in Ottawa, Ontario, (613) 233-9366.

CAPABILITY: Canadair has a high technology R&D capability specializing in aerodynamics, flutter analysis, composite materials, remotely piloted vehicles, fracture analysis, and computational design techniques. Their product line includes:

- Challenger business jet aircraft
- CL-215 multi-purpose amphibious aircraft
- CL-89, CL-227 and CL-289 unmanned airborne surveillance systems

They have active subcontract work on the Boeing 767, Lockheed C-5B, CP-140 and P-3C, McDonnell Douglas F/A-18A, F-15, and Northrop F-5, CF-5, and T-38. They specialize in machining to close tolerances (0.001 inch) with a high degree of repeatability. They have an integrated heat treating and stretch-forming system capable of treating and forming aluminum alloy sheets 40 ft x 8 ft x 0.375 in.

Their CL-89 (AN/USD-501) Airborne Surveillance System (unmanned) was designed for use at the Army Division level. It is fitted with either a photographic or infrared line scanning sensor and is reusable. It is launched from a mobile zero-length launcher and recovered with

a two-stage parachute system employing inflatable air bags to absorb landing shocks. This drone is stocked in the arsenals of the UK, West Germany, France, and Italy.

The CL-289 (AN/USD-502) is a longer range updated version being developed jointly with Dornier GmbH of West Germany. This new vehicle carries both a photographic sensor and an infrared line scan (IRLS) sensor and covers a 150 kilometer range at speeds in excess of 700 kph. A real-time data transmission link is associated with the IRLS System. Onboard computers carry the flight instructions for both the CL-89 and CL-289. Production of the CL-289 for the armies of West Germany and France is underway.

The third model, CL-227, is an hourglass shaped, remotely piloted vehicle, and is now in the full scale engineering development stage. It is designed as a highly survivable surveillance and target acquisition system for use at medium range. It has VTOL capability and is launched and recovered from a mobile two-meter diameter platform. It can transmit real-time data.

AVERAGE WORK FORCE: 5565 Total

GROSS SALES: 1987 – \$624M (Aerospace Products)

PLANT SIZE: – 2,700,000 Sq Ft (under cover)

EQUIPMENT: Their special equipment includes:

- Two Cincinnati profilers; numerically-controlled; 5-axis: Each bed 212 ft long, 13 ft 4 in wide. Each bed has 3 gantries with 3 spindles each.
- One Ingersoll profiler; numerically-controlled; 3 axis: Bed 96 ft long, 17 ft 5 in wide. Single gantry with 3 spindles.
- Nine Wilson profilers; tracer-controlled; 3 axis: Some 6 spindle, some 4 spindle.
- Several Kearney and Trecker 3 and 5 axis profilers; numerically-controlled.
- Two Autoclaves; one 15 ft dia, one 12 ft dia, for metal-to-metal, honeycomb and composite bonding.
- Heat-treat, stretch forming system. Electrically-heated furnace takes sheets 40 ft by 8 ft. 1000-ton stretch press takes sheets 50 ft by 8 ft and 1/2 in thick.

EXPERIENCE: The Canadair experience over the past two years include subcontracts for vertical stabilizers for the EF-111A, components for the Lockheed P-3C and CP-140, rear fuselage sections for Boeing 747SP and 767, components for the McDonnell Douglas F-15 and F/A-18A, and shipsets of components for the Lockheed C-5B. Current products include Challenger business jet, CL-215 multi-purpose amphibian, three surveillance systems and subcontracts.

KEYWORDS: Aerodynamics; Aircraft; Airframe Components; Airframe Structures; Castings; Coatings; Components (Airframe); Composite Components; Computational Design; Extended Length Machining; Flutter Analysis; Forgings; Fracture Analysis; Heat Treating; Machining; Metalworking; RPV; Software Services; Testing/ Test Equipment.

REVISED: January 88

CANADIAN AIRCRAFT PRODUCTS Ltd

ADDRESS: 2611 Viscount Way
Richmond, British Columbia, Canada
V6V 1M9

CONTACT: Mr J A Cameron, President – (604) 278-9821

HISTORY: Canadian Aircraft Products Ltd was founded in 1955 to design and produce aircraft floats. The company is Canadian owned and has no other Canadian locations or US subsidiaries.

CAPABILITY: The company designs, engineers and fabricates aircraft components and other allied and support items for the aerospace industry in both aluminum and composites. They maintain a design and engineering office capable of producing products to stated performance specifications and military specifications. They specialize in the design and manufacture of aircraft structures, tools and jigs, support equipment-ground, ancillary equipment-air, cargo handling equipment, aircraft modifications, and aircraft systems.

Modifications to aircraft include the design and installation of additional fuel systems, seats, engine replacement, and structure changes. They have also conducted analyses relative to aircraft/airport compatibility.

AVERAGE WORK FORCE: Total - 160

GROSS SALES: 1986 - \$12.0M
1987 - \$18.0M

PLANT SIZE: 100,000 Sq Ft

EQUIPMENT: Forming capability (3,000 ton rubber bed press), heat treating capability (3x4x18 ft gas-fired oven with water quench) and supporting services. NC milling machines, a composite facility that includes an oven (8x8x10 ft) and an autoclave (5x15 ft).

EXPERIENCE: Canadian Aircraft Products Ltd has a long background of capability and expertise in repair, overhaul, manufacture and fabrication, as well as design and test of aircraft structures and components. They have designed, manufactured and repaired structures and components of a similar nature such as large aluminum boats, air cushion vehicles, etc. They have produced sheet metal fabricated parts for civil and military application. One such contract was for ammunition boxes for Kaiser Aluminum. They produce wing floats for the Canadair CL-215 water bomber and the floats for the deHavilland Twin Otter aircraft. The company has built and structurally tested the complete airframe of the Trident Aircraft Ltd Trigull aircraft. Other contracts include the horizontal stabilizer and auxiliary fuel tanks for the Canadair CL-600 aircraft, control surfaces and airstair door for the DeHavilland Dash 7 STOL airliner, the horn assembly for the McDonnell Douglas DC-9, Sabliner detail parts for N. A. Rockwell, and the design, engineering and production of the horizontal stabilizer, elevators and rudders for the deHavilland Dash 8 commuter aircraft.

KEYWORDS: Airframe Components; Airframe Structures; Aluminum Components; Cargo Handling Equipment; Composite Components; Flaps; Helicopter Subsystems; Jig Fabrication; Machining; Modification (Aircraft); R&O (Aircraft Components); Rudder Assemblies; Software Services; Structural Analysis; Structural Design; Tooling.

REVISED: January 88

CANADIAN ASTRONAUTICS Ltd

ADDRESS: 1050 Morrison Dr
Ottawa, Ontario, Canada
K2H 8K7

CONTACT: Mr Chuck Thigpen, Director, Marketing - (613) 820-8280

HISTORY: Canadian Astronautics is a rapidly growing, wholly-owned Canadian company incorporated in 1974. There are no Canadian divisions and no US subsidiaries.

CAL is primarily a systems level contractor with interests in four principal business areas - Space Systems, Radar Systems, Advanced Systems, and Defense Electronics. In addition to these development and manufacturing activities, the company performs engineering design/study work in all four areas.

CAPABILITY: As previously mentioned, Canadian Astronautics is divided into four business areas with capabilities as follows:

- Space Systems - CAL has an excellent capability in development and manufacture of spacecraft equipment and subsystems. Particular examples include antennas, RF subsys-

tems, electro-optical equipment, battery management systems (NiCd and NiH2), and power converters (high voltage and high efficiency).

- Radar Systems - CAL designs and manufactures airborne SAR and SLAR equipment and has a development capability for radar of all types, particularly those involving complex signal processing. CAL additionally has capabilities in phased arrays, having developed airborne planar arrays and MLS ground antennas, along with specialized thin film microstrip components, such as precision phase shifters, corporate feeds and radiating elements.

- Defense Electronics - EW and advanced military communications are the main activities of this division. In EW, the company has developed the Tactical Signal Simulator (TASS), which is a fully programmable dynamic scenario stimulator for ESM receiver evaluation and operator training. Technology developments include fast tuning millimeter wave VCO's for ECM and simulator applications. In MILCOM, CAL has designed and built a Spread Spectrum Radio Simulator which generates a multiplicity of voice/data spread spectrum RF signals.

- Advanced Systems - The main activity of this division is the supply of Search and Rescue Satellite (SARSAT) ground stations. CAL provides a full capability station including processing channels for 121.5, 243, 406 MHz, capable of remote/unattended fully automatic operation. Other activities include custom software development, typically for real time signal or data processing applications. Experience is available in many high level languages, including Ada, and CAL has the capability to develop software to MIL SPEC 1679. The Advanced Systems Group also performs acoustic studies for Anti-Submarine Warfare (ASW) applications.

AVERAGE WORK FORCE: Scientists & Engineers - 190
Others - 85

GROSS SALES: 1986 - \$22.0M
1987 - \$23.0M

PLANT SIZE: 52,000 Sq Ft Corporate Headquarters includes clean rooms, development laboratories, antenna range, military secure area with TEMPEST shielded room, and CAD facility.

30,000 sq ft Manufacturing facility includes inventory controlled stores, and production equipment.

EXPERIENCE: CAL has developed an excellent reputation for performing challenging programs, in a professional, reliable manner. The company's record with respect to schedule and budgets is excellent. Contracts are typically divided between the Canadian Government (60%), NASA (20%) and others (20%). Canadian Government departments include Communications; National Defense; Environment; Energy, Mines and Resources; and National Research Council. Private customers include Telesat Canada, Atomic Energy of Canada, Marconi Space and Defense Systems (UK), MEL (Phillips, UK) European Space Agency, Intelsat, Bell Canada, and others. CAL has no direct contracts with the USAF, but are heavily involved via the SARSAT Program and Space Based Radar. One of the four SARSAT ground stations provided to NASA is located at Scott AFB, IL. CAL has supplied EW equipment to US Naval Air Test Center. CAL can perform to military specifications.

KEYWORDS: Antennas; Battery Management Systems; C3 Systems; Communications; Computers; Data Reduction; Electro-Optics; Electromechanical Design; ECM; Electronic Warfare; Environmental Testing; Ground Stations; Image Processing; Microprocessors; Navigation; Phased Array; Planar Array; Power Converters; RF Subsystems; Rad-Hardened Microprocessors; Radar; Remote Sensing; SAR; Satellite Electronics; Search & Rescue Equipment; Side-Looking Airborne Radar; Signal Processing; Simulators; Software Services; Solid State Devices; Space Based Radar; Space Systems; Structural Analysis; Structural Design; Synthetic Aperture Radar; Systems Studies; Tactical Signal Simulator; Test Rigs; Testing/Test Equipment; Ultra Violet Imagers.

REVISED: January 88

CANADIAN MARCONI COMPANY

ADDRESS: 2442 Trenton Ave
Montreal, Quebec, Canada
H3P 1Y9

CONTACT: Mr E J Spinner, Mgr, Business Development & Programs,
Avionics Division – (514) 341-7630, Ext 4335

HISTORY: CMC is a public company incorporated in Canada in 1903 as the Marconi Wireless Telegraph Company of Canada. The change to its current name occurred in 1925. The General Electric Company, p.l.c. of London, England, holds 51% of CMC's shares, with the remainder being widely held in Canada and the US.

The company is organized into six more or less autonomous Divisions, each performing in separate product and/or services areas. The Divisions are Components, and Special Services, based almost entirely in Montreal; Avionics Division, based in Montreal but has a fairly large R&D and systems group in its Kanata facility; Radar, and DataCommunications Products Divisions in Kanata; and Defence Communications Division, based in Montreal, but recently opened a new facility in Cornwall, Ontario. CMC has one wholly-owned subsidiary in the US – CMC Electronics Inc in Eatontown, NJ.

CAPABILITY: The Divisional product areas are:

- Avionics Division – Navigation systems, landing systems, monitoring and display instruments, and performance management products.
- Radar Division – Ship surveillance, search and rescue, and surface radar systems and related equipment.
- DataComm Products – Telex/data exchange systems.
- Components Division – Multi-layer printed circuit boards, hybrid micro-circuits, illuminated panels, power supplies, precision machined parts, surface mount technology and rigid-flex boards.
- Defence Communications Division (DCD) – Tactical communications equipment.
- Special Services Division (SSD) – Repair and overhaul of communications and electronic products, calibration of electronic test equipment, and through its Commercial Communications Group, automated training systems, and other support systems.
- CMC Electronics Inc – Support for marketing, sales and services of company products, and research and development in support of the Defence Communications Division.

The company's military avionics products are used by the defense agencies of more than 20 countries. More than 5,000 Doppler navigation systems and velocity sensors have been supplied for use in rotary wing and fixed wing aircraft as well as drones. Commercial avionics is equally active. Airlines in 45 countries use CMC's navigation, monitoring and display systems aboard more than 100 aircraft.

The company's digital, color-coded, vertical-scale engine instruments have set a standard for the aerospace industry. Performance of these instruments has led the US military to select them for use in the MOHAWK, APACHE, SEAHAWK, AHIP (OH-58D) and BLACKHAWK programs. Some CMC cockpit instrumentation has been designed to be compatible with specialized night-vision equipment. The reliability and accuracy of these engine instruments provide aircraft operators with precise measurements of all vital engine parameters.

In addition to Doppler navigation and engine instruments, the Avionics Division produces Omega/VLF navigation systems. CMC started designing Omega navigation systems during the early 1970s. The company is now producing its third and fourth generation Omegas, the CMA-734/771 "Alpha" Omega, and the CMA-734 "Arrow", which uses an LCD display.

Finally, the Avionics Division manufactures ground based MLS, and designs and manufactures ILS, DME and VOR equipment, and air-

borne MLS receivers. The division also designs and produces NAVSTAR/GPS receivers.

CMC's most advanced radar system is the AN/SPS-503 surveillance system. Developed for the Canadian Destroyer Life Extension program (DELEX), it is now being marketed in various configurations to other countries of the world. The surveillance system is intended for fast patrol craft, frigates and destroyers. The company's LN-66 family of radars is used extensively by the US Navy. More than 850 of the AN/SPS-59(V) configuration are aboard virtually all classes of US Navy vessels.

Few companies in North America possess CMC's high technology ability for the production of printed circuit boards (including SMT and rigid-flex), hybrid microcircuits and power supply systems. CMC's Components Division has built a strong base of competitive technology and superior human resources. In addition to supporting the other CMC divisions, the Division boasts a strong sales base of international aerospace and defense companies.

In data communications, CMC's CMS-755 telex exchange now handles all of the UK's telex traffic originating from 11 major cities. The telex system uses new technology in low-speed data switching. This system is being marketed to other areas of the world with a need for this service.

CMC's Defence Communications Division (DCD) is a world leader in design and supply of line-of-sight tactical radio, having supplied 8,000 sets to the US Army and 7,000 sets to 25 other countries. This radio, the AN/GRC-103(V), has recently been joined in US Army inventory by a multiplexer, the TD-1427, and two converter types, all contained in Radio Terminal Set AN/TRC-180(V), built specifically for the 9th Infantry Division Quick Reaction Program.

CMC's most recent contribution to US Army inventory is the AN/GRC-226(V), the exclusive line-of-sight radio set for the Mobile Subscriber Equipment program. Under contract to the US Army, DCD is currently developing a Digital UHF ECCM Radio, which is expected to be produced in large numbers in the 1990s.

On the telephone side, DCD has established a world reputation with the SB-4170/TT Switchboard and is now offering the Subscriber Access Radio Telephone (SART) which increases capabilities and flexibility in the combat radio networks.

The Special Services Division's expertise includes calibration of precision test equipment, repair and overhaul of electronics systems, and field support of communications and detection installations.

CMC Electronics Inc in the USA provides research and development in conjunction with future US Army requirements in communications. While future plans call for manufacturing expansion at this facility, the Company currently concentrates on support for marketing, sales and service of communications and electronics products to the US military and civil aviation.

AVERAGE WORK FORCE: * Engineers – 267
* Technologists – 60
Others – 2533
Total – 2860

* These figures include only those (in Canada) actively engaged in R&D; it excludes management and production personnel.

GROSS SALES: 1986 – \$210M
1987 – \$214M

PLANT SIZE: Montreal – 500,000 Sq Ft
Kanata – 194,000 Sq Ft
Cornwall – 42,000 Sq Ft

EQUIPMENT: CMC has a wide variety of specialized production and test equipment including an Anechoic Antenna Test Range, Automated Test Equipment, EMI/EMC testing to 2GHZ, and environmental testing facilities to all major MIL standards. In addition, complete facilities are available for component manufacture of specialized items, and assembly of electronic components and systems to customer design or specifications.

EXPERIENCE: Canadian Marconi Company has provided systems, equipment, components and services to every branch of the US DOD and the US Coast Guard over the past 25 years, meeting all military specifications satisfactorily. The products of CMC, military and commercial, are exported regularly to 94 countries world-wide. The company has been granted every Mil Spec available.

KEYWORDS: Adapters; Avionics; Calibration; Circuit Packaging; Cockpit Displays; Communications; Components (Avionics); DME; Data Communications; Digital Order Wire; Displays; Doppler Navigation Systems; ECCM Radio; Engine Instruments; Hybrid Circuits; ILS; Illuminated Panels; Image Processing; Injection Molding; Instrument Repair; Intelligent Instruments; Landing Aids; Lighted Panels; Line Terminating Unit; MLS; Machining; Magnetic Devices; Microcircuits; Multiplexer; Navigation; Navigation Aids; Navstar GPS; Omega Navigation Systems; PC Board Design & Fabrication; Photogrammetry; Photoplatting; Power Supplies; Precision Machining; R&O (Avionics); Radar; Radio Ancillaries; Radio Communications; Radio Wire Integrator; Surveillance; Tactical Radio Relay; Tactical Switchboards; Testing/Test Equipment; Thick Film Hybrid Microcircuits; Thin Film Hybrid Microcircuits; Transformers; VOR; Welding.

REVISED: February 88

CANUTEL INDUSTRIES Ltd

ADDRESS: Box 610
College Heights, Alberta, Canada
T0C 0Z0

CONTACT: Mr Hugo Wegmuller, President - (403) 782-4838

HISTORY: Canutel Industries Ltd is a Canadian-owned company specializing in the contract assembly of sophisticated electronic equipment and printed circuit boards on a build-to-print basis. It was established in 1981 on the campus of Canadian Union College, College Heights, Alberta. The company has an US associate, Canutel Berrien Inc., located in Berrien Springs, MI. The company is represented in Western US by Canadian Commercial Advisers of Marina del Rey, CA (Contact - Mr Ed Hepner at (213) 822-2701).

CAPABILITY: Canutel Industries Ltd provides professional electronic contract manufacturing facilities on a build-to-print basis, specializing in high quality, yet competitive, assembly of complete electronic equipment, printed circuit boards of the conventional, multilayer and surface mount type, cable and wire harnesses and mechanical assemblies related to the electronic field. The manufacturing process, when required, conforms to Military Specifications MIL-1-45208A and NATO AQAP1 and AQAP4, and it is subject to a strict anti-static protection program.

AVERAGE WORK FORCE: Engineers - 3
Others - 60+

GROSS SALES: 1986 - \$750,000
1987 - \$750,000

PLANT SIZE: 13,500 Sq Ft

EQUIPMENT: Canutel Industries' equipment includes: wave soldering machines, freon vapor degreasers and automatic lead forming/cutting machines. Also included are routine electronic test instruments and stereo microscope heat chamber for environmental testing, and computerized production management and cost control system. The company is planning to introduce automatic production facilities for surface mount assembly operation.

EXPERIENCE: Canutel Industries' experience includes the fabrication of all types of professional and industrial electronic equipment and printed circuit boards for the Canadian Government and for private industry in the areas of telecommunications, computers, oil industry, aviation, process control, rail transport, etc. Also the company holds certificates of approval from the US and Canadian prime contractors to manufacture to military quality, high reliability soldering technology by China Lake Naval Weapon Center in California.

KEYWORDS: Build-To-Print; PC Board Design & Fabrication; Circuit Boards.

REVISED: February 88

CARR-SAWYER Inc

ADDRESS: 1885 Wilson Avenue
Weston, Ontario, Canada
M9M 1A2

CONTACT: Mr Alan C Carr, President - (416) 741-4733

HISTORY: Carr-Sawyer Inc (CSI) is a Canadian-owned high technology aerospace consulting company founded in 1984. The company is wholly owned by its Directors - Alan C Carr, Richard N A Sawyer, and Haig Saadetian.

CAPABILITY: CSI's principal field of specialization is aerospace. Other fields of interest are ground transportation, nuclear, robotics, CAD/CAM/CAE and heavy industrial.

Capabilities offered by CSI are: Detailed aircraft design, (aerodynamics and stress analysis); design and approval of airframe modifications; design, analysis and manufacture of custom test rigs and equipment; consulting services for 'finite element structural analysis'; and consulting services for CAD/CAM/CAE.

CSI also markets specialty PC-based software for structural analysis, CAD/CAM, fracture analysis, piping analysis, and heat transfer/thermal analysis.

CSI's typical projects include:

- Aerospace - Design of wing-mounted fuel tank for SKYVAN Aircraft (EMR); aerodynamic design and stress analysis for LW-SKAD wing-mounted stores; detail stress analysis of various components on DASH-7 and DASH-8 aircraft (deHavilland Aircraft of Canada); accident analysis including expert witness advice in court; design and manufacture (procurement) of test rigs for AN/SAR-8 Program including commissioning and project management (shipborne surveillance system for SPAR Aerospace); design, analysis and manufacture of vibration fixtures for ADATS components (Grantech); research & development of frangible towers for airport use; and design of containers & test equipment for ANIK-E Satellite.
- Transportation - Detail stress analysis of ORION I bus including field tests measurements - Ontario Bus Industries; and detail stress analysis of ORION II Bus - Ontario Bus Industries).
- Nuclear/Piping - Consulting services to review reports (Ontario Hydro), and detail analysis of piping system for a waste-re-cycling system (B & R Engineering).
- Robotics - Feasibility study and preliminary designs of a 5-axle router for cutting doors in airframe structures (deHavilland Aircraft of Canada).
- Heavy Industrial - Detail stress analysis of mine hoist and winch drums (John T Hepburn Co), and detail stress analysis of various press platens (John T Hepburn Co).

AVERAGE WORK FORCE: Professional Engineers - 6
Designers - 2
Others - 2

GROSS SALES: 1986 - \$500,000
1987 - \$800,000

PLANT SIZE: 2,000 Sq Ft (Office Space)

EQUIPMENT: Various Microcomputers including IBM's, Sperry 286, Televideo 386, CAD Workstation, and Plotter (E Size)

EXPERIENCE: CSI's present customers include various department of the Canadian Government, but most of their business is with the private sector. Customers include: SPAR Aerospace Ltd, The deHavilland Aircraft Company of Canada (Boeing of Canada), Fleet Industries, CAE Electronics Inc, John T Hepburn Ltd, Innotech Aviation Ltd, and Ontario Bus Industries.

KEYWORDS: Consulting; Aircraft Analysis; Modifications (Analysis); Stress Analysis; Studies; Accident Analysis; Robotics; Testing/Test Equipment; Frangible Towers.

REVISED: February 88

CARR-TECH SERVICES Ltd (A Division of Howden Canada Inc)

ADDRESS: 331 Alden Road
Markham, Ontario, Canada
L3R 3L4

CONTACT: Mr Brian G Glew, President - (416) 293-6400

HISTORY: Carr-Tech Services has been associated with Canadian Aerospace since its formation in 1947 under the name Carriere and MacFeeters Limited at Toronto Island Airport. In January 88, Carr-Tech became a member of the Howden Canada Group of companies and is a subsidiary of Howden Group PLC which is located in Glasgow, Scotland.

CAPABILITY: The company is engaged in engineering, manufacturing, repair, overhaul, and field service operations involving military and commercial aircraft electronic, electrical and hydraulic accessory equipment; electrically controlled hot water dispensing systems for aircraft; and diesel, gasoline, or electrically driven ground power equipment. Other capabilities include custom designed power generation equipment for standby and prime source applications together with related electronic control, monitoring and protection equipment for the industrial, commercial transportation and agricultural markets.

Carr-Tech can also undertake subcontract programs (including custom designed or built to specification) for the manufacture of power supplies, regulators, inverters, control and annunciator panels, air and ground rotating beacons, landing lights, portable and emergency lighting equipment.

Carr-Tech Services Ltd implements a well established quality assurance program to ensure that all products and services supplied by the company are controlled to obtain the best possible quality and reliability, commensurate with economical and competitive cost considerations. The Chief Inspector of their Quality Control Department has over 25 years experience in aerospace and industrial quality control practices and procedures.

Carr-Tech's inspection organization and facilities are approved by the Department of Transport in respect of products supplied for use in civil registered aircraft and their Quality Control operation is recognized by the Department of National Defense as meeting the requirements of DND Specifications 1015 (MIL-Q-9858A), 1016 (MIL-I-45208), 1017 and 1019. In addition, their Quality Program standards meet or exceed CSA Standard 299.2.

AVERAGE WORK FORCE: Engineers/Technicians - 6
Production - 22
Others - 16

GROSS SALES: 1986 - \$4.5M
1987 - \$4.0M

PLANT SIZE: 43,500 Sq Ft

EQUIPMENT: Carr-Tech's production facilities are suitable for low quantity production runs and the manufacture of experimental and prototype equipment - lathes, milling machines, drills, punch presses, shears, welding equipment, riveters, grinders, paint spray booth, ovens, etc. Test instrumentation includes electrically driven test stands for generators, voltage regulators and control equipment; Bosch fuel injectors and fuel pump testers; hydraulic and fuel test stands for large capacity high pressure equipment; test stands for speed switches, tachometer generators and other instrumentation. Precision electrical and electronic measuring equipment is calibrated regularly to NRC standards.

EXPERIENCE: Carr-Tech Services Ltd is an approved supplier of services and qualified products to such companies as Aerospatiale,

Air Canada, Boeing Aircraft, Canadair, deHavilland, McDonnell Douglas and Wardair, plus the Canadian Government (DND and DOT), and various provincial government departments.

KEYWORDS: Aircraft Power; Avionics; Beverage Dispensing Systems; Build-To-Print; Hydraulics; Lighting Equipment; Prime Power Generating Equipment; R&O (Hydraulics); Solid State Devices; Standby Power Generating Equipment; Toilet Hot Water Systems.

REVISED: February 88

CASEY COPTER ACCESSORIES Ltd

ADDRESS: P. O. Box 121
Montreal AMF Dorval, Quebec, Canada
H4Y 1A5

CONTACT: Mr M J Casey, Vice President - (514) 636-6155

HISTORY: Casey Copter Accessories Ltd is subsidiary of Dynamic Air Engineering, Santa Ana, CA, founded in 1975 with no other Canadian divisions.

CAPABILITY: The major products of this company are heating and air-conditioning systems for both aircraft and helicopters. Other products are DC motor speed control devices and temperature controls.

The heating system is applicable to aircraft equipped with Allison 250 series or Pratt & Whitney PT6 series engines. The system is designed for maximum reliability with minimal moving parts. This passive heater system is based on the air-to-air heat exchanger principle, requiring minimal maintenance. Use of the heater system does not reduce range, restrict airspeed, nor reduce rate of climb because it does not require bleed air or fuel. The heater system will provide a cabin temperature of 15°C at an outside temperature of -40°C, a 30 pound weight saving over a combustion heater, and a high output.

The air-conditioning system is of the vapor cycle type with an engine driven compressor. System capacities are available up to 36,000 BTU per hour with current designs. Higher capacities may be developed to customer requirements as will drive systems and installations. The systems are designed to be compatible with Casey heater installations.

Motor speed controls have been designed to provide variable speed control for 28V DC motors in air moving applications and provide increased brush life as well as continuous or step-wise variable control. These units are customized for each application.

AVERAGE WORK FORCE: Engineers - 2
Inspection - 1
Others - 9

GROSS SALES: 1986 - \$500K
1987 - \$500K

PLANT SIZE: 6,000 Sq Ft

EXPERIENCE: The Casey Heater System is currently being used by various departments of the Canadian Federal and Provincial Governments, governments of other countries, US State Governments, and in wide use with Army National Guards and the US Army (Alaska area). The air-conditioner is in early commercial introduction. Speed controls have been provided for military land vehicle installation and test stands. It is estimated that 80 - 90% of total sales are to the US (10% to the National Guards). Currently there have never been any sales to the USAF. They are interested in doing business with the USAF.

KEYWORDS: Airconditioning (Aircraft); Aircraft Airconditioning; Aircraft Heating; Electronic Controls; Heating (Aircraft); Motor Speed Control; Temperature Control.

REVISED: January 88

CERCAST Inc

ADDRESS: 3905 Industrial Blvd
Montreal North, Quebec, Canada
H1H 2Z2

CONTACT: Mr Dieter Rupp, Sales Manager - (514) 322-2371

HISTORY: Cercast Inc was incorporated in Montreal in 1959. It has since expanded to 8 manufacturing plants - Cercor Inc (Georgetown, Ontario), Ceramet Inc (Bethlehem, PA), Cercon Casting Corp (Hillsboro, TX), Sigma Casting Corp (City of Industry, CA), Feinguss GmbH (West Germany), CIRAL SA (France), Microfusione De Aluminio, SA (Spain).

CAPABILITY: Cercast Inc is well known for its capabilities of producing large complex investment castings used primarily in the aerospace industry.

Their Quality Control systems are approved by all major Canadian, US and European aerospace manufacturers and their in-house special processes include: heat treating of aluminum alloys, radiographic inspections, penetrant inspections, chemical analysis, mechanical testing, metallurgical laboratory, and repair welding of aluminum castings. These special processes are all approved by their customers.

AVERAGE WORK FORCE: Production Workers - 145
Quality Control - 15
Engineering/Admin - 30

GROSS SALES: 1986 - \$21.7M
1987 - \$24.8M

PLANT SIZE: 86,000 Sq Ft

EQUIPMENT: Cercast Inc is a very modernly equipped investment casting foundry, including the latest robotics for shell dipping, computerized chemistry, mechanical testing and a 3-dimensional measuring machine. Data is transferred to their main computer for further processing and certification.

EXPERIENCE: Cercast Inc's present customer list is extensive including all major aerospace and defense-related industries in Canada, the US, and Europe.

KEYWORDS: Castings; Investment Castings.

REVISED: January 88

CHAMP-ARMSTRONG COMMUNICATIONS Inc

ADDRESS: #5, 2010 - 30th Avenue N E
Calgary, Alberta, Canada
T2E 7K9

CONTACT: Mr Gary E Gunthorpe, PEng, Vice President, Operations
(403) 250-3202

HISTORY: Champ-Armstrong was formed in 1985 as a sole proprietorship to facilitate the need for the manufacturing and design of effective strobe lighting for the Avionics industry. The company was officially incorporated under the laws of Alberta (Canada) in November 1986 with a capitalization of \$400,000. In January 1987, a program was put together that would generate approximately \$1.4M of potential business over the next 18 months. This goal was reached in 12 months.

Champ-Armstrong is in the business of developing and manufacturing transpondable systems for the military and the OEM markets. The company is presently seeking AQAP 4 recognition with several military prime contractors. The objective is to become internationally recognized as an expert in RF communication, and to be a contributor to such programs as MSAT, Space Station, and new communications programs for the Department of Communications.

CAPABILITY: Champ-Armstrong is primarily involved in contract design and manufacturing of high quality electronic products and components. Their technical expertise is centered around three areas:

- Energy Systems (batteries, chargers, power supplies)
- Data Acquisition (small RTU's)
- Transpondable RF Systems

Champ-Armstrong's design team utilizes the latest versions of FutureNet, Dash PCB, CADAT, uCad and Autocad computer design tools, to speed design and insure complete documentation. The company has embarked on a long term program to develop a commercially available, low cost deployable ELT utilizing Civil Military an SARSAT frequencies (121.5, 243, 406 MHz).

AVERAGE WORK FORCE: Master Engineers - 1
P Engineers - 5
CET - 4
Others - 14

GROSS SALES: 1987 - \$.4M
1988 - \$2.6M (Est'd)

PLANT SIZE: 10,000 Sq Ft

EQUIPMENT: Champ-Armstrong's equipment includes: Daetron MC300 (cap meter), Iwatsu SS-5212 (dual trace 15 MHz Oscilloscope), Tektronix 2215 (dual trace 60 MHz Oscilloscope), HP 6271B (power supply), HP 3312A (function generator, 10 MHz), Fluke 1950A (digital counter, 100 KHz), Fluke 6060A (RF signal generator), Advantest TR4131 (10 KHz to 3.5 GHz spectrum analyzer), Boonton 4210 (RF microwatt meter), Boonton 4210-7E (power sensor), Yaesu YC-35SC (35 MHz frequency counter), Electrovert MK-6/94 (wave soldering machine), B&K 1470 (15 MHz scope), Tektronix 575 (transistor-curve tracer), Fluke 8050A (4 1/2 digit DVM), Filtron Fil Shield (shielded room), and futureNet CAD System.

EXPERIENCE: Champ-Armstrong's present customers include: various departments in the Canadian and Alberta Governments, and commercial industries in Canada. They are interested in doing business with the USAF, USN and US Coast Guard with regards to cover/transpondable ELT's and flash technologies.

KEYWORDS: Build-To-Print; Transponders; Emergency Locator Transponders; Energy Systems; Flash Technology; Data Acquisition; Batteries; Power Supplies.

REVISED: January 88

CHICOPEE MANUFACTURING Ltd

ADDRESS: 975 Wilson Ave
Kitchener, Ontario, Canada
N2C 1J1

CONTACT: Mr David Belanger, VP Marketing & Operations -
(519) 893-7575

HISTORY: Chicopee Manufacturing Limited is a private, wholly owned Canadian company incorporated under the laws of Ontario in 1967.

CAPABILITY: The company specializes in precision machining of medium to large complex components to close tolerances from high strength steels, titanium and aluminum alloys for the aerospace and other related industries. Technical knowledge combined with state-of-the-art equipment enables the company to deliver a wide range of such quality products including aircraft structural components, landing gear components, helicopter hubs, helicopter retentions, hydraulic actuators, precision parts for Canada's space arm, and machined components for other space vehicles and equipment.

Chicopee maintains strict quality control and has approvals from most of the major aerospace companies and in addition, complies with the requirements of AQAP-4, MIL-Q-9858, and CSA Z 299.3. Procedures call for first-off inspection of every manufacturing operation, as well as 100% final inspection of all critical dimensions. Reverse traceability of materials, parts and processes is guaranteed.

AVERAGE WORK FORCE: 250

GROSS SALES: No Data

PLANT SIZE: 100,000 Sq Ft (Manufacturing Area)

EQUIPMENT: Equipment consists of a full range of CNC and NC profile milling machines including 2 five-axis CNC gantry profile milling machines; four-axis CNC travelling column machining centers with automatic tool changers; hydraulic trace profile milling machines; vertical, horizontal and universal mills; CNC and conventional lathes; boring mills; drilling and grinding tools and all other necessary support equipment to produce precision custom products.

EXPERIENCE: Present customers include: The Boeing Co, Boeing Military Airplane Co, Cleveland Pneumatic Co, The deHavilland Aircraft of Canada Ltd, Ernst Leitz Canada Ltd, Fleet Industries, Indal Technologies Inc, Kaman Aerospace Corp, Lockheed Georgia Company, McDonnell Douglas Canada Ltd, Menasco Aerospace Ltd, Martin Marietta Aerospace, and Spar Aerospace.

KEYWORDS: Aluminum Alloys; CNC Machining; Helicopter Hubs; Helicopter Retentions; High Strength Steels; Hydraulic Actuators; Landing Gear Components; Machining; Precision Machining; Precision Parts; Structural Components; Titanium.

REVISED: January 88

CIBA-GEIGY CANADA Ltd

ADDRESS: 6860 Century Avenue
Mississauga, Ontario, Canada
L5N 2W5

CONTACT: Mr Niels M Nielsen, Industry Specialist - Composite Materials (416) 821-4420

HISTORY: CIBA-GEIGY Canada Ltd is a Canadian member company of the worldwide CIBA-GEIGY Corporation based in Basel, Switzerland. The company was formed on 1 January 71 by the merger of two well established chemical corporations. CIBA has been operating in Canada since 1922 and GEIGY since 1945. The group consists of affiliates in some 60 countries, employing more than 80,000 people.

CAPABILITY: CIBA-GEIGY 's Plastics Division would be of primary interest to this survey. CIBA-GEIGY Plastics include synthetic resin systems and moulding compounds based on epoxies and other thermoset specialty resins. Their products, owing to their excellent adhesive qualities, toughness, chemical resistance and non-conductive properties, find their way into a wide range of applications such as construction, aerospace engineering, automotive, tooling, adhesives and electrical applications. In combination with fiber reinforcement, such as fiberglass, aramid and graphite, their resins are used to make aircraft and other military/civilian structures. These high performance, lightweight fabricated products are especially valuable for aerospace applications. They include unique lightweight, honeycomb structures - made from aluminum foil and aramid in paper form - and decorative reinforced plastics laminates.

The head office (Plastics Division) with warehouse/manufacturing is located in Mississauga, Ontario. There is also a warehouse located in Dorval, Quebec.

AVERAGE WORK FORCE: Over 15 (Plastics Division)

GROSS SALES: 1986 - \$12M (Plastics Division)
1987 - \$15M (Plastics Division)

EXPERIENCE: CIBA-GEIGY 's current customer list includes: the Canadian and US Governments, as well as all major industries in Canada and the US involved in aerospace design and manufacture.

KEYWORDS: Composite (Components); Advanced Composites; Adhesives; Honeycomb Materials; Fabrics (Composite); Plastics; Laminates.

REVISED: January 88

CLAY-MILL TECHNICAL SYSTEMS Inc

ADDRESS: 2855 Deziel Drive
Windsor, Ontario, Canada
N8W 5A5

CONTACT: Mr J Keith Arner, Vice President - (519) 944-7902

HISTORY: Clay-Mill Technical Systems Inc was founded by Clayton Pearce. In 1974, as half-owner, Clayton started an automotive tool company in Farmington Hills, MI. In 1981, Clayton resigned and took control of its Windsor operation, changing its name to Clay-Mill Technical Systems Inc. Anticipating market needs, Clay-Mill staff reviewed the existing state of robotics development and robotic applications. They developed an exceptionally strong, versatile gantry type robot. It is a refined and advanced version of this robot and complementary robotic systems that Clay-Mill is currently producing.

CAPABILITY: Clay-Mill is capable of doing in-house all engineering, design, fabricating, machining, assembly, service and training. The Clay-Mill Gantry Robot is ideally suited for applications that require heavy payloads to be manipulated with precision accuracy. The Clay-Mill Gantry Robot has been interfaced with machine vision systems to allow the robots to accurately perform complicated assembly procedures that were previously impossible for conventional robots. These include robotic systems for the automatic installation of fenders, doors, and deck lids. Gantry systems can also use vision generated offsets to pierce holes and slots accurately in specific locations throughout the car body. The applications for the Clay-Mill Gantry Robots are virtually limitless.

AVERAGE WORK FORCE: PhD - 1
MASc - 2
Engineers - 4
Others - 95

GROSS SALES: 1986 - \$23.4M
1987 - \$15.4M

PLANT SIZE: 45,000 Sq Ft (2 assembly bays 75'x300'x32' under hook)
7,500 Sq Ft (Machine Shop)
5,000 Sq Ft (Admin & Engineering)

EQUIPMENT: Clay-Mill's equipment includes:

- IBM System 36, Microvax II and several IBM PCs, and IBM compatible including CAD.
- CNC vertical machining center, 6 boring mills, 2 lathes, 6 bridgeport vertical mills (standard), 3 vertical bandsaws, 2 horizontal bandsaws, and 1 blanchard grinder.

EXPERIENCE: Clay-Mill's customers include: General Motors Corp (Gantry Robotic systems), Chrysler Canada Corp (Crossmember Assembly), Chrysler Liberty (Door Loading System), Imperial Tobacco Ltd (Palletizing System), Magna Corp (Bumper Removal System), Pifco (Material Handling Equipment), and Standard Fuel Co (Material Handling Equipment).

KEYWORDS: Robotics; Gantry Robot; Manufacturing Technology; Automation (Manufacturing).

REVISED: January 88

COM DEV Ltd

ADDRESS: 155 Sheldon Drive
Cambridge, Ontario, Canada
N1R 7H6

CONTACT: Col (Retired) Neil Russell, Dir, Business Dev - (519) 622-2300

HISTORY: COM DEV was incorporated federally in 1971 and is a Canadian high technology company.

CAPABILITY: Major business areas at which COM DEV's products are aimed include Communications and Remote Sensing Satellites, Earth Terminals, Surveillance Radar, Electronic Warfare and mm-Wave Systems.

- Satellite Products – Contiguous and non-contiguous dual mode output multiplexers; group delay and amplitude equalized input multiplexers; high power waveguide and low power coax isolators; low pass harmonic reject filters; telemetry, command and preselect filters; adaptive variable power dividers and combiners; and polarization switches and beam reconfiguring subsystems. Com Dev is a participant in the Canadian DND RAF SATCOM project, Space Based Radar, Radarsat, and US Navy M-ROSS programs.

- Earth Terminal Products – High power microwave components and subsystems including filters, diplexers, combiners, isolators and terminations; low-loss and high power filters; and antenna feed networks.

- Radar Products – Specialized radar antennas, feed networks, phase shifters, high power filters and circulators and SAW enhanced pulse compression subsystems. Com Dev supplies pulse compression subsystems to Raytheon (MOT RAMP program), Mitsubishi Electronics and other radar primes. A mm-wave radiometer designed to detect arctic ice conditions is under evaluation.

- Electronic Warfare Products – Microwave and millimeter subsystems; antennas for ESM and ECM applications; microwave subsystems; millimetric receivers; unique passive/active circular phased array; mm-wave payloads for RPVs; and made to order mm-wave frequency extensions for RWR and RSM systems.

- Antenna Products – Design and manufacture of specialized antennas for spacecraft, airborne, shipborne and transportable applications. Items such as SAR, phased arrays, high power beam forming networks, and systolic arrays are available from UHF to EHF frequencies. A dual polarized SAR antenna is flying in the Arctic with the Canadian Center for Remote Sensing.

- Signal Processing and (SAW) Products – Advanced signal processing components and subassemblies for radar and satellite communications, e.g., filters, delay lines, convolvers, SAW oscillators and synthesizers, microscan (ESM) receivers, code and chirp waveform generators.

- Consulting Services – Studies undertaken on trade-offs, optimization and hardware design aspects of subsystems used in related product areas.

- Research and Development – Active and passive techniques at frequencies from DC to over 115 GHz; SAW devices as signal processing elements in digital communications and radar systems; high power ferrite technology and beam reconfiguring networks. Several EW projects funded by the Canadian DND and two by the US Army.

AVERAGE WORK FORCE: Technical Staff – 90
Manufacturing, Management and Support Staff – 123

GROSS SALES: 1987 – \$22.0M

PLANT SIZE: 70,000 Sq Ft

EQUIPMENT: A large computer facility is used extensively for design (CAD), manufacture (CAM) and testing (CAT). There are automatic test facilities to measure product performance, thermal vacuum chambers to test performance in a simulated space environment, and shock and vibration equipment to simulate conditions from helicopters to shuttle launch. The microelectronics facility includes a recently enlarged and updated clean room, machining of items to 0.0001 inch tolerance and 6 micron finish, GaAs processing and MIC assembly. The plating facility is equipped to produce space-qualified nickel, copper and silver plating, primarily on invar and aluminum parts. The antenna facility has an indoor anechoic chamber, a 500 foot outdoor test range, precision positioners and CAT equipment.

EXPERIENCE: COM DEV equipment flies on three-quarters of the free world's communications satellites. Virtually every major builder of earth stations in the western world uses some COM DEV components. Customers include Hughes Aircraft, RCA, Ford Aerospace, Litton, Lockheed, SPAR Aerospace, Marconi (UK), Harris, TRW and the Canadian & US Governments.

KEYWORDS: Communications; Microwave Subsystems; Microelectronics; Millimeter Wave Systems; Radar; Satellite Subsystems; Space Systems; Surface Acoustic Wave Subsystems.

REVISED: January 88

COMINCO Ltd (Electronic Materials Division)

ADDRESS: Cominco Ltd
P. O. Box 3000
Trail, British Columbia, Canada
V1R 4S5

Cominco Electronic Materials Inc
E 15128 Euclid Ave
Spokane, Washington 99216

CONTACT: Mr A G White, General Manager – (604) 364-4758

HISTORY: Cominco Ltd was incorporated in 1906 and is 91 % Canadian owned. Head Office is located at 200 Granville St, Vancouver, British Columbia. The operations of Cominco are divided into three industrial segments – Mining and Integrated Metals, Chemicals and Fertilizers, and other Operations. The Electronic Material Division is part of the latter segment.

CAPABILITY: Cominco is the world's largest producer of zinc and lead with significant output of many by-product metals and chemical fertilizers.

Electronic Materials Division Production:

- High Purity Metals – 17 different metals each in several degrees of high purity and shapes.

- High Purity Arsenic – 49 to 79 grade arsenic in various allotropic crystal forms and shapes. Largest plant of its kind in the world.

- Semiconductors – single crystal boules and polished wafers of gallium arsenide, indium antimonide, cadmium telluride, cadmium mercury telluride, gallium antimonide, and indium arsenide, germanium and epitaxial cadmium mercury telluride.

- High Purity Metals Fabrication – alloying, casting, rolling, extrusion, stamping, pressing and machinery operations to produce semiconductor processing and packaging materials e.g., evaporation charges, sputtering targets, solder preforms, bonding wires, and ribbons. A well equipped precision tool and die shop serves both Production and Development.

- High Purity Chemicals – As₂O₃, As₂O₅, Zn₃As₂, CdS, and ZnS.

Electronic Materials Division Development:

- R&D is directed toward high purity new metal, compound and semiconductor processes, product advancement, and production equipment. Cominco is currently involved in projects to produce Semiconductor Materials in Microgravity.

AVERAGE WORK FORCE: Electronic Materials Div

(Trail, British Columbia)
Engineers – 17
PhDs – 2
Machinists – 3
Others – 98

(Spokane, Washington)
Engineers - 8
PhDs - 3
Machinists - 6
Others - 152

GROSS SALES: Electronic Materials Division
1986 - \$55M
1987 - \$70M

PLANT SIZE: Electronic Materials Division
(Trail, BC) - 80,000 Sq Ft
(Spokane, WA) - 80,000 Sq Ft

EQUIPMENT: Melbourn high pressure Czochralski Crystal Growers; low pressure Czochralski Crystal Growers, Bridgman Crystal Growers, Zone Refiners, custom built metal refining equipment; custom built crystal slicing, fabrication and polishing facilities; and high purity metals fabrication equipment.

EXPERIENCE: Cominco has been in the electronic materials business since 1949 and has supplied materials to most major US electronic companies.

KEYWORDS: Bonding Wire & Ribbons; Compound Semiconductor Wafers; Evaporation Charges; High Purity Metals; Infrared Materials; Metallurgy; Microgravity; Semiconductor Wafers; Semiconductors; Solder Preforms; Sputtering Targets.

REVISED: January 88

COMPUTING DEVICES COMPANY

ADDRESS: P. O. Box 8508
Ottawa, Ontario, Canada
K1G 3M9

CONTACT: Mr G M Mount, Senior Vice President - (613) 596-7105

HISTORY: Established in 1948, Computing Devices Company is the founding member of Ottawa's "Hi-Tech" community. Early successes included the sale of 4500 Position and Homing Indicators (PHI) to the F-104 aircraft of 17 nations and the fitment of the Projected Map System (PMS) in USAF/USN A-7 D/E aircraft and USAF PaveLow 3 helicopters. The company designs and manufactures advanced electronic systems for military applications. It markets on a worldwide basis with the US DOD as the largest customer. It has been a component of Control Data Corporation since 1969.

CAPABILITY: Computing Devices is divided into five business areas: ASW Systems, Ground Systems, Display Systems, Surveillance Systems, and contract Manufacturing.

The business areas are supported by comprehensive laboratory and CAD/CAM facilities, and vertically integrated manufacturing facilities.

Quality Control systems are compliant to DND 1015/MIL-Q-9858, and AQAP-1/13.

• ASW Systems

The company's start in ASW Systems was with the USN SOSUS and Nav Air communities. Present products include the company designed and developed sonobuoy processor (UYS-503) which has been sold to the Swedish Air Force, Canadian Navy, Australian Navy and United States Navy. For Canada's surface fleet, the company is producing the SQS-510 Active Sonar and the SQR-501 Towed Array Sonar. For Canada's New Shipborne Aircraft Project, Computing Devices is developing the dipping sonar/sonobuoy system and the command and control system which also serves as the integrating element for the mission sensors on the 1553B data bus.

• Ground Systems

The company has worked on ballistics computation since the early sixties. This work led to the development and production of a digital ballistic fire control computer for the US Army Abrams M1A1 Main Battle Tank. In excess of 5000 systems

have been fielded and the company has been contracted for the balance of the M1A1 production run.

The Ground Systems Division is also producing ballistic fire control computers for the Republic of Korea Main Battle Tank, the M48A5/T2 Main Battle Tank Upgrade for Turkey, and the M48H Main Battle Tank Upgrade for Taiwan. In addition, a prototype Battle Field Management System is to be installed in the Abrams Main Battle Tank. This division also developed and produced the MiliPAC Artillery Computer for the Canadian Forces.

• Display Systems

The Shipboard Integrated Processing and Display Systems (SHINPADS) has been developed for the Canadian Navy to provide state-of-the-art system integration encompassing the entire ship including combat system equipment, propulsion and damage control systems, and the administrative support hardware. Computing Devices' Shipnads Standard Display (SSD) is a true multi-sensor display that accepts video input data from all shipboard sensor systems and through digital scan conversion techniques and large scale real-time random access memory, provides both sensor information and complex graphical overlays on high resolution full color television monitors.

Computing Devices' SSD interfaces with any general purpose NTDS-capable computer functioning as a display processor or with an ADA-capable embedded processor. Standardization of hardware, software and interfacing has been achieved to the point where this unique display satisfies all of the requirements for operational interface with any sensor, weapon, or machinery control function. It is a powerful tactical and command situation display providing the command and control team instant access to all data available on board. The SSD may be reconfigured dynamically by system command and operator intervention to any function in the user's repertoire.

Computing Devices' Shipnads Standard Display has been adopted as the standard display for the Canadian Navy.

The Display Systems Division also produces mil-standard Electroluminescent panels. In addition, they are currently in full scale engineering development of the Sensor Scan Converter for the US Navy's AN/SAR-8 Shipboard Infra Red System.

• Surveillance Systems

Computing Devices Company is a world leader in high performance outdoor security systems for a broad range of military and industrial applications. The company has been under contract for R&D to all three DOD services and other government agencies responsible for security sensor and systems. A full line of state-of-the-art RF and video intrusion detection sensors have been developed. The AN/GSS-34 is a full MIL SPEC long perimeter buried line sensor (up to 3200 meters per system) developed for the USAF (ESD, Hanscom AFB) to Base and Installation Security System (BISS) requirements. The GUIDAR is the industrial grade version of the AN/GSS-34. The Short Perimeter Intrusion Radar (SPIR) is a buried line sensor (up to 300 m per sensor) for individual resource protection such as parked aircraft. The Ported-Coax Intrusion Sensor is an indoor sensor under development for the US Army (Ft Belvoir). The Digital Automatic Video Intrusion Detection sensor (DAVID) has also been developed by the company and is sold for use with outdoor CCTV cameras. In addition, this division has done system integration work and has a range of new tactical and rapid deployment sensors under development.

Building on the company's established technology base and market penetration in ground and shipboard combat systems, displays and real-time C³, Computing Devices has developed a capability in ground/shipboard control subsystems for unmanned vehicle systems such as RPVs, drones, and test targets. The subsystem capability encompasses mission/flight planning, mission management, recording and sensor data analysis.

• *Contract Manufacturing*

Computing Devices' fully integrated manufacturing facilities are made available to companies requiring alternate sources of supply for sophisticated electronics systems. Major customers include Hughes Aircraft and FMC.

AVERAGE WORK FORCE: Professionals – 400
Total – 1200

GROSS SALES: 1986 – \$ 91M
1987 – \$113M

PLANT SIZE: 375,000 Sq Ft (five buildings)
400 Acres (Stittsville Research Facility)

EQUIPMENT: No Data

EXPERIENCE: Computing Devices has considerable experience with the US military (approximately 50% of their total sales). They have outstanding production facilities.

KEYWORDS: 1553 Data Buss; ASW; Acoustic Sensing; Avionics; Ballistic Computer Systems; C3 Systems; Cockpit Displays; Computers; Data Acquisition; Data Analysis; Data Handling; Engine Controls; Engine Thrust Measuring Device; Fire Control; Instruments; Intrusion Detection; Navigation; Performance Measuring Devices; Projected Map Displays; Radar; RPV Ground Control; Signal Processing; Systems Integration; Video Display Systems.

REVISED: March 88

CONAIR AVIATION Ltd

ADDRESS: P. O. Box 220
Abbotsford, British Columbia, Canada
V2S 4N9

CONTACT: Mr Barry DeBruyn, Director of Marketing –
(604) 853-1171

HISTORY: Conair Aviation Ltd is a Canadian-owned specialty aviation company founded in 1969. Conair is the parent company to five subsidiary companies, most of which are involved in specialty aviation products and services.

CAPABILITY: Conair is primarily involved in providing aerial fire fighting services and products for fixed and rotary wing aircraft.

The company converts aircraft to the air tanker configuration, such as the F27 Firefighter and Conair Firecat, and designs and manufactures fire fighting systems for various types of helicopters. The company also designs and manufactures aerial spray systems for fixed and rotary wing aircraft. Conair developed aircraft and systems are used in Canada, Australia, France, the US, Italy, Japan, and Saudi Arabia. The company's capabilities include aeronautical engineering (using computer-aided design CAD), aircraft modification and systems manufacturing, fleet management (Conair operates the largest private fleet of air tankers in the world), quality assurance, and training.

AVERAGE WORK FORCE: Engineering – 25
Production – 160
Operations – 134
Others – 46

GROSS SALES: 1986 – \$17.0M
1987 – \$18.0M

PLANT SIZE: 130,000 Sq Ft

EQUIPMENT: Conair's equipment includes a fleet of 48 fixed wing and 27 rotary wing aircraft, CAD system, and in-house manufacturing, aircraft maintenance, modification, repair and overhaul shops.

EXPERIENCE: Conair's present customers include various departments in the Canadian and British Columbia governments, the USAF, the Government of France, and industry in Australia and Japan.

KEYWORDS: Modification (Aircraft); R&O (Aircraft); Aerial Delivery Systems; Fire Fighting Equipment (Aircraft); Fire Detection & Mapping; Oil Spill Control.

REVISED: February 88

CONTRACTING ADVISORY SERVICES Inc

ADDRESS: 56 Sparks St, Suite #100
Ottawa, Ontario, Canada
K1P 5A9

CONTACT: Mr Mark S Fleiszer, President – (613) 235-8135

HISTORY: Contracting Advisory Services Inc was established in 1985.

CAPABILITY: Contracting Advisory Services Inc has provided services in the following ways:

- Assistance to Canadian, US and other foreign companies in dealing with the Canadian Government.
- Assistance to Canadian companies wishing to do business with US Defense department.
- Assistance in all phases of the acquisition process from the preparation of proposals through contract negotiations and administration, to contract completion.
- Representation of Canadian and foreign firms to the Canadian Governments.
- Assistance in negotiating off-set, co-production, licensing, transfer of technology and other similar agreements.
- Organizing consortia for large projects.
- Acting as an Ottawa branch office with or without office services.
- In-house courses on Canadian government procurement regulations and practices.
- Organizing of professional conferences.

AVERAGE WORK FORCE: MPA, BSC – 1
Others – 1

GROSS SALES: No Data

PLANT SIZE: No Data

EQUIPMENT: No Data

EXPERIENCE: Contracting Advisory Services Inc has 20 years experience in the Canadian government Department of Supply and Services in the procurement of defence material.

KEYWORDS: Consulting; Government Relations; Business Development; Industrial Benefits; Procurement (Courses).

REVISED: February 88

C.P.S. INDUSTRIES Inc (LES)

ADDRESS: 2745 DeMiniac Street
Montreal, Quebec, Canada
H4S 1E5

CONTACT: Mr Peter Wiedemann, Sales Manager – (514) 336-0568

HISTORY: C.P.S. Industries is a Canadian-owned company founded in 1963.

CAPABILITY: C.P.S. Industries is primarily engaged in the manufacture of aircraft and commercial parts to customer supplied drawings and specifications.

AVERAGE WORK FORCE: Production – 43
Engineers – 2
Admin – 5

GROSS SALES: 1986 – \$3.07M
1987 – \$3.38M

PLANT SIZE: 19,000 Sq Ft

EQUIPMENT: Equipment includes CNC lathes and milling centers; surface cylindrical and centerless grinders; computerized machine programming equipment; computerized coordinate measuring machine; plus a full range of conventional machinery and equipment including chemical finishing and painting facilities.

EXPERIENCE: Present customers include – Dowty Canada Ltd, Menasco Aerospace Ltd, Lucas Industries, Pratt & Whitney Canada Inc, Canadian Arsenals Ltd, Allied-Bendix (US), and Simmonds Precision (US).

KEYWORDS: Aircraft Parts; Airframe Components; Ammunition (Parts); Fuel Control (Parts); Landing Gear Components; Machining.

REVISED: February 88

CROVEN CRYSTALS Ltd

ADDRESS: 500 Beech Street
P. O. Box 420
Whitby, Ontario, Canada
L1N 5S5

CONTACT: Mr Bob McCormick, Sales Manager – (416) 668-3324

HISTORY: Croven started as a subsidiary of a US company set up in Whitby in 1954 to manufacture crystals for a NATO contract held by Collins Radio of Toronto. In 1958, the US parent sold the company to the management. In 1967, the company was purchased by a US conglomerate. It is presently owned by Oak Industries, but has been managed since 1970 solely by Canadians.

CAPABILITY: Croven manufactures quartz crystals and only quartz crystals. Within this product line, Croven has carved out a niche as one of the premier suppliers of high quality, high reliability quartz crystals to the telecommunications, avionics and aerospace industries, as well as directly to the military.

Their crystals are used by companies making telephone equipment, microwave radios, radar for ground and airborne applications, and missile and satellite systems. Some of the better known programs are the fire control radar in the F-16 and F-18 fighter planes, the Navy's Phalanx Weapon System and shipboard radar, the Standard Missile and many of RCA Astro's satellites.

Their ongoing research and development programs combined with their state-of-the-art testing and screening facilities, make them second to none in the industry.

AVERAGE WORK FORCE: Engineers – 5
Technicians – 10
Others – 185

GROSS SALES: 1986 – \$10.0M
1987 – \$ 9.5M

PLANT SIZE: 30,000 Sq Ft

EQUIPMENT: Equipment includes all necessary equipment to manufacture and test high quality, high reliability quartz crystals. IBM System 34 is used for production control.

EXPERIENCE: Present customers include: AvanteK, Bendix, California Microwave, DESC, E-Systems, Equatorial Communications,

Frequency West, Frequency Sources, Garrett, General Dynamics, GTE, GE, Harris, Hewlett Packard, Honeywell, Hamilton Standard, Hughes, ITT, JPL, Lockheed, McDonnell Douglas Elect, Magnavox, MCI, M/A Com, Motorola, Martin Marietta, Northern Telecom, Omni Spectra, Plessey, Rockwell, Raytheon, RCA, Spar, Sperry, Scientific Atlanta, Sanders, Texas Instruments, TRW, Varian, Westinghouse, Wilcox, Watkins-Johnson, plus many divisions of the US and Canadian military and Government.

KEYWORDS: Crystals; High Q Crystals; Quartz Crystals.

REVISED: April 88

DECADE INDUSTRIES (An Avcorp Company)

ADDRESS: 7860 River Road
Richmond, British Columbia, Canada
V6X 1X7

CONTACT: Mr Jimmy L Cook, President – (604) 278-3561

HISTORY: Decade Industries Ltd was founded in 1970 primarily as a manufacturing service company supporting the aero engine maintenance shops of locally based airlines.

In 1975, Decade moved to their present facilities and have since expanded their markets to include principle airframe/engine manufacturers, airlines of the US, the Pacific Rim, and the Far Eastern markets, as well as becoming a major tooling supplier directly to the aero engine manufacturers themselves.

CAPABILITY: Decade Industries' manufacturing facilities include conventional milling and turning equipment, and a well-equipped welding and fabrication shop.

A comprehensive quality assurance program in line with AQAPS-4 and MIL-I-45208A, the Canadian Standards Association, and the specifications of their major customers in the US, ensures a reliable production of high quality, conforming products.

Non-destructive testing and proof load testing is carried out at Decade with certificates furnished for all inspections. Proof loading capability is to 25 tons in their universal tensile loading facility.

Decade Industries is the leading manufacturer of aircraft maintenance tooling in Canada. The Boeing Company has awarded Decade a license to manufacture all the maintenance tooling for their aircraft. Decade has a similar agreement with Douglas Aircraft. Decade Industries has designed, tested and manufactured two new shipping stands for commercial transport engines in the last year. Quantities of these stands have been delivered and are in use by customer airlines in North America.

AVERAGE WORK FORCE: Consultant Engineers – 2
Resident Engineers – 1
Machine Shop Personnel – 20
Administrative – 5

GROSS SALES: 1986 – \$2.0M
1987 – \$2.0M

PLANT SIZE: 10,000 Sq Ft

EXPERIENCE: Decade Industries customers include:

- Airlines – Air Canada, Canadian Airlines International, United, Northwest Orient, Philippines, Singapore, WardAir, American West, Continental, Delta Airlines, and TAA.

- Aero Engine Companies – General Electric, Pratt & Whitney, SNECMA/CFMI, and Rolls Royce.

- Aircraft Manufacturing Companies – Boeing, and McDonnell Douglas.

KEYWORDS: Aircraft Maintenance Tooling; Electrical Test Equipment; Engine Overhaul Equipment; Engine Shipping Stands; Ground Support Equipment; Machining; Non-Destructive Testing; Precision Tooling; R&O (Equipment); Tooling (Aircraft/Engine).

REVISED: February 88

DESIGNED PRECISION CASTINGS Inc

ADDRESS: 75 Eastern Avenue
Brampton, Ontario, Canada
L6W 1X9

CONTACT: Mr Paul Roy, Sales Manager - (416) 453-0421

HISTORY: Designed Precision Castings Inc is a Canadian-owned investment foundry that was established in Brampton in 1958.

CAPABILITY: Designed Precision Castings Inc is an investment casting firm involved in the aerospace, defence, nuclear and commercial markets. We pour both ferrous and non-ferrous alloys in a size range from ounces to sixty pounds. The plant is located in Brampton, Ontario - a suburb of Toronto, Ontario. From Brampton it serves both the local market and the greater North American market, with customers from California to Nova Scotia.

Comprehensive in-house testing is performed according to a written quality control manual. Testing facilities include spectrographic alloy analysis, magnetic particle inspection, liquid penetrant inspection, x-ray, hardness and tensile testing.

Work is done in accordance to military specifications MIL-I-45208 and to many of our customers private specifications for whom we are an approved source. As required, traceability is maintained and records are preserved for 7 years.

AVERAGE WORK FORCE: Office - 8
Inspection - 5
Production - 31
Engineering - 2

GROSS SALES: 1986 - \$3.0M
1987 - \$3.0M

PLANT SIZE: 42,000 Sq FT

EQUIPMENT: Designed Precision Castings has a complete investment casting facility including a spectrometer, a 100 ton wax extruder, temperature and humidity controls in the shell room, autoclave dewaxing and induction melting. The Quality Control department has hardness and tensile testers, liquid penetrant and wet magnetic particle inspection systems and a 320 KV x-ray machine.

EXPERIENCE: Designed Precision Castings has done work for a wide range of customers in the Aerospace and Nuclear industries including some Class 1 Grade A Castings. We have been surveyed and hold quality control approvals for the following firms. - General Dynamics, McDonnell Douglas Corp, Pratt and Whitney Canada, deHavilland Aircraft, Colt Industries, Garrett Manufacturing, Brunswick Defense Corp, Hazeltine Corp, Bendix Avelex, and Sikorsky Helicopter.

KEYWORDS: Castings; Investment Castings.

REVISED: January 88

DEVTEK CORPORATION

ADDRESS: 1410 Birchmount Road
Scarborough, Ontario, Canada
M1P 2E7

CONTACT: Mr H Trevor Pawson, Director of Marketing -
(416) 752-4006

HISTORY: Devtek Corp is a wholly owned Canadian company founded in 1980. It was originally the Aerospace/Defense Group owned by Magna International Inc, a Toronto based high technology company. Companies affiliated with Devtek are Diemaco Inc, Hermes Electronics Ltd, Magna Electronics, Verral Metal Fabricators, West Height Manufacturing Inc, General Manufacturing Inc, Grantech Mfg, Hochelaga Aerospace Inc and Dexter Tool Co.

CAPABILITY: Devtek Corp has eleven modern plants, each specializing in various phases of high technology engineering and manufacturing products ranging from undersea detection devices to components for outer space projects. Having pursued markets in the aerospace/defense and commercial goods sectors, Devtek has relied on its people to develop unique, new highly efficient manufacturing techniques. This confidence has resulted in an average annual sales growth of 30% and has made Devtek one of the fastest growing international manufacturing corporations. Devtek's nine companies offer a wide range of modern computer controlled machine tools, staffed with highly qualified people with unique experience in fabricating critical components and sub-assemblies. A new technology center has added a unique engineering capability to the corporation's sophisticated, high precision manufacturing activities, including a CAD/CAM system. One of the Devtek companies has assembled extensive engineering and manufacturing skills for the design, development, testing and production of components and systems for military hardware. Another Devtek company holds a leading position in the development, design and manufacture of hydroacoustic sensors and data analysis and transfer systems as well as HF communication equipment to meet exacting military specifications. To complement the technical staffs of the companies in the corporation, Devtek provides the support of a special Corporate Engineering Group which conducts research and development and assists with problems of a highly sophisticated, technical, technological, process or production nature. Devtek's divisions and companies operate to the following Quality Specifications as appropriate - AQAP-1, MIL-Q-9858A, AQAP-4, and MIL-I-45208. The divisions are recognized by the Department of National Defense for having quality programs within their facilities meeting the requirements of AQAP-1 (MIL-Q-9858A).

AVERAGE WORK FORCE: 1100

GROSS SALES: 1986 - \$78M
1987 - \$104M

PLANT SIZE: 420,000 Sq Ft

EXPERIENCE: Devtek's varied clientele includes: Bell Aerospace Co; Boeing of Canada; Bristol Aerospace Ltd; CAE Electronics Ltd; Canadair Ltd, US Army, Ft Monmouth, NJ; US Navy; French Navy; Swiss Army Signal Corps; Australian Navy; Canadian General Electric Co; Computing Devices of Canada Ltd; The deHavilland Aircraft of Canada Ltd, Dowty Equipment Ltd; Emerson Electric; Fleet Industries; General Electric Co; B F Goodrich; Hughes Aircraft; Honeywell Inc; Leigh Instruments; Ernst Leitz Canada Ltd; Litton Guidance & Control Systems, Woodland Hills, CA; Litton Systems (Canada) Ltd; Lumonics Research Ltd; Martin Marietta; McDonnell Douglas Corp; Motorola Inc; Northern Telecom; Philips Electronics; Raytheon Co; RCA; Sanders Associates; Spar Aerospace; Sperry Univac; RCA; Department of National Defense; and others.

KEYWORDS: ASW; Alum Dip Brazed Heat Exchangers; Beacons; Environmental Laboratory; HF Antennas; HF Communications; Landing Gear Components; Machining; PC Board Design & Fabrication; R&O (Small Arms); Small Arms Components; Sonobuoys; Weather Stations; Welding.

REVISED: February 88

DEW ENGINEERING AND DEVELOPMENT Ltd

ADDRESS: 3429 Hawthorne Road
Ottawa, Ontario, Canada
K1G 4G2

CONTACT: Mr Wally Roueche, President - (613) 523-8150

HISTORY: DEW Engineering is a Canadian-owned defence contracting firm founded in 1978 to provide vehicle systems engineering capability to the Department of National Defence (DND).

CAPABILITY: DEW Engineering is primarily involved with defence contracting in Canada. DEW provides a full range of engineering services which includes – design, prototype and development, test and evaluation; bilingual technical manuals and level III Technical Data packages to DND specifications. DEW has a fully equipped metal fabrication and manufacturing facility for the manufacture or special aluminum communication shelters and SMP trailers. Most of these systems are designed, developed and manufactured by DEW.

AVERAGE WORK FORCE: Engineers – 12
Others – 45

GROSS SALES: 1986 – \$4.0M
1987 – \$6.5M

PLANT SIZE: 40,000 Sq Ft (plus a secure 11 acre site)

EQUIPMENT: Equipment includes: Wang OIS complete with type-setter for technical manuals and all production equipment required to manufacture diverse products to DND specifications from aluminum communications shelters to heavy duty trailers.

EXPERIENCE: Present customers include Department of National Defence and Royal Canadian Mounted Police.

KEYWORDS: Vehicle Systems Engineering; Military Pattern Trailers; Communications Shelters; Material Handling Trailers; Military Vehicle Kits (Special); Aircraft Ground Support Equipment; NBC Decontamination Systems; Field Generators; Engineering Services; Contract Management Services.

REVISED: January 88

DIEMASTER TOOL Inc

ADDRESS: 160 Watline Avenue East
Mississauga, Ontario, Canada
L4Z 1R1

CONTACT: Mr Terry Lozowskij – (416) 890-1144

HISTORY: Diemaster is a Canadian-owned company that has been in business for over 15 years.

CAPABILITY: Diemaster is a precision engineering/machining firm specializing in machining to aerospace, military and nuclear standards, jig boring, CNC machining, EDM machining, turning, and milling. A major product line is the manufacture of gas turbine engine shafts. Diemaster performs electron beam welding of critical component parts. They perform stamping operations from 16 to 500 metric tons. Diemaster also designs and fabricates production tooling, special purpose machines, jigs, fixtures, gauges, and dies. Their quality control meets CSA-Z-299.3, AQAP-4, MIL-Q-9858A and MIL-I-45208A.

AVERAGE WORK FORCE: Total – 160

GROSS SALES: 1986 – \$8.6M
1987 – \$9.2M

PLANT SIZE: 66,000 Sq Ft

EQUIPMENT: NC & CNC machining centers, and computing centers. Complete CAD/CAM capability and small to large size co-ordinate measuring machine capacity. Other typical equipment includes mills, grinders, borers, milling machines, drills, lathes, pantograph, presses, cutting, finishing and inspection equipment.

EXPERIENCE: Diemaster customers include SPAR, Argotech, Textron Lycoming, Sanders' Associates, Dupont, Bombardier, IBM, McDonnell Douglas, Pratt & Whitney, Xerox, Rockwell International, RCA and many more well known companies. Products to these companies have included aircraft engine parts, fuel tanks, critical components for aircraft navigation systems, components for nuclear industry, dies, gauges, test and production centers, and stampings.

KEYWORDS: Boring; CNC Machining; Die Fabrication; Gauges; Machining; Milling; Precision Machining; Stamping; Turning.

REVISED: February 88

DIFFRACTO Ltd

ADDRESS: 2835 Ken Drive
Windsor, Ontario, Canada
N8T 3B7

CONTACT: Mr W J Pastorius, Director, Strategic Accounts –
(519) 945-6373

HISTORY: Diffracto Ltd was incorporated in 1973 as an off-shoot of work done at the University of Windsor. The company is Canadian controlled with a minority interest owned by General Motors of Canada and Otto Wolff AG of Cologne, Germany. They also have a US subsidiary, Diffracto Ltd, located at Two Northfield Plaza, Suite #416, 5700 Crooks Road, Troy, Michigan, 48098, (313) 828-7370. Most of the business of the company is conducted in the US through the US subsidiary which largely acts as a sales and service operation.

CAPABILITY: Diffracto has been a pioneer in the application of electro-optical inspection equipment to the manufacturing industry, primarily automotive, but also including nuclear, turbine engine, bearings, ordnance, and the like. These electro-optical units were originally developed on a custom basis, but are currently standardized. Many are finding their way into robotic applications for guidance.

Diffracto currently produces a variety of standard sensor products. In addition are certain special machines, the most predominant example is the Programmable Airfoil Contouring System (PACS) for turbine blade inspection. The PACS was originally developed as a joint Canadian/US Defense Development Sharing project with the USAF (AFWAL/MLTM), General Electric, and Diffracto. This particular project has led to the sales of ten such machines to manufacturers of blades in the US and Canada, and is subject of intense current interest relative to both the inspection of new and rework blades. A second major area is dimensional and flaw inspection of large objects such as car bodies and aircraft panels.

Diffracto has devoted considerable effort to R&D activities and has received support in this area from the National Research Council of Canada, and the Department of Industry, Trade and Commerce. Current projects exist in the following areas:

- Surface flaw detection on large panels
- CMM and Robot probe development – miniaturized light section sensors
- Vision sensors for machine tool feedback

Major applications for this type equipment within private industry and possibly within the USAF are as follows:

- Inspection and automatic adaptive control of turbine blade manufacture and rework.
- Inspection of turbine assemblies and components. For example, they have projects underway with General Electric for inspection of rotor shaft internal defects. Previous projects were concerned with tip clearance on rotors and for the automatic ultrasonic inspection of disks (laser/optical sensor control portion).
- Air frames and components for dimensional integrity and surface defect inspection, particularly in composites.
- Manufacturing Technology – Applications include the inspection of parts on flexible machining centers and the inspection of tools in the changers.
- Ordnance – Diffracto inspection systems can be used for the inspection of ordnance. These normally high volume, high tolerance items require both dimensional and defect inspection, and are therefore ideally suited for electro-optical inspection. Sensors exist for large caliber barrel straightness determination. Barrel bore dimensions and flaws are other areas

for which sensors have been developed. Miniaturization of this technology to small caliber barrels (5.56mm to 40mm) has proved successful.

- Robot Guidance – A major project is currently underway to utilize the vision guidance system of the Canadarm used on the Space Shuttle to guide robots in plants. This project, in conjunction with the Government of Canada and a major automobile manufacturer, is expected to result in improved robots capable of much higher accuracy. A principle goal of the project is dynamic, flexible assembly and material handling.

Diffracto standard products include:

- Standard Laser/Electro-Optical Sensors
 - D Sight – Surface defect inspection
 - Z Sensors – Light sectioning and feature measurement
 - 'LaserProbe' High Resolution Laser Triangulation Sensors
- Standard Machines
 - PACS – Programmable Laser Airfoil Contour Systems
 - 'RoboSorter' Computer Vision Bolt Sorting Machine

AVERAGE WORK FORCE: Total – 125 (5 PhDs)

GROSS SALES: No Data

PLANT SIZE: 69,000 Sq Ft

EXPERIENCE: Diffracto has performed two contracts with the USAF (AFWAL – Materials Laboratory) through the Defense Development Sharing Program. They have worked with the US Army (Picatinny Arsenal) as well as with US industry, e.g., General Electric Co., Boeing Aircraft Co., Union Carbide, Uniroyal, Westinghouse, Bunker-Ramo, Battelle, and others. They also work with the Canadian Department of National Defense and National Research Council of Canada.

KEYWORDS: Automated Precision Measuring; Electro-Optic Inspection; Flaw Detection; Gear Inspection; ICAM; Inspection Equipment; Inspection Systems; Laser Optics; Machine Vision; Manufacturing Technology; Measurement & Control Systems; Optics; Ordnance Inspection Equipment; Precision Measurement; Robot Guidance; Robotics; Sensors; Structural Integrity; Turbine Blade Inspection.

REVISED: January 88

DIPIX TECHNOLOGIES Inc

ADDRESS: The Baxter Center
1050 Baxter Road
Ottawa, Ontario, Canada
K2C 3P1

CONTACT: Mr Mike Cockburn, US Sales Executive – (613) 596-4942

HISTORY: Dipix Technologies Inc is a Canadian owned company incorporated in Canada in December of 1987 (formally Dipix Systems Ltd – incorporated in September of 1978). They are presently represented on a world-wide basis by various companies.

CAPABILITY: Dipix Technologies Inc has an established capability in the field of digital image processing for remote sensing and digital terrain mapping applications. The company has developed a powerful family of image analysis systems capable of processing imagery from satellite data (e.g., Landsat), digitized imagery (e.g., Photographic), cartographic (Map Digitizer), seismic, and other sources. Dipix engineers, analysts and programmers have designed many unique features into its systems. As a result, the company has been able to establish and maintain a leading market position with export sales around the world.

Central to Dipix's highly regarded position in the image processing field, is its extensive technical and analytical experience in developing applications and utility software to address user operational needs. Dipix has an enviable in-house research and development track record. The company's new ARIES III + image analysis system with

its proprietary iterative pixel processor offers a programmable high speed processor for improved interactive image processing of large images.

AVERAGE WORK FORCE: PhDs – 3
Masters – 5
Bachelors – 25
Others – 36

GROSS SALES: 1986 – \$10.2M
1987 – \$ 6.0M

PLANT SIZE: 6,000 Sq Ft

EQUIPMENT: Dipix has a full range of modern test equipment including DEC VAX and micro VAX computers, as well as a number of Dipix ARIES-II and ARIES III Systems used for program and engineering development.

EXPERIENCE: Dipix personnel have many years of experience in digital image analysis going back to the early 1970s. Dipix has had a close relationship with the Canada Center for Remote Sensing, where they have been contracted for both hardware and software development. At present, Dipix has in excess of 200 turnkey digital image analysis systems installed world-wide. In the last two years, the company has installed ARIES systems at the Defense Mapping Agency, Chevron Petroleum Products and Mars Inc, and has continued to maintain systems at the Jet propulsion Laboratory, US Corps of Engineers and various universities and commercial organizations.

KEYWORDS: Digital Image Analysis; Image Processing; Software Development; Software Services; Storage of Digital Imagery; Transmission of Digital Imagery; Turnkey Image Processing Systems.

REVISED: February 88

DONLEE PRECISION

ADDRESS: 9 Fenmar Drive
Toronto, Ontario, Canada
M9L 1L5

CONTACT: Mr Rodney Innes, Sales Manager – (416) 743-4410

HISTORY: Donlee Precision is a Division of Redpath Industries Ltd. Donlee Precision was founded in 1966.

CAPABILITY: Donlee Precision is a manufacturer specializing in precision tubular and shaft type components for the Aerospace, Military and Nuclear industries. Components manufactured include jet engine shafts, landing gear cylinders and pistons, rotor masts, and propeller shafts. Capabilities include complete engineering, manufacturing and quality assurance departments.

AVERAGE WORK FORCE: Engineers – 3
Manufacturing – 65
Administrative – 15

GROSS SALES: 1986 – \$11.0M
1987 – \$10.0M

PLANT SIZE: 60,000 Sq Ft

EQUIPMENT: Production facility includes CNC turning and milling, gear cutting and grinding, internal honing, deep hole boring, ID grinding, and OD grinding. Quality Assurance includes complete inspection and non-destructive testing facilities.

EXPERIENCE: Present customers include Canadian Government Crown Corporations and major Aerospace and Military contractors in both Canada and the US.

KEYWORDS: Boring; Cylinders; Gears; Grinding; Jet Engine (Components); Landing Gear Components; Machining; Non-Destructive Testing; Shafts.

REVISED: January 88

DOWTY CANADA ELECTRONICS Ltd

ADDRESS: 2000 Fisher Drive
P. O. Box 4525
Peterborough, Ontario, Canada
K9J 7B1

CONTACT: Mr D Crook, General Manager – (705) 743-6903

HISTORY: Dowty Canada Electronics Ltd was incorporated in 1976 to design, manufacture and service electronic products for the communications, air, maritime and ground transportation markets. In 1982, Dowty Canada Electronics Ltd (formerly Simtron Ltd) was acquired by Dowty Equipment of Canada Ltd. Dowty specializes in the design, development, manufacturing, certifications testing and overhaul of landing gear, flight control systems and related aerospace and marine equipment.

CAPABILITY: Dowty Canada Electronics Ltd's activities are divided into three major areas:

- **Aerospace** – The design and manufacture of aircraft subsystems and black boxes. This is typified by the microprocessor-based "steer-by-wire" equipment presently in production as standard equipment on the Canadair Challenger 601, the deHavilland Dash 8, and Gulfstream IV Aircraft. Dowty Canada Electronics Ltd is approved to AQAP 4 levels which have direct equivalency to MIL-Q-9858.
- **Multiplex Systems** – Dowty Canada Electronics Ltd has developed a Data Acquisition System (Multiplex 490). Ongoing R&D and development are proceeding on equipment Health Monitor and Control Systems, particularly in the aerospace sector. Custom Systems engineering activity is ongoing.
- **Build-To-Print** – Dowty Canada Electronics Ltd is engaged in high quality Build-to-Print for a number of customers. Products include printed circuit board assembly, wire harnessing, cabinet assembly, test equipment and testing. The in-house engineering capability enables Dowty Canada Electronics Ltd to offer design, redesign and substitution services on subcontract work.

AVERAGE WORK FORCE: R&D – 3
Engineers – 3
Technicians – 3
Production – 65
Others – 10

GROSS SALES: 1986 – \$2.5M
1987 – \$2.5M

PLANT SIZE: 20,000 Sq Ft

EQUIPMENT: Equipment includes Hollis Wave Soldering Machine, degreasing unit, various R&D and test equipment, and vibration and environmental chambers for engineering, R&D, and manufacturing screen testing.

EXPERIENCE: See Capability Section.

KEYWORDS: Steer by Wire Systems; Build-To-Print; PCB Fabrication; Test Equipment; Specialized Test Equipment; Wiring Harness Fabrication; Cabinets; Cabinet Testing.

REVISED: July 88

DOWTY CANADA Ltd

ADDRESS: 574 Monarch Avenue
Ajax, Ontario, Canada
L1S 2G8

CONTACT: Mr Fran Stilwell, Regional Marketing Manager – (416) 683-3100

HISTORY: Dowty Canada is a member of Dowty Aerospace North America, a part of the Dowty Group. The Group with headquarters in Cheltenham, England, is an international supplier of aerospace and defense, mining, industrial and electronic equipment.

Dowty Canada Ltd has a longstanding reputation as a supplier of state-of-the-art aircraft landing gear and industrial and marine hydraulic systems. In recent years, the company has developed a total capability in microprocessor-controlled hybrid actuation systems with the acquisition of Dowty Canada Electronics Ltd, a company specializing in the design, development and manufacture of sophisticated electronic control equipment.

CAPABILITY: Dowty provides Integrated Systems Management from concept design to product support of – aircraft landing gear systems; microprocessor-controlled ground handling and flight control systems; industrial, marine and military hybrid actuation systems; and equipment health monitoring, information and communication systems.

Computer aided design augments our extensive design and development capability and with CNC manufacturing equipment, ensures the cost effective production of sophisticated products. Ongoing development projects ensure that Dowty Canada is prepared for future hydraulic, electrohydraulic, mechanical, and electronic controlled actuation and control system needs. Current R&D activities include landing gear studies for soft/rough field applications and crashworthiness features for helicopter landing gears.

AVERAGE WORK FORCE: Design & Development
Engineering – 50
Sales & Technical Staff – 30
Quality Control – 30
Operations – 200
Financial & Administration – 30
Total – 340

GROSS SALES: 1987 – \$1.8B (Total Dowty Group Sales)

PLANT SIZE: 12 Acres (Land)
200,000 Sq Ft

EQUIPMENT: Dowty Canada maintains an extensive design capability, augmented by an integrated CAD/CAM system and specialized analytical modelling software. Development and certification test facilities include a Cyber II computer for test control and data acquisition; a Honeywell H-TMs 3000 Test Management System; strength, fatigue, drop and photo-elastic test rigs; and environmental test chambers. A wide range of state-of-the-art manufacturing equipment ensure cost-effective production of the sophisticated components produced by Dowty Canada. In addition to CAD/CAM, Dowty has implemented an integrated machining cell system linked to a Distributive Numerical Control (DNC) system which provides immediate electronic transfer of data from CAD/CAM direct to the CNC Control. Quality assurance and reliability functions are performed in accordance with the standard practices of the aerospace and marine industries. Dowty Canada operates in accordance with Canadian and US military and commercial standards meeting MIL-Q-9858A, AQAP-1, AQAP-4, AQAP-6, FAA and DOT requirements.

EXPERIENCE: Since its inception in 1940, Dowty Canada has provided landing gear for many successful commercial and military aircraft, ranging from business jets and commuter transports to military fighters, jet trainers and helicopters.

Current programs include main landing gear for the Bell-Boeing V-22 Joint Services Vertical Lift Aircraft and the Kaman Aerospace USN SH-2F (LAMPS MK1) Helicopter. Dowty is also providing a wide range of equipment, including main and nose landing gear and steer-by-wire nosewheel steering systems, for the deHavilland Dash 8 Short Haul Transport and the Canadair CL-601 Jet Transport. Dowty also supplies outrigger landing gear for the McDonnell Douglas USMC AV-8B V/STOL Light Attack Aircraft.

Dowty Canada also designs and manufactures a wide range of marine equipment and systems. Currently in production are lightweight capstans for the Bell Aerospace US Navy Aircushion Landing Craft (LCAC). Dowty also supplies the hydraulic power pack and constant tension winch for the DAF Indal Helicopter Recovery Assist, Securing and Traversing (RAST) System, which is in service with the US, Japanese and Canadian Navies.

Current flight control programs include the hydromechanical rudder control actuators and dampers for the deHavilland Dash 8 and actuators for the MD-80 and Dash 7 aircraft.

In conjunction with its Electronics Subsidiary, Dowty has developed aircraft ground steering systems which comprise a microprocessor-based electronic control unit which integrates signal inputs from the rudder pedals and/or a pilot's handwheel to control the electrohydraulically actuated nosewheel. Dowty designs and manufactures the electronics, the hybrid actuation and the landing gear, providing complete systems management throughout the project. The steer-by-wire systems have been developed for deHavilland Dash 8, Canadair CL-601 and Gulfstream G-IV aircraft.

Based on its demonstrated microprocessor control technology Dowty Canada was selected by Boeing Helicopter to design, develop and produce Landing Gear Control units for the V-22 FSD program. The system performs several functions related to landing gear and door sequencing during and retraction and lowering of the gears, interfaces with the on-board computer and is equipped with built-in test equipment (BITE) for self test and maintenance activities.

KEYWORDS: Actuators; Aircraft Landing Gears; Certification Testing; Damping; Electromechanical Design; Flight Controls; Helicopter Landing Gears; Hydraulics; Hydromechanical; Integrated Systems Management; Landing Gears; Liquid Springs; Machining; Microprocessor Control Units; Motions Compensation; Shock Mitigation; Steering (Ground) Systems ; Steering Systems.

REVISED: April 88

DSMA INTERNATIONAL Inc

ADDRESS: 6655 Airport Road
Mississauga, (Toronto), Ontario, Canada
L4V 1V8

CONTACT: Dr S Roy Swanson, PEng, Director of Business Development (416) 672-3800

HISTORY: Dilworth, Secord, Meagher and Associates Limited, established in 1952, is the parent company for a group of companies that provides high technology test facilities to the aerospace, automotive, and petroleum industries. Test facilities can be provided on either an engineering or turnkey design and supply basis.

CAPABILITY: DSMA's primary business focus lies in the engineering and turnkey supply of custom-design test and research facilities for a worldwide client base in the automotive, petroleum (fuels and lubricants), and aerospace communities.

The range of DSMA test facility projects is comprised, for the most part, of two families of wind tunnel designs:

- Aerodynamic Test Facilities – various types of wind tunnel designs to support full and reduced scale investigations into the aerodynamic (and aero-acoustic) characteristics of airborne and surface vehicles.
- Climatic Test Facilities – various types of controlled-environment wind tunnel and test chamber designs to support product development investigations involving the thermodynamics of surface vehicles at the whole-vehicle and component test levels.

In addition to these two families of facilities, DSMA has also executed test facility projects having to do with acoustics, altitude effects, hydrodynamics, icing, and boundary layer aerodynamics for aircraft, vehicles, buildings and structures.

Most recently, they have gone on to develop a significant new product to satisfy the ever increasing demand for test facility automation – these unique and proprietary software system, registered under the "talent" trade name. Talent represents the culmination of an intensive DSMA development program, initiated in large part through the creation of the DSMA Systems Engineering Division in 1982.

TALENT-based test automation systems form an integral part of almost all of the DSMA test facilities which have become operational since 1986. There are now 5 operational automotive test facilities managed by TALENT-based systems, with 7 more coming on-line in the next two years. In just a few short years, DSMA has managed to develop the TALENT test automation system from a concept into a proven and highly respected product.

AVERAGE WORK FORCE: PhD – 4
Engineers – 40
Others – 60

GROSS SALES: 1986 – \$15.2M
1987 – \$ 9.0M

PLANT SIZE: 27,000 Sq Ft

EXPERIENCE: As stated above, DSMA's experience and expertise lies in the engineering and turnkey supply of custom-design test and research facilities. They serve a worldwide market having worked on 150 test facility projects for clients in 18 countries. The company has a net capital value of \$600 Million.

KEYWORDS: Aerodynamic Test Facilities; Calibration; Climatic Test Facilities; Design Services; Engineering Services; Environmental Testing; Instrumentation; Test Facilities; Test Management; Testing (Environmental); Wind Tunnels.

REVISED: February 88

DY-4 SYSTEMS Inc

ADDRESS: 21 Credit Union Way
Nepean, Ontario, Canada
K2H 9G1

CONTACT: Mr Terry Black, VP Marketing & Sales – (613) 596-9911

HISTORY: DY-4 Systems Inc is a Canadian-owned manufacturer of high-performance VME bus computer modules and system level products for commercial, civil and military applications. Formed in 1979, the company has expanded rapidly based on strong engineering design and system integration talent, and a high quality manufacturing process. The company has sales offices located in Ottawa, Canada, Campbell, CA, Fountain Valley, CA, Westford, MA and Arhus, Denmark.

CAPABILITY: The board-level products, which the company has developed and manufactures to commercial as well as Mil-Spec levels, are based on the industry standard VME bus architecture using 68000/10 (16-bit), 68020 (32-bit), and 68030 processor family. The product line includes a wide selection of processor, memory and intelligent disk and tape controllers, as well as intelligent I/O controller and chassis systems, again for rugged commercial and military applications. A variety of DOS and real time operating systems, as well as high level languages are offered including Ada.

In addition to the above products, the company also provides potential customers extensive engineering capabilities ranging from system integration of chassis and board level products, to system software development. DY-4 has related experience in graphics subsystems for C3 and Air Traffic management. DY-4's manufacturing has a Quality Assurance Program equivalent to Z-299.1 MIL-Q-9858A.

AVERAGE WORK FORCE: Employees – 210

GROSS SALES: 1986 – \$10.0M
1987 – \$17.0M

PLANT SIZE: 40,000 Sq Ft

EQUIPMENT: Extensive LAN-based development systems, CAD, and semi-automatic production facilities.

EXPERIENCE: The DY-4 present customer base for commercial and military VME programs includes Raytheon (Canadian Radar Modernization Program), Magnavox (Air Traffic Control), Terma Electronik

(C3 Systems and Graphic Display), Picker International (Army Mash Units), Hughes Aircraft, Boeing Aerospace, Rockwell (computer systems for Royal Australian Navy Submarines), and Honeywell Ltd (integrated navy system and sonar stabilization).

DY-4 has designed a ruggedized shipboard command and control system for the Danish Navy; an airborne management computer was designed for a system integrator for the Canadian Armed Forces Navigation Trainer and a similar system for a remote sensing ice reconnaissance aircraft is under contract with Canadian Armed Forces for a militarized reconfiguration multiprocessor for ship computing systems.

KEYWORDS: Computers; Avionics Computers; 1553 Data Bus; Radar Processing; Graphics Subsystems; ATC; C3 Systems; Relational Processors; Systems Integration; VME Computer Modules.

REVISED: February 88

EASTERN PRECISION CASTING Inc

ADDRESS: 820 Deslauriers St
Montreal, Quebec, Canada
B4N 1X1

CONTACT: Mr A W Centazzo, Sales Technical Manager -
(514) 337-9600

HISTORY: EPC is a Canadian-owned small business (as prescribed by the SBA) established in 1976. They are a precision investment casting house in both ferrous and non-ferrous alloys utilizing the lost wax process. The company has a US subsidiary, Eastern Precision Casting (NY) Inc., located in Plattsburgh, NY. The US subsidiary company was opened in 1984, but is not yet a complete foundry. Since 1986, EPC owns Eastern Aerocast Inc (formerly Supreca Inc) in Montreal, Quebec.

CAPABILITY: EPC produces investment castings to the customers drawing and specifications, and their clients are from the following fields of endeavor - Aerospace, Aircraft, Missile, Microwave, Engines and Commercial. Ferrous to 20" x 20" x 20" - Non-ferrous to 50" x 30" x 20".

AVERAGE WORK FORCE: Engineering - 18
Quality Control - 7
Sales & Marketing - 5
Production - 120

GROSS SALES: 1986 - \$6.0M
1987 - \$7.0M

PLANT SIZE: 45,000 Sq Ft

EQUIPMENT: Equipment includes furnaces, robots, wax injection machines to 100 tons, x-ray, spectrometer, tensile testing M/C, coordinate measuring M/C, hardness testing M/C, zygo, and heat treatment capability for non-ferrous.

EXPERIENCE: Approximately 80% of their production is for the US market. US clients include: Colt Industries, Lockheed, McDonnell Douglas, Raytheon, Hughes Aircraft, Singer, TRW, Litton Industries, Martin Marietta, Rockwell International and Bendix. Canadian clients include: Canadair, Pratt & Whitney, Canadian Marconi, Northern Telecom, Garrett Manufacturing, Spar Aerospace and RCA.

KEYWORDS: Investment Castings; Castings; Ferrous Castings; Non-Ferrous Castings.

REVISED: June 88

EBCO AEROSPACE INDUSTRIES Inc (Division of Ebco Industries Ltd)

ADDRESS: 8510 River Road
Delta, British Columbia, Canada
V4G 1B5

CONTACT: Mr Helmut Eppich, Chairman & CEO - (604) 278-5578

HISTORY: Ebco Aerospace Industries Inc is a wholly Canadian-owned company formed in 1983 and is a division of Ebco Industries Ltd, formed in 1956. Ebco Aerospace recently moved into a newly constructed 43,000 sq ft state-of-the-art NC machining facility to support the precision manufacturing needs of the North American aerospace industry. The Ebco Group has 800 employees and 500,000 sq ft of manufacturing facilities. In addition to Aerospace, the operating divisions of Ebco Industries are - light metal fabrication, metal finishing, tool and die, and heavy fabrication and machining. Within the Ebco Group are companies manufacturing office systems, commercial and institutional furniture, automotive products, and electronic data collection systems.

CAPABILITY: Ebco Aerospace machine tools operate under direct numerical control (DNC). The system includes IGES capability, allowing Ebco customers to off-load high priority machined parts at short notice by furnishing cutter instruction on electronic media.

Special machine tools acquired during 1987 are listed below:

- SNK gantry type (four complete gantries) three spindle five-axis profiler, numerically controlled, Fanuc 12M control system - 30 HP spindle drives separately equipped for steel and aluminum, 40" between spindles, 20 - 4,000 rpm speed range (steel), 1,000 - 7,000 rpm speed range (aluminum) - 500 lbs/ft² maximum load on work mounting surface - 110" travel, x-axis; 164" travel, y-axis; 28" travel, z-axis; ± 25° spindle swivel (a-axis) and tilt (b-axis) - work mounting surfaces: 160" width, 190.3' length.

- SNK Type FSP 100-V five-axis machining center, numerically controlled, Fanuc 11M control system - 25 HP spindle drive, 20 - 5,000 rpm speed range - pallet size: 30.4" x 39.4" maximum pallet capacity: 5,500 lb - maximum distance, pallet surface to spindle center, spindle horizontal: 55.1", spindle vertical: 39.4 - 60" travel, x-axis; 56.3" travel, y-axis; 55.1" travel, z-axis; + 30° to - 120° spindle tilt (a-axis); 360° table rotation (c-axis).

- SNK gantry type single spindle five-axis profiler, numerically controlled, Fanuc 12M control system - 30 HP spindle drive, 20 - 4,000 rpm speed range - 500 lbs/ft² maximum load on work mounting surface - 240" travel, x-axis; 56" travel, y-axis; 28" travel, z-axis; ± 25° spindle swivel (a-axis) and tilt (b-axis) - work mounting surfaces: 48" width, 240" length (354" bed length).

- Mori Seiki Model TL-5B 3000 turret lathe, numerically controlled, Fanuc control system - 25HP spindle drive, 12 - 1,400 rpm speed range - 5,000 lb capacity - 14" diameter swing over carriage, 100" between centers, eight indexing stations on turret.

AVERAGE WORK FORCE: 30 (Aerospace Division, 400 Ebco Industries)

GROSS SALES: Data not available for the Aerospace Division. Data for Ebco Industries is as follows:
1986 - \$55M
1987 - \$65M

PLANT SIZE: 43,000 Sq Ft (Aerospace Center on 52 acres for future development)

EQUIPMENT:

- Four SNK gantry profilers on a 13.3' x 190' bed
- SNK FSP 100-V machining center, 5-axis
- SNK single gantry profiler, single spindle, 5-axis
- Mori Seiki CNC Lathe, 14" x 100"
- Cincinnati Millicron machining center, 3-axis
- Giddings & Lewis machining center, 3-axis
- Automated UT inspection (immersion type)
- Mitutoyo coordinate measuring machine
- Automated PT inspection
- Other heavy conventional manufacturing capability
- Cranes: 2 x 10 Tons (Aerospace)
- Computers: DEC Micravax II/VMS with McDonnell Douglas
- Unigraphics/DC-135 CAD/CAM

EXPERIENCE: Ebco's clients include: Boeing Co (MX transporter trailer for USAF & CNC – machined components for jetfoil vessel for USN); Hooker Chemical Co (Electrolytic cathode cells for Chlorine plants); deHavilland Aircraft (CNC – machines aluminum components for Dash 7 and Dash 8 aircraft); Bristol Aerospace (CNC – machined components for CF fighter refurbishment program); University of British Columbia (56 ft vacuum tank and resonators for the Meson Facility – TRIUMF Project); Robbins Co (underground tunnel boring machines to 32 ft dia); Lockheed Petroleum Services Ltd (well head cellars for sub-sea oil well drilling and exploration); plus many other companies and a variety of manufactured items.

KEYWORDS: Coatings; Die Fabrication; Extended Length Machining; Heat Treating; Hydraulics; Machining; Mechanical Assembly; Metal-working; Precision Machining; Repair Capability Machining; Stamping; Titanium; Tooling.

REVISED: February 88

ENHEAT Inc (Aircraft Division)

ADDRESS: P. O. Box 10
Amherst, Nova Scotia, Canada
B4H 3Y7

CONTACT: Mr Roger Hawthornthwaite, General Manager –
(902) 667-3315

HISTORY: Enheat Inc is a high-technology aircraft component manufacturing, repair and overhaul facility founded in 1952 by Enamel & Heating Products Ltd of Sackville, New Brunswick, Canada. It was originally owned by Rhodes & Curry Ltd, an Amherst based company, who sold it to Canadian Car & Foundry Ltd of Montreal, Quebec. These companies manufactured railway wheels and cars for over 60 years prior to the Second World War.

Canadian Car & Foundry started an aircraft plant in 1940. Until the end of the war in 1945, the Canadian Anson was manufactured as well as many other types and makes of aircraft. Enamel & Heating Products Ltd changed its name to Enheat Ltd in 1972 and Enheat Inc in 1980.

CAPABILITY: Enheat Inc, Aircraft Division, is a high technology aircraft component manufacturing and repair & overhaul facility.

AVERAGE WORK FORCE: Engineers – 2
Quality Control – 11
Others – 219

GROSS SALES: 1986 – \$15M
1987 – \$17M

PLANT SIZE: 120,000 Sq Ft (Manufacturing)

EQUIPMENT: Enheat Inc employs the following equipment: auto-clave, drying ovens, temperature controlled layup room, process room, paint shop, brakes, presses, routers, rolls, shears, drop-hammers, stretch forming machines, lathes, millers, planers, jig borers and grinders, dimplers, miscellaneous small hand tools and processing tanks for phosphoric acid anodizing.

EXPERIENCE: Enheat has 36 years of experience with major aircraft companies of North America. Present customers include: Canadian Department of National Defense, Boeing Airplane Co, Lockheed California Co, McDonnell Douglas Aircraft Co, Grumman Aerospace Co, Fleet Industries Ltd, The deHavilland Aircraft of Canada Ltd, and Canadair Ltd.

KEYWORDS: Airframe Components; Bonded Components (Composite); Bonded Components (Metal); Components (Aircraft); Machining; R&O (Aircraft Components).

REVISED: May 88

EPIC DATA Inc

ADDRESS: 7280 River Road
Richmond, British Columbia, Canada
V6X 1X5

CONTACT: Mr Tom Carpenter, Vice President of Marketing –
(604) 273-9146

HISTORY: Epic Data Sales Ltd is a member of the Canadian owned Ebco group of companies. Ebco's wide range of products and capabilities caused numerous difficulties in labor and material tracking. Identifying a need for an automated data collection system, they looked at the marketplace and could not find a fully capable system at a reasonable price. Consequently, Ebco developed its own system and incorporated Epic Data in 1974 to manufacture and market it.

CAPABILITY: Epic Data designs and manufactures microprocessor-based data collection systems. Terminals and controllers incorporated in modular hardware and software design ensure both reliability and flexibility. Terminal users on the factory floor, in the office, and in other environments find the terminals easy and straight forward to operate. Cost savings are realized immediately by users of Epic Data Systems in terms of reduced time to input and process valuable time and labor data.

Epic Data offers a wide range of data collection terminals. The Low Cost Terminal (LCT) is a small, inexpensive data collection terminal that accepts barcode and keyboard input. The LCT allows an exceptionally high density of terminals at a low cost and is therefore ideally suited to applications that require large concentrations of terminals within easy reach of individual employees. The 200 series Portable Terminals accept barcode wand, keyboard and laser scanner input. The Portable Terminals are suitable for applications where mobility is a factor, e.g., inventory control, meter reading, order entry and stock taking. The 300 series Dual-Function Terminals are powerful, microprocessor-based terminals for barcode and magnetic stripe data collection. These on-line terminals with user-definable operating characteristics are suitable for all data collection applications, especially those in harsh environments. The 500 series Independent Terminals provide on-line data collection via terminals that guarantee continuous data collection by gathering and storing data if the control unit is busy or unavailable. Terminals in this series range from the one-line display, Independent Transaction Terminal to the 1920 character display of the Full Screen Terminal and the graphic display of the Independent Graphics Terminal. In addition to requirements for large screen and graphics, these terminals are suitable for applications where data security and quick response time to the operator are essential. Finally, the Telephone Data Terminal (TDT) is a microprocessor based terminal capable of collecting and transmitting data to a host computer via a standard telephone network. Specifically designed for use by office personnel, the TDT's compact size allows it to become an effective platform for a standard desk telephone thereby reducing the need to sacrifice valuable desk space. The TDT is ideally suited or professional and office environment applications including time management, time and expense control, billings, documentation control and inventory control.

Epic also manufactures the 1648 Series of system controllers. Controllers are an intermediary device between the data collection terminals and the system's host computer. The controller's primary functions are polling terminals for collected data; transmitting prompts to the terminals for user guidance; sequencing, editing, and assembling collected data; time of day generation; and data output to host or off-line storage. More sophisticated Epic controllers offer such capabilities as user programmability of controller operating parameters, and data validation (in conjunction with an Epic Winchester disk storage unit). The primary advantages of Epic controllers are maximization of system throughput and redundancy (dual controllers, each with their own communications line, monitor each other and take over in a case of failure of either the other controller or the other line). Redundancy can be built into every level of Epic systems thereby ensuring not only maximum throughput but also continuous data collection, even if the host goes down.

Epic Data's line of controllers range from the Host Programmable Control Unit-Minimum configuration capable of managing a network

of up to 24 terminals on 2 partylines, to the Network Control Unit, capable of managing a network of up to 1536 terminals on 16 partylines.

Epic's expertise lies in adapting microprocessor technology to the broad field of data collection. This includes support of both standard and custom hardware and software products, and covers a range of responsibilities from terminal OEM sales to the installation and maintenance of turnkey systems – including the host computer the customer prefers. The capabilities of the assembly group include – PCB component insertion, wave soldering and board cleaning, terminal assembly, cable fabrication, and metallized foil label making. The Manufacturing Test Group performs board and terminal burn-in and test. Self Test Program (STP) proms are utilized during the terminal burn-in process to check out and monitor terminal functions. Customer orders are fully configured in-house and go through a full systems test prior to shipping. Multi-stage quality monitoring is provided by an independent QA/QC Group. Epic Data's manufacturing facility is augmented by its parent company, Ebco Industries Ltd. Ebco provides capabilities in the areas of metal fabrication, painting, and tool & die making.

In addition to the manufacture of data collection hardware and operating software, Epic Data is able to offer complementary application software products. A division of Epic Data, the Epic Systems Group, was formed specially to design application software to meet customers unique requirements.

AVERAGE WORK FORCE: Total – 150

GROSS SALES: 1986 – \$16.0M
1987 – \$23.0M

PLANT SIZE: 14,500 Sq Ft

EQUIPMENT: Epic Data's equipment includes – Wave solder machine; aqueous PCB washer and contaminant monitor; PCB bake chamber and PCBA dry chamber; component prep machines; semi-automatic DIP inserter; metallized foil processing equipment; automatic shorts tester; cable tester; PCB burn-in rack; walk-in terminal burn-in chamber; drill presses; flat cable press; crimp terminal machines; STP dedicated testers for PCBAs; and miscellaneous meters, scopes, analyzers, and debugging testers.

EXPERIENCE: Epic Data is a pioneer and leader in the design and manufacture of data collection equipment and software. Epic has major clients throughout the world and their equipment is frequently recommended for use by such major computer companies as Xerox, Tandem, DEC, and Sperry. Epic's base of over 500 customers include – General Electric, Hughes Aircraft, LTV Aerospace, DEC, General Dynamics, Litton, Lockheed, Martin Marietta, Monsanto, Northrop, Mexican Government, Canadian Government, and Motorola.

KEYWORDS: Component/System Testing; Controllers; Custom Hardware; Custom Software; Data Acquisition; Microprocessors; Modular Design; Portable Terminals; Software Services; Solid State Devices; Standard Products; Terminals; Testing/Test Equipment; Turnkey Data Collection Systems.

REVISED: January 88

ERNST LEITZ CANADA Ltd

ADDRESS: 328 Ellen St
Midland, Ontario, Canada
L4R 2H2

CONTACT: Mr David G Stephenson, Vice President – (705) 526-5401

HISTORY: Leitz Canada was established in Midland, Ontario in 1952 as a subsidiary of Ernst Leitz Wetzlar GmbH, West Germany. At that time, the company commenced operations with twelve personnel and since then, the company has expanded through internal growth in three major business areas:

- Photography
- Custom commercial optical assemblies and systems
- Military electro-optical instruments and systems

In 1987, the Wild and Leitz companies combined to form the Wild Leitz Group, and Leitz Canada was assigned to the Special Products Division to take advantage of the full range of capabilities within the group for defense electro-optical systems in the Canadian marketplace.

CAPABILITY: Ernst Leitz Canada is a well integrated firm specializing in the design and manufacture of complex precision opto-mechanical and electro-optical assemblies and systems for the commercial and government markets built under the Leitz, ELCAN and Wild Leitz trade-names. From a comprehensive suite of computerized optical design and CAD programs in the engineering departments, to complete opto-mechanical testing capabilities, Leitz is equipped with the most modern equipment to undertake both large volume production and prototype quantities for conventional, state-of-the-art and research programs. Full machining capabilities, surface treatment, optical grinding and polishing of spherical, aspherical and plano optics, in glass, metal and infrared materials, microprocessor controlled thin film coating facilities, and optical measurement and testing apparatus enable Leitz to undertake the fabrication, assembly and test of this complex optical equipment. New developments are underway in optical data storage equipment for harsh environments and military systems, infrared coating, and weight reduction techniques using plastics.

In addition, the resources and technology of Wild and Leitz are available to be applied or transferred as necessary. Special capabilities exist in the fields of glass and optical materials, optical lenses, seekers, night vision, helicopter sighting systems, target acquisition equipment, and gun alignment and control systems.

AVERAGE WORK FORCE: Professionals – 50
Total – 475

GROSS SALES: 1986 – \$28.0M
1987 – \$30.0M

PLANT SIZE: 130,000 Sq Ft

EQUIPMENT: Ernst Leitz' equipment include – In-house IBM and HP computing hardware, Eros MTF measuring benches, environmental test facilities, CNC machining centers, full set of optical measuring equipment including Tropel digital measuring interferometer, microprocessor controlled coating chambers, and Leitz 3-axis coordinate measuring machine.

EXPERIENCE: Ernst Leitz' experience is outlined in four different areas:

- Photography/Reconnaissance – design and manufacture of the Leica M camera and a family of photographic lenses for the Leica M and R cameras; production of cameras for instrumentation and event recording; design and manufacture of lenses used in underwater applications for military and commercial applications; and design and fabrication of lenses used in aerial reconnaissance, earth resources and space application with focal lengths from 18mm to 900mm.
- Custom Commercial Assemblies and Systems – optics for optical data storage, x-ray equipment, image intensifiers and microfilm systems; complex periscope viewing systems for use in high radiation nuclear environments; and industrial electro-optical equipment including laser scanners, non-contact inspection devices and quality control instruments.
- Other Military Applications – design and manufacture of visual and infrared systems for guidance and fire control applications including tank fire control and muzzle reference systems, binoculars, rifle sights, weapon sights, rangefinders (optical and laser), HUD and HDD optics, and night vision products, both image intensification and far infrared equipment.
- Research and Development – optical countermeasures, optical data storage for harsh environments, thermal imaging, image intensification, and optics for space.

KEYWORDS: Electro-Optics; Fire Control Optics; Image Processing; Laser Optics; Lenses (Reconnaissance); Lenses (Underwater); Optical

Coatings; Optical Research & Development; Optics Infrared; Optics Visual; Optomechanical Precision Assemblies; Photography; Remote Sensing; Sights.

REVISED: February 88

EXPRO CHEMICAL PRODUCTS Inc

ADDRESS: P. O. Box 5520
Valleyfield, Quebec, Canada
J6S 4V9

CONTACT: Mr J A MacGregor, VP of Marketing - (514) 371-5520

HISTORY: Expro Chemical Products Inc (formerly Valleyfield Chemical Products Corp) was started in 1940 and has been operating continuously ever since. The complex has undergone two multi-million dollar modernization programs - the first in 1950-1952 and the second in 1977-1978. It was incorporated under the former name in 1977. The company changed ownership on 15 March 1982. Because of the new minority share interest held by CIL Inc, the company will have access to Nobel's Explosive Company, Ardeer, Scotland. The latter company has extensive capability for primary research.

CAPABILITY: Expro is a fully integrated commercial and military propellant and explosives complex. It has its own capability to produce nitric acid, nitroglycerine, nitrocellulose, propellants, and RDX. Nitrocellulose is produced by the batch process, utilizing wood pulp of high alpha cellulose content and nitric acid. It also has the capability to produce nitrocellulose from cotton linters. Present plant capacity for nitrocellulose production is 15 million pounds per year, with the capability to expand to 40 million pounds annually should the need arise.

Expro uses the in-house produced nitrocellulose in the manufacture of single-base, double-base and triple-base propellants. The former are primarily used in small arms munitions, military or sporting, in medium caliber military ammunition, and large caliber weapons in multi-perforated form. The double-base product is used mainly for small caliber guns. The plant produces its own nitroglycerine, using the Biuzzi Process, for the manufacture of the double and triple base propellants. Nitroguanidine for triple-base propellant manufacture is purchased.

Expro produces RDX by the Bachmann Process. It is manufactured to military specifications in various granulations as required. The RDX is mixed with TNT to produce cyclotol. Other products include Composition B, Compositions A-3 & A-4, and Compositions C-4 & A-5. Demolition Block M5-A1 and M112 is also manufactured at the company's facilities.

AVERAGE WORK FORCE: Total - 950

GROSS SALES: No Data

PLANT SIZE: 1,100 acre site

EXPERIENCE: Though its prime client continues to be the Canadian Department of National Defense, Expro is one of the two accredited suppliers of propellant for the US Air Force GAU-8/A weapon system and the US Army 25mm Bushmaster. With respect to the GAU-8 system, they supply Honeywell with both propellant and high explosive (Comp A-4) and Aerojet with Comp A-4. For the Bushmaster, they supply both Honeywell and Ford. Other major clients in the US include Olin Corp (Nitrocellulose for ball propellant), and IMR Powder Inc (propellant). HE distribution in US is by direct sales. Expro has received orders for its propellants and explosives from the Netherlands, Belgium, Portugal, Italy, France, Greece, Turkey, Brazil and Venezuela.

KEYWORDS: A-3; A-4; A-5; Armament; C-4; Chemistry; Composition B; Demolition Block; Double Base; Explosives; High Explosives; Nitrocellulose; Propellants; RDX; Single Base; Triple Base.

REVISED: January 88

FAG BEARINGS Ltd

ADDRESS: 801 Ontario St
Stratford, Ontario, Canada
N5A 6T2

CONTACT: Mr John Tsaltas, Customer Service, Sales -
(519) 271-3230

HISTORY: FAG Bearing Ltd has been in business since 1883 (Germany). The company is incorporated under the laws of the Dominion of Canada. Branch offices are located in Vancouver, Edmonton, Winnipeg, Sudbury, Toronto, Hamilton, Montreal, and Truro. A US affiliate, FAG Bearings Corp, is located in Stamford, Conn.

CAPABILITY: FAG Bearings Ltd is involved in the manufacture of precision ground anti-friction bearings including instrument & miniature bearings, water pump shaft assemblies, and separate aircraft bearing assemblies.

AVERAGE WORK FORCE: Engineering - 22
Production - 568
Admin & others (Stratford) - 195

GROSS SALES: No Data

PLANT SIZE: Manufacturing - 220,000 Sq Ft
Warehouse - 75,000 Sq Ft
Engineering - 4,000 Sq Ft
Laboratory - 2,500 Sq Ft

EQUIPMENT: FAG Bearings has complete facilities to manufacture precision ground anti-friction bearings from raw materials (bar stock or tubing). Tolerances to ABEC 9. Aircraft bearing production started in 1981 (heat treating, grinding, assembly, etc). They have well equipped heat treating facilities, a metallurgical laboratory, bearing testing facilities (life, noise, torque, etc.), complete Clean Room (Class IV), assembly for instrument bearings, and separate aircraft assembly. FAG Bearings also has:

- Materials Control Laboratory - Leitz Stereo Microscope and Microscope (mag 1250x); Vickers and Knoop Micro Hardness Tester; Rockwell Hardness Tester; and Eddy Current and Ultrasonic Devices; Temperature Cycling Chamber.
- Heat Treating Furnaces - Vacuum (computer controlled), Batch with Endo Thermic Generators, continuous type (Nitrogen/Methane), Induction, Salt, and Carburizers (pack & gas).
- Sub-Zero Production Chilling Chamber.
- Acid (etching) Room - Etching, Passivating and Black-oxidizing facilities.
- Mass Spectrometer - Leak Detector.

EXPERIENCE: FAG Bearing has experience with many US and Canadian companies - Garrett (Airesearch) in Phoenix, AR; Bendix Corp at various locations; GE in Wilmington, MA; Litton Industries at various locations; McDonnell Douglas in Grand Rapids, MI; Sperry at various locations; Varian Assoc in Beverly, MA; Canadian Marconi in Montreal, Que; Spar Aerospace in Toronto, Ont; DISC Defense Ind Supply Center in Philadelphia, PA; Dept of National Defense in Downsview, Ont; and US Army Aviation in Texarkana, TX. Final destinations of some contracts include numerous US Air Force Bases.

KEYWORDS: Anti-Friction Bearings; Bearings; Instrument Bearings; Miniature Bearings; Precision Bearings; Waterpump Shaft Assemblies.

REVISED: January 88

FELL-FAB PRODUCTS

ADDRESS: P. O. Box 3303, Sta C
2343 Barton Street E
Hamilton, Ontario, Canada
L8H 7L6

CONTACT: Mr Don Fell, President - (416) 560-9230

HISTORY: Fell-Fab was established in 1954 as a two-man company, manufacturing truck tarpaulins. It has evolved into a sophisticated manufacturing facility specializing in textile products with 130 employees, an engineering group, clean room facilities, advanced manufacturing equipment and quality assurance programs that satisfy both military and commercial aviation requirements. Fell-Fab has a wide range of proprietary products related to storage and transportation. Fell-Fab is a privately held Canadian company.

CAPABILITY: Fell-Fab's capabilities include:

- Thermal and shock protection systems for spacecraft. Installations include the interleaves for solar array and multi-layered insulation for the satellite body on the European Olympus satellite program.
- Fire-block seat covers and interiors for aircraft. Fell-Fab equipped DND's B707 fleet with passenger seat covers and is supplying crew fire-blocked seat covers for the complete Air Canada fleet. Canadair's CL-600 and CL-601 are using Fell-Fab's acoustical and thermal insulation.
- Cargo restraint systems for aircraft, naval vessels and ground vehicles. Fell-Fab supplied the webbing system for DND's C-130 fleet.
- Customs covers. Fell-Fab supplies wing covers to McDonnell Douglas Canada for the protection of the complete wing during transportation to California.
- Military webbing and equipment. Fell-Fab supplies the personal webbing to DND together with specialized equipment such as flight helmet bags, ammunition pouches, body bags and water bottle containers.
- Tents, sleeping bags and ground sheets. Fell-Fab participates in DND's modular tentage system designed for arctic and tropical use. Most protective shelters used by Bell Canada and other public utility companies are provided by Fell-Fab.
- Soft Body Armour. Fell-Fab is an approved vendor to the Royal Canadian Mounted Police for bullet proof vests and is developing applications for thin-skinned vehicles and aircraft. Fragmentation jackets also form part of Fell-Fab's capability to DND.
- Antenna covers. Microwave antenna shields protect Andrew equipment around the world.
- Dry and liquid bulk transportation and storage. A range of patented systems allows the utilization of standard containers for efficient bulk transportation and facilitates the protection and storage of, for example, grains and resins.

AVERAGE WORK FORCE: Engineers - 4
Technicians - 4
Others - 122

GROSS SALES: 1986 - \$6.5M
1987 - \$5.5M

PLANT SIZE: 60,000 Sq Ft

EQUIPMENT: Comprehensive range of manual and automatic machinery for cutting, sewing, welding and gluing fabric, specialized plastics and composite material. CAD/CAM system with auto cutting and fabrication was installed in late 1987. Clean room facilities.

EXPERIENCE: Over 60% of Fell-Fab's production is exported, primarily to government organizations or large companies, such as airlines in the US and Africa. Refer to the capabilities section for experience related to specific product lines. In addition, Fell-Fab's container experience has resulted in an invitation from the Canadian Government to participate in the development of missile containers.

KEYWORDS: Aircraft Interiors; Armour; Cargo Handling Equipment; Collapsible Storage Containers; Components (Aircraft); Fabrication (Fabrics); Harnesses; Satellite Subsystems; Seat Covers (Fire-Block); Sewing (Fabric); Sleeping Bags; Storage Systems (Dry & Liquid); Tents; Transportation Systems (Dry & Liquid); Webbing; Welding (Fabric).

REVISED: March 88

FIELD AVIATION COMPANY Ltd

ADDRESS: *Head Office*
Field Aviation Co Ltd
Lester B Pearson International Airport
Box 6023
Toronto AMF, Ontario, Canada
L5P 1B9

Government Liaison Office
* Field Aviation Co Ltd
Standard Life Building
275 Slater St, Suite #320
Ottawa, Ontario, Canada
K1P 5H9

CONTACT: * Mr C H Wilkinson, Mgr, Gov't/Industry Relations - (613) 236-9577

HISTORY: Field Aviation started in Canadian general aviation in 1947 in Oshawa, Ontario, and expanded to include a western facility in Calgary, Alberta in 1952. The eastern facility moved to the Toronto airport in 1960. The company is one of the Hunting Group of Companies, a widely diversified group with headquarters in London, England and operations worldwide in many different segments of the manufacturing and service sectors. Recent expansion has resulted in the purchase of a majority holding of Navair Ltd, an avionics sales, service and installation company (see separate listing) and the aviation parts distribution network previously owned by Standard Aero International. The company now has five operating arms with names and locations as follows (headquarters italic):

- Field Aviation East Ltd - *Toronto*
- Field Aviation West Ltd - *Calgary*
- Field Aviation Sales Ltd - *Toronto, Calgary, Ottawa*
- Field Aviation Parts Sales Ltd - *Vancouver, Edmonton, Calgary, Winnipeg, Toronto, Ottawa, Montreal, & Fredericton*
- Navair Ltd (Majority Share) - *Toronto*

CAPABILITY: Field Aviation provides a full range of aircraft sales, service, modification, repair and overhaul services to general aviation, regional airlines, corporate aviation departments, and governments. The company is the exclusive Canadian distributor for Beech Aircraft Corporation and provides a broad spectrum of Beech and other aircraft parts from its Canadian warehouses across the country.

Field West has a first-rate quality aircraft painting facility that will accommodate aircraft up to Boeing 737 size.

Field Aviation also has complete overhaul jigs for the deHavilland Twin Otter and Buffalo aircraft, and a full line of Bell helicopters. The shops have completed conversions of a number of Gulfstream G1s to commuter airliners configuration, and have undertaken major structural modifications of Convair 580 passenger aircraft to convert them to freighters.

A seat manufacturing facility in Calgary has provided production seats for the Twin Otter, CASA 212 and has developed custom seats for a number of other aircraft types. It currently produces all seats for the deHavilland Dash-8 production line.

Field's engineering department specializes in custom modification of aircraft to meet any unusual needs of its customers. Their custom designs of aerial survey installations and fire bombing systems are flying in many part of the world, and include both fixed and rotary wing systems.

Specialized expertise exists for repair/modification of Twin Otter, Buffalo, Convair 580, SD3-30, SD3-60, Gulfstream G1, HS 748, Bell Helicopters and the full spectrum of general aviation aircraft.

AVERAGE WORK FORCE: Engineers – 2
Technologists/Design Spec – 8
Others – 450

GROSS SALES: 1986 – \$40.0M
1987 – \$41.0M

PLANT SIZE: 175,000 Sq Ft (Toronto)
250,000 Sq Ft (Calgary)
(Plus aircraft parts, offices/warehouses at branch locations)

EQUIPMENT: Standard FBO facilities at Toronto and Calgary for aircraft up to small airliner size; major overhaul jigs for Twin Otter, Buffalo and Bell helicopters; hydraulic test facility; specialized aircraft salvage equipment; B737-sized paint shop; precision machine shop; and aircraft seat manufacture and assembly line.

EXPERIENCE: Field Aviation's regular customers include the Canadian Department of National Defense; Canadian Department of Transport; Royal Canadian Mounted Police; US Navy; US Army; and numerous regional airlines and corporate flight departments.

KEYWORDS: Aerial Spray/Water Bombing; Aerial Survey Systems; Hydraulics; Modification (Aircraft); Non-Destructive Testing; R&O (Aircraft); Seat Manufacture; Spares Supply; Survey Systems; Water Bombing.

REVISED: February 88

FLEET INDUSTRIES (A Fleet Aerospace Company)

ADDRESS: P. O. Box 400
Fort Erie, Ontario, Canada
L2A 5N3

CONTACT: Mr H B MacRitchie, VP, Marketing – (416) 871-2100

HISTORY: Fleet Industries began operations in Canada in 1930 as Fleet Aircraft of Canada Ltd.

CAPABILITY: Fleet Industries manufactures major components for the prime Canadian and US manufacturers of commercial and military aircraft, helicopters, satellites, and radar and sonar systems. Fleet was established in Canada in 1930 to design and manufacture aircraft for the world's civilian, transport, and military markets. Between 1930-1950, almost 4,000 complete aircraft were built at Fleet and flown from the company's 2,400-ft on-property runway.

Today the company concentrates its efforts on the production of major components. Fleet has enclosed facilities of approximately 500,000 sq ft, and about 800 employees. Assembly and test methods meet the latest requirements of both civil and military authorities in Canada and the US. Fleet's ability to produce quality products on schedule and at competitive prices has won a high reputation for the company in both commercial and defense work. In 1987, Fleet's sales were more than \$56M.

• **AIRCRAFT:**

- Boeing – E3A/E6A fin and rudder; 727 aft engine fairing; 747 SP wing-to-body fairing structure; Boeing E3A TF33 engine nacelles; 757 APU doors; Boeing A6 Rewing – Flaperon.
- Canadair – Challenger CL600 rudder assembly.

- deHavilland – DHC-5 bonded components; DHC-6 bonded components; DHC-7 bonded components and engine nacelles; DHC-7 wing leading edges, ailerons; and DHC-8 bonded wing and fuselage panels, inboard and outboard flap assy.

- Grumman – A6 inboard and outboard flaps, and bonded honeycomb assemblies.

- Lockheed – L-1011 main landing gear doors (aft dorsal structure & aft engine cowlings), and CP140/P3C flight station.

- McDonnell-Douglas – A4E speed brakes and flaps; F/A-18 graphite avionics doors; DC-9 flaps and ailerons (Canada); DC-10/MD-11 Flapvanes; spoilers, and access doors; and F-15 Rudder fairings.

- Sikorsky Aircraft – Black Hawk UH60A Medevac kits, and blade sub-assemblies.

• **RADAR:**

- General Electric – ASR welded antennas. Lockheed Electronics – Gun fire control system antennas and cabinets.

- Raytheon – Phased array antennas "Pave Paws" & "Cobra Judy", AEGIS.

- Sperry – Gun fire control system antenna and cabinet.

• **SATELLITE:**

- Hughes Aircraft – Solar panel substrates, Anik C, SBS, NASA, Anik D, GOES/GMS, Westar/Palapa B, Leasat, and AT&T.

- Spar Aerospace – Bonded panels/structures, Anik C, SBS, Anik D, and Westar, spun/despun assemblies for Brasilsat.

• **SONAR:**

- Dept of Supply & Services – Retractable fixed hull mounted, towed bodies, VDS systems and faired tow cables; and repair and overhaul.

- EDO Corp – Transducer structure.

- General Electric – Heat exchangers.

- Westinghouse Canada Ltd – Retractable fixed hull mounted, towed bodies, VDS systems and faired tow cables.

- Raytheon – Variable depth sonar (VDS) hoist system.

AVERAGE WORK FORCE: Total – 800

GROSS SALES: 1986 – \$47.0M
1987 – \$56.0M

PLANT SIZE: 500,540 Sq Ft

EQUIPMENT: Fleet Industries' equipment includes Kearney & Trecker, Sundstrand and Cincinnati numerically controlled equipment, autoclaves, mills, lathes, presses, furnaces and other special equipment associated with aerospace manufacturers. New bonding facility includes 10' x 31' autoclave, water jet cutting, 5-axis NC core cutting and C-scan inspection equipment.

EXPERIENCE: In 1987, from sales of over \$57M, some 80% was exported to the US. Commercial sales accounted for 53% with 47% military.

Facilities and skills have been developed to produce a diversified list of mechanical structures which include radar, sonar, air cushion vehicles, and other defense and commercial assemblies. In the bonding field, Fleet Industries manufactures a wide range of structural components such as antennas, space satellites, electronic cabinets and other specialized items requiring composite technology.

The list of Fleet's customers reads like a "who's who" of the aerospace industry. Boeing, deHavilland, General Electric, Grumman, Hughes, Lockheed, McDonnell Douglas, Raytheon, Sikorsky, Westinghouse, and many others have placed their confidence in the ability of Fleet Industries to produce quality components.

Fleet Industries' Quality Assurance Program meets the requirements of both Canadian Government specification DND-1015, NATO Spec AQAP-1, and US Mil Spec MIL-Q-9858A. The average ratio of inspection to direct labor is 1:8. To insure that production of components meets contractual requirements, the Quality Assurance department reviews and defines product quality with the engineering department; collaborates in the review of specifications; generates quality assurance procedures; reviews quality problems; and effects corrective action and reports on departmental quality performance. Standard mechanical inspection techniques are supplemented by magnaflex, fluorescent penetrant, radiography, destruction testing, chemical analysis, and three-axis co-ordinate measuring equipment.

KEYWORDS: Advanced Composites; Airframe Components; Bonding Capabilities; Radar Antennas; Satellite Structures; Sonar Equipment.

REVISED: January 88

FLEXIBULB (1983) Inc (Division of AVCORP Industries Inc)

ADDRESS: 9000 Boulevard Parent
CP/PO 635
Trois-Rivieres, Quebec, Canada
G9A 5J3

CONTACT: Mr Jeannot Bourassa, President - (819) 374-9250

HISTORY: Flexibulb is a Canadian-owned plastics parts manufacturing company founded in 1970. It remained a privately owned company until 1986 when it was acquired by AVCORP Industries, a Canadian aerospace-based holding company.

CAPABILITY: Flexibulb is primarily involved in the fabrication of plastic components as a subcontractor to the prime manufacturers in the aircraft and ground transportation industries and is approved by Transport Canada to supply plastic parts for the interiors of civil aircraft.

Flexibulb has thermoforming, injection and extrusion capability and specializes in the transformation of more difficult materials such as polycarbonates and polycarbonate blends, as well as the usual ABS, polyethylene & acrylic materials. An additional specialization is the capability of producing self-skinning foam products.

AVERAGE WORK FORCE: Production - 25
Admin & Sales - 9

GROSS SALES: 1987 - \$1.8M
1988 - \$2.5M (Est'd)

PLANT SIZE: 22,000 Sq Ft

EQUIPMENT: Flexibulb's equipment includes: 3 single platen vacuum thermoformers (4x8, 6x10, 6x12); 3 extrusion machines (1", 2", & 3.5" screw size); 1 injection moulding machine with 125 ton self skinning foam injection equipment; and in-house machine shop for tool & die manufacture.

EXPERIENCE: Flexibulb's principal customers include - Canadair, Bombardier, Prevost Car, Via Rail, and Pannac.

KEYWORDS: Plastics Parts; Thermoforming; Vacuum Forming; Injection Molding; Plastic Extrusion; Self-Skinning Foam Products; Aircraft Cabin Interiors.

REVISED: January 88

FOOTTIT MITCHELL AND ASSOCIATES

ADDRESS: 77 Metcalfe St, Suite #807
Ottawa, Ontario, Canada
K1P 5L6

CONTACT: Mr J C Bond, Vice President - (613) 563-0236

HISTORY: Foottit-Mitchell and Associates is a Canadian owned company founded in 1976 with its office in Ottawa, Ontario. The objectives of the company are two fold:

- To provide an interface between industry and appropriate Canadian Government departments and agencies.
- To provide advice to industry on the establishment of liaison on company-to-company and company-to-government bases.

CAPABILITY: Senior members of the firm have had extensive experience in both Canadian Federal Government and industry in the fields of research, development, marketing and production. Much of this experience has been in the area of US-Canada defense-industrial cooperation. The combination of industrial and government experience is applied to facilitating government-industrial relationships and to company-to-company cooperation in the following areas - Aerospace, Electrical and Electronic, Shipbuilding, Transportation, Machinery, General Manufacturing, Government Organization, and Systems Planning and Management Evaluation.

Foottit-Mitchell and Associates, in addition to the professional staff of six, has a number of associates with specialized knowledge who are called in for specific tasks and assignments.

AVERAGE WORK FORCE: Professional - 6
Support Staff - As required

GROSS SALES: No Data

PLANT SIZE: 1,500 Sq Ft

EXPERIENCE: Foottit-Mitchell and Associates currently provides services to twenty manufacturing companies of which several are located in the US. The provision of these services involves contact with Canadian Federal Government departments and agencies, particularly with the Departments of National Defence, Regional Industrial Expansion and Supply and Services. The work with these agencies is conducted at all levels and has been concerned with policy, industrial benefits, customs issues, technology, marketing, funding and contracting.

KEYWORDS: Consulting; Government Relations; International Trade Relations; Marketing; Systems Planning.

REVISED: January 88

FOUNDATION INSTRUMENTS Inc

ADDRESS: 24 Colonnade Road
Nepean, Ontario, Canada
K2E 7J6

CONTACT: Mr J P Clermont, Marketing Manager - (613) 226-4000

HISTORY: Foundation Instruments Inc has been active in the fiber optic market since 1977. The company specializes in complete fiber optic communications products and systems that it has developed, manufactured and installed. To meet customer requirements, they have distributors around the world and a plant in Cleveland, OH.

CAPABILITY: Foundation Instruments Inc is a high-technology company dedicated to advancing fiber optic capabilities. The company performs the design, development and manufacture of all it's products. Beginning with a full understanding of a client's communications requirements, Foundation Instruments Inc provides assistance in project management, systems specifications, application engineer-

ing, installation supervision, documentation and training. The company provides complete turn-key service from the design to the installation of a fiber optic communications system to fully meet existing and future requirements.

The research capabilities with respect to fiber optic systems are best related by referring to systems that have been designed by Foundation Instruments' R&D Group. These projects include - fiber optic transmission system with high performance 10 MHz baseband analog bandwidth; 250 Mb/s digital link; bi-directional data links; and a special fiber optic system for a shipboard communications simulator. Other systems FI has supplied include secure (TEMPEST) data circuits using fiber optics; subscriber and central office local loop terminals for telephone systems; T1, T2, and 12.98 Mb/s data rate, long haul fiber optic links; and tactical fiber optic communications systems.

Foundation Instruments' capabilities are constantly being expanded to include a five video channels per fiber communications systems, a high data rate multiplexer and a fiber optic data multiplex system.

AVERAGE WORK FORCE: Engineers - 27
Production - 15
Admin - 11

GROSS SALES: 1986 - \$5.0M
1987 - \$3.0M

PLANT SIZE: 20,000 Sq Ft (New facility - Jan 84)

EXPERIENCE: Foundation Instruments Inc has experience with government and commercial corporations, several of which are listed below:

- Department of National Defense
- Atomic Energy Canada Ltd (AECL)
- US Navy
- IBM
- General Electric
- US Army Corps of Engineers
- US Air Force
- Ontario Hydro
- Ford Aerospace Corp
- Quebec Hydro
- National Research Council
- Harris Corporation
- GTE Government Systems
- Spar Aerospace

KEYWORDS: Avalanche Detectors; C3 Systems; Communications; Fiber Optics; Fusion Splicers; Laser Diodes; Modems; Moisture Content; Optical Communications; Power Measurement; Radar; Receivers; Space Systems; Telephone Communications; Transmitters; Video Systems; Wideband.

REVISED: April 88

FRONTEC LOGISTICS Corp

ADDRESS: Corporate Headquarters
10035 - 105 Street
Edmonton, Alberta, Ontario
T5J 2V6

NWS Contract Management Office
130 Slater St, Suite #1300
Ottawa, Ontario, Canada
K1P 6E2

CONTACT: Mr George Paicu, President - (403) 420-7112

HISTORY: Frontec is a Canadian technical services and logistics company jointly owned by ATCO and Canadian Utilities. It was founded in 1986 to bring together the combined expertise of the ATCO group in the areas of facilities management, logistics support in remote regions, operation and maintenance, power generation and transmission. The ATCO group of companies, including Canadian Utilities, employs 6,000 people, has assets of more than \$3.0B and annual revenues in excess of \$1.5B.

CAPABILITY: Frontec specializes in facilities management, operation and maintenance, logistics support in remote locations, technical services, power generation, communications networks and has expertise in computerized management support systems. Frontec also draws on the broad experience and expertise of associated companies such as Alberta Power Ltd, Northland Utilities and Yukon Electrical Co, Northwestern Utilities, Canadian Western Natural Gas, ATCOR, ATCO Drilling and ATCO Structures. Frontec has offices in Edmonton, Ottawa and Yellowknife, Canada.

AVERAGE WORK FORCE: No Data

GROSS SALES: No Data

PLANT SIZE: No Data

EQUIPMENT: No Data

EXPERIENCE: Under contract to the Canadian Department of National Defence, through the Department of Supply and Services, Frontec operates and maintains the first phase of the new North Warning System. Frontec offers its services to the defence industry, resource companies, government and business.

KEYWORDS: Logistics Support; Technical Services; Management Support; Power Generators; Communications Networks; Remote Operations; O&M.

REVISED: January 88

FULL LOTUS MANUFACTURING Inc

ADDRESS: #406-5940 No 6 Road
Richmond, British Columbia, Canada
V6V 1Z1

CONTACT: Ms Candace Nirenberg, Sales Manager - (604) 270-0188

HISTORY: Full Lotus Manufacturing Inc was incorporated in March 1985 with the objective to design and manufacture the world's first inflatable floats for light aircraft.

CAPABILITY: Full Lotus Manufacturing Inc is primarily involved in the design, manufacture and production of inflatable float equipment for the aviation industry. Current products include: Full Lotus two float systems in 12.5 ft (3.8m), 14ft (4.3m), and 17.5 ft (5.4m) lengths, suitable for aircraft with a gross weight of up to 2000 lbs (907 Kg), available with or without retractable landing gear; and Full Lotus mono float systems for ultralight and light experimental aircraft, suitable for aircraft with gross weight of up to 1050 lbs (475 kg), available with or without retractable landing gear. Full Lotus inflatable floats offer many advantages over other float systems. They are half the weight of fiberglass floats, stronger than fiberglass or aluminum, flexible and resilient to absorb impacts, have eight airtight compartments per float, provide superior handling characteristics, and fold up for low shipping costs. Other products in development include certified floats for larger aircraft and helicopters.

AVERAGE WORK FORCE: 20

GROSS SALES: No Data

PLANT SIZE: 3,000 Sq Ft

EQUIPMENT: Equipment includes: electronic RF welding equipment for welding coated fabrics, assorted sewing and machining equipment, 6000 gallon test tank with crane, and in-house computer systems (IBM & Wang).

EXPERIENCE: Full Lotus floats are used by pilots in recreational and commercial operations on all five continents.

KEYWORDS: Aircraft Floats; Floats (Aircraft); Inflatable Aircraft Floats; Landing Gear (Retractable).

REVISED: January 88

GARRETT CANADA

ADDRESS: 255 Attwell Drive
Rexdale, Ontario, Canada
M9W 6L7

CONTACT: Mr C F Fauquier, Manager of Marketing & Sales –
(416) 675-1411

HISTORY: Garrett Canada is a division of Allied-Signal Canada Inc. The company is supported by the Allied-Signal Aerospace Company's worldwide network of field sales and services offices.

A Garrett office was established in Canada in 1952 to provide sales and services support for Garrett products in Canada. One year later, the company established a repair and overhaul facility near Toronto International Airport and added an engineering department to support this endeavor.

Throughout the 1950s, Garrett expanded its engineering department, added a production department and began the design and manufacture of ground equipment for the Canadian aircraft industry. In 1961, Garrett Manufacturing Ltd assumed a world product mandate for design, development and production of electronic temperature controls.

CAPABILITY: Backed up now by a quarter-million square feet of modern design, manufacturing, testing and support facilities, Garrett Canada markets electronic environmental control systems, communications systems, thick and thin film hybrid microcircuits, illuminated information panels, peripheral vision display systems, advanced systems and subcontract services, and employs approximately 1200 people of which 30% are engineering or engineering support staff. Garrett Canada now has six facilities in Rexdale, Ontario.

Garrett Canada's engineering facilities have expanded significantly and their marketing efforts have yielded important accomplishments in all of the company's product lines. Garrett Canada:

- Has developed a new and innovative system controlling the temperature and pressure of aircraft bleed air. The electronic bleed air system promises to increase reliability and fuel economy, while reducing weight and maintenance costs.
- Has developed an Electro Impulse De-Icing system for the leading edge surfaces of aircraft wings, stabilizer, engine cowls and inlets.
- Has developed the Peripheral Vision Display system, intended to prevent pilot spatial disorientation.
- Is completing a study of the ICECS (Integrated Closed Loop Environmental Control System) concept for the Advanced Tactical Aircraft.
- Has developed a portable test system for airport instrument landing systems that require ground inspection, calibration, alignment and trouble shooting. Easily carried with a shoulder strap, the lightweight system performs test procedures more quickly in locations far from active runways without interrupting air traffic.
- Has been certified to Military Standard 1772. Certification to this new and more stringent standard is mandatory for all hybrid microcircuit manufacturers submitting proposals for new military contracts let by the US Department of Defense.
- Has been selected second source for the electronic control unit on the GBU-15 fin actuation system.
- Has been selected as the Canadian Contractor for the NATO ASRAAM Program. Garrett Canada's responsibility includes not only the design and development of the missile fin control actuation system, but other elements of the total weapon system. Garrett Canada's marketing efforts are supported in the field by the Allied-Signal Aerospace Company's sales and service organization with offices in most major cities in the world.

Garrett Canada is actively engaged in the research and development of control systems, RF communications, analog and digital circuit design, power and hi-speed digital hybrids, and display technology. Approximately 20% of annual sales is spent on research.

Environmental and EMI qualification testing to military/aerospace standards is performed in their government-approved test facility. The facility includes a Canadian Government TEMPEST test facility. This facility is staffed to perform tests for equipment accreditation based on compliance with NACSIM 5100. A simple standard quality control system than conforms to NATO AQAP-1 and MIL-Q-9858 is employed.

Electronic Environmental Control Systems (EECS): Garrett Canada EECSs are a major subsystem of the Environmental Control Systems that fly on more than 70 percent of the commercial and military aircraft in the western world. EECSs are used in cabin, cockpit and compartment air-conditioning systems; wing anti-ice temperature control systems; window heat control systems, and some liquid coolant systems.

Garrett Canada is under contract to McDonnell Douglas and Boeing to develop and manufacture a new and innovative system controlling the temperature and pressure of aircraft (C-17A, MD-11, 767-300) bleed air. The electronically controlled bleed air system is software adaptable to various engine choices. It promises to increase reliability and fuel economy, while reducing weight and maintenance costs.

In 1984, Garrett Canada is completing a contract sponsored by the Flight Dynamics Laboratory, Aeronautical Systems Division at Wright Patterson AFB to study and demonstrate the life cycle costs related to advanced digitally controlled Integrated Closed-Loop Environmental Control Systems (ICECS). Four years of research has involved analysis, simulation and development of a full scale laboratory system.

Garrett Canada is internationally known for its expertise in digital control. The ICECS program further enhances the company's technology base with the implementation of modern control theory techniques within a fully integrated aircraft system. Several advanced digital technologies will also be studied.

Communications Systems: Emergency Locator Beacons developed by Garrett Canada are used throughout the world in military, commercial and general aviation applications. These low power transmitters automatically provide an emergency homing signal to assist search aircraft to locate an aircraft in distress.

Personal Locator Beacons and Survival Radio Sets for military users permit two-way voice communications with search aircraft as well as providing an emergency homing signal. These radios are being used by the Canadian Forces and the Swedish Air Force.

VHF/AM Single Channel Transmitters and Receivers are produced for civil and military aviation air traffic control communications. Contracts have been received from the Ministry of Transport to update all Canadian air traffic control towers. This type of equipment offers many performance and maintenance features not previously available.

The ILS (Instrument Landing System) test set is a new product which performs ILS test procedures more quickly and far from active runways without interrupting air traffic. Using a shoulder strap, the lightweight system is easily carried by the operator.

The system is unique in the number of functions it combines from various existing pieces of equipment. This test set's integrated design and digital processor technology ensure significantly reduced maintenance costs while enhancing measurement accuracy.

Designed and developed by Garrett under license to British Aerospace PLC, the Low Profile Antenna (LPA) replaces the commonly used vehicular end-fed whip antenna. The LPA's unique design – reduced height and robust construction – makes it ideal for use in the tactical arena where a reduced visual signature and excellent operational capability are desirable.

Microcircuits (Custom Thick and Thin Film Hybrid Circuits): Garrett Canada's microcircuits are produced in a fully integrated facility with a dedicated engineering, sales and production staff. The facility,

equipped with specialized manufacturing equipment, is considered one of North America's best. Custom thick and thin film hybrids are now being manufactured to the new and more demanding Military Standard 1772. These include power hybrids and assemblies with leadless chip carriers surface mounted on multilayer ceramic motherboards.

Hybrids manufactured by Garrett are used in missile guidance systems, inertial navigation systems, radar systems and other electronic equipment on a variety of military and commercial aircraft, as well as in US Government electronic security systems.

Peripheral Vision Display: The PVD is a subliminal attitude change indicator for cockpit work-load reduction and pilot disorientation prevention. It operates on the principle that orientation information is sensed primarily by a person's peripheral vision system and is processed subconsciously by dedicated areas of the brain. The system is now in production for military applications.

Advanced Systems and Subcontract Manufacturing Service: Garrett Canada's 30 years experience in the design, development and manufacture of a wide range of aerospace and aerospace related products provides a sound base for the production of state-of-the-art major defense and communication systems. This experience, supported by a modern up-to-date facility, is also being offered for subcontract manufacturing.

The Advanced Systems capability provided by Garrett Canada has been recognized and proven in the NATO arena through the company's participation in a number of multi-national collaborative programs. Programs beginning with R&D and design, through the system integration and development of comprehensive benefits programs, to complete life cycle support and world-wide marketing.

Currently, Garrett Canada is addressing the feasibility, design and development of control actuation systems, power supplies, weapons computers and specialized test equipment for several NATO requirements. In addition to Garrett Canada's participation in the NATO ASRAAM program, the company is teamed in a multi-national consortium to address the NATO requirement for Modular Stand-Off Weapon (MSOW). This company is also a consortia team member for the NATO Anti-Air Weapons System (NAAWS), 155mm autonomous Precision Guided Munitions (APGM) and the NATO Area Defence Weapon.

Garrett Canada has contributed in a number of NATO working groups in the pre-feasibility studies for NATO LAMS/MFR and the Area Defense Weapon (ADW). The company supplies components and assemblies for numerous other defence projects which include the British Aerospace Rapier, GBU-15 glide bomb, ASRAAM, and Chapparal.

The Subcontract Manufacturing services include build-to-print, assembly and testing of sub-assemblies, assembly and testing of electronic systems, and employment of Garrett Canada's highly experienced manufacturing groups, including aerospace standard assurance and computer aided test facilities, to help customers meet demanding delivery schedules. This service backed up by a high-technology team, employing computer aided design and manufacturing techniques provides the best cooperation in major procurement programs.

AVERAGE WORK FORCE: Total - 1200

GROSS SALES: 1986 - \$104.0M
1987 - \$101.4M

PLANT SIZE: Administration Building - 64,000 Sq Ft
Engineering Facility - 33,000 Sq Ft
Main Production Plant - 75,000 Sq Ft
Microcircuit Plant - 21,000 Sq Ft
Customer Support Plant - 34,000 Sq Ft
Illuminated Panels Facility - 21,000 Sq Ft

EXPERIENCE: Garrett Canada customers are world-wide and include both the commercial and military sectors.

KEYWORDS: ATC Communications System; Avionics; Beacons; Build-To-Print; Cockpit Displays; Communications; Crash Position

Indicator; Digital Electronics; EMI; Emergency Locator Beacons; Environmental Control; Environmental Instruments; Hybrid Circuits; ILS; Illuminated Panels; Lighted Panels; Measurement & Control Systems; Missile Control Systems; PC Board Design & Fabrication; Peripheral Vision Display; Power Supplies; R&O (Avionics); RF Communications; Radio Communication Gear; Regulators (Hi/Lo Voltage); Software Services; Solid State Devices; Subcontract Manufacturing; Systems Integration; TEMPEST; Test Instrumentation; Testing/Test Equipment; Thick Film Hybrid Microcircuits; Thin Film Hybrid Microcircuits; Voltage Transformers.

REVISED: February 88

GasTOPS Ltd

ADDRESS: 1011 Polytek Street
Gloucester, Ontario, Canada
K1J 9J3

CONTACT: Mr D A Murray, Vice President, Marketing -
(613) 744-3530

HISTORY: GasTOPS Ltd is a Canadian owned company founded in 1979. Capitalization of the company has been through initial investments and retained earnings, and its growth has been steady since operations began.

CAPABILITY: GasTOPS Ltd is primarily involved in the design and development of subsystems and support systems for gas turbine based propulsion systems. The company is organized around projects which emphasize R&D. Projects have been concentrated in the fields of engine health monitoring, engine control systems, engine test data systems, and propulsion system simulations. A substantial amount of this development involves computers and software, and the company offers services in these fields to its customers. In the last several years, the customer base has been almost exclusively military - both naval and airborne.

AVERAGE WORK FORCE: PhDs - 3
Engineers - 30
Others - 10

GROSS SALES: 1986 - \$2.0M
1987 - \$2.8M

PLANT SIZE: 15,000 Sq Ft (including 2500 sq ft model shop)

EQUIPMENT: Complete mechanical model shop, electronics test equipment, and in-house computer systems and software including MICROVAX-II and PDP 11/23.

EXPERIENCE: Present customers include engine manufacturers, control system manufacturers, and various departments in the Canadian Government including the Navy and the Air Force. GasTOPS Ltd is an R&D company devoted to engineering development of prototypes. Cooperative projects with manufacturers are preferred.

KEYWORDS: Automatic Data Acquisition systems; Control Systems; Data Acquisition; Demonstrator Consoles; Engine Health Monitoring; Engineering Services; Expert Systems; Gas Path Analysis; Gas Turbine Engines (R&D); Inflight Engine Monitoring; Software Development.

REVISED: January 88

GEC PLESSEY TELECOMMUNICATIONS (Canada) Ltd

ADDRESS: 419 Notre Dame Ave
Winnipeg, Manitoba, Canada
R3B 1R3

CONTACT: Mr R A Ashman, President - (204) 942-7221

HISTORY: GEC Plessey Telecommunications, an established Canadian company for over 55 years, is a wholly owned subsidiary of the GEC Plessey Telecommunications of England. There are offices in Winnipeg, Toronto, New York, Los Angeles and Washington, DC.

CAPABILITY: GEC Plessey Telecommunications is involved in the engineering, manufacturing, distribution and installation of various telecommunication switching systems. They have supplied major local and toll switching systems for North American metropolitan areas, as well as smaller dial offices, PABX systems, and peripheral equipment. They have also supplied numerous American Air Force bases with video compression equipment used in Aircraft and missile surveillance.

AVERAGE WORK FORCE: Engineers - 17
Others - 66

GROSS SALES: 1986 - \$ 7.4M
1987 - \$10.6M
(Parent company has \$1.5B in Sales for 1987)

PLANT SIZE: 40,000 Sq Ft (Winnipeg Plant)

EQUIPMENT: The company has the following equipment available for use on projects:

- Laboratory Equipment: SWPT 6800 Computer Software System, Soroc Software Programming (Development) System, various mini and micro computer systems, CAD system, etc.
- Machinery Equipment: Ragen 750 Automatic Self Programmable PC Board Assembly System, Econopak 229 Automatic PC Board Soldering System, etc.
- Test Facilities: Environmental Chamber, adjustable from 0 to 70°C (32.0 - 158°F) for burn-in testing of various integrated circuits (PC boards).

EXPERIENCE: GEC Plessey Telecommunications is involved in the production of Automatic Number Identification (ANI) systems and 911 Emergency Reporting Systems for world-wide markets. The company is involved in the manufacture of single and double line telephone sets, video teleconferencing equipment, and smart IC cards.

KEYWORDS: Automatic Number Identification System; Communications; Emergency Reporting Systems; PABX Systems; Peripheral Equipment; Switching; Telecommunications; Telephone Communications.

REVISED: January 88

GEHRING RESEARCH CORPORATION

ADDRESS: 1200 Bay Street, Suite 502
Toronto, Ontario, Canada
M5R 2A5

CONTACT: Mr P H Barry MacLennan, PEng, President -
(416) 966-3139

HISTORY: Gehring Research Corporation is a Canadian-owned company pursuing applications for its proprietary three-dimensional audio technology. It was incorporated in April 1986. Mr Louis S "Bo" Gehring and Mr Barry MacLennan are the company's principals.

CAPABILITY: During its first year of operation, Gehring Research Corporation was involved in the general field of advanced cockpit displays and now concentrates its efforts on three-dimensional audio and its application to the aerospace/defence market. A machine which processes ordinary audio signals to make three-dimensional (binaural) sound is called an auditory localizer. Recent advances in digital signal processing technology and in Gehring Research's understanding of binaural audio and its utility now make it possible to produce artificial binaural sound indistinguishable from that heard naturally. In a fighter aircraft, today's pilot relies almost exclusively on his visual sense for information about his combat situation. An auditory localizer,

on the other hand, gives the pilot immediate awareness of the threats and opportunities in the combat environment by locating them in space as sound sources.

Gehring Research Corporation is committed to the development and marketing of a family of advanced fully-electronic auditory localization product to satisfy customer requirements for three-dimensional auditory localizer products.

AVERAGE WORK FORCE: Engineers - 1
Others - 2

GROSS SALES: 1986 - \$290K
1987 - \$350K (Est'd)

PLANT SIZE: 1,240 Sq Ft

EQUIPMENT: Gehring Research Corporation employs Sony PCM Digital Audio, Apple MacIntosh computers and a laserwriter.

EXPERIENCE: Gehring Research Corporation's customers include - Armstrong Aerospace Medical Research Laboratory, Visual Displays Branch, AAMRL/HEA, Wright-Patterson AFB, OH; Pilot's Associate Program, USAF, Wright-Patterson AFB, OH; and Litton Systems Canada Ltd, Display Systems Engineering Group, Rexdale, Ontario, Canada.

KEYWORDS: Auditory Localizer; Binaural Audio Generator; Spatial Audition Displays; Cockpit Displays (Audio).

REVISED: February 88

GENELCOM Ltd

ADDRESS: 90 Clayson Road
Weston, Ontario, Canada
M9M 2G7

CONTACT: Mr Brian Stal, Market Development Engineer -
(416) 741-1060

HISTORY: Genelcom Ltd, a subsidiary of GE Canada, was established in 1972. Key personnel at Genelcom have continuity of experience in repair and overhaul starting in 1953 when Canadian General Electric established a repair and overhaul facility to provide contractor support for ground radar systems and communication equipment. Over the years, the amount of field service work has reduced and the in-plant repair and overhaul business has grown, establishing Genelcom as a recognized expert in depot level maintenance.

CAPABILITY: Genelcom's capabilities in several areas are described below:

- Engineering - Genelcom has an engineering staff experienced in providing engineering support for repair and overhaul activities including design and development of system modifications, reliability engineering, failure analysis, and technical investigations.
- Repair and Overhaul - Genelcom performs repair and overhaul to electronic, communication, avionics, nav aids, radar, surveillance and interrogation equipment to NATO AQAP-1 quality standards.
- Manufacturing - Custom manufacturing and prototypes are provided to compliment the R&O operation. Modifications and enhancements to improve equipment operation includes manufacturing and replacement of circuit boards and components.
- Calibration Facility - Genelcom's calibration facility is equipped to perform repair and calibration to the required degree of accuracy on virtually all standard electronic test equipment and on an extensive range of specialized devices. Standards for time, frequency, voltage, etc., are traceable to the National Research Council and National Bureau of Standards. The calibration department staff is available for consul-

tation and assistance on problems of test equipment design, development selection, application, and operation and maintenance.

• Operation and Maintenance – Genelcom provides installation, operation and maintenance services for Canadian radar sites in the form of permanent on-site staff, installation crew staffing, or field service representation.

AVERAGE WORK FORCE: Engineers – 4
Technicians – 25
Others – 15

GROSS SALES: 1986 – \$4.2M
1987 – \$4.7M

PLANT SIZE: 20,000 Sq Ft

EQUIPMENT: Standard and custom designed electronic test equipment.

EXPERIENCE: Genelcom's experience includes the Department of National Defense (DND), Transport Canada, USAF, Ministry of the Environment, Hughes Aircraft, and the Government of India.

KEYWORDS: Avionics; Communications; Electronics; Testing/Test Equipment; Components (Avionics); R&O (Avionics); R&O (Components); R&O (Electronics).

REVISED: January 88

GENERAL MOTORS OF CANADA Ltd (Diesel Division)

ADDRESS: P. O. Box 5160
1991 Oxford St East
London, Ontario, Canada
N6A 4N5

CONTACT: Mr W L Claggett, Sales Manager, Defense Products – (519) 452-5184

HISTORY: Diesel Division, General Motors of Canada Ltd, was established in 1949 for the manufacture of diesel-electric locomotives. Diesel Division is a division of General Motors of Canada Ltd, which is a wholly-owned subsidiary of General Motors Corporation.

CAPABILITY: Diesel Division is primarily involved in the engineering and manufacture of Diesel-electric locomotives, transit buses and military vehicles. They have advanced skills and techniques in shearing, forming, fabricating and welding of large and complex steel components. They are fully qualified military vehicle prime contractors for the Canadian and US Air Forces.

AVERAGE WORK FORCE: Engineers – 150
Others – 1850

GROSS SALES: 1986 – \$522M
1987 – \$385M

PLANT SIZE: 1,400,000 Sq Ft (Spread over 4 major plants)

EXPERIENCE: Diesel Division is under contract with the US Marine Corps to deliver 758 8X8 Wheeled Light Armored Vehicles (LAV). Four hundred and twenty two of these vehicles will carry a 2-man 25 MM turret. The remaining vehicles include Logistics, Recovery, Mortar, Command & Control and Anti-Tank. Under an R&D contract, they have built 2 prototype Mobile Electronic Warfare Support System (MEWSS) variants of the LAV and have received a contract for 12 production units. An Assault Gun Vehicle and an Air Defense Vehicle are 2 additional variants which the USMC are interested in. Delivery of the LAV commenced in October, 1983 and will be completed in 1988.

In the Fall of 1982, Diesel Division completed the delivery of 491 6x6 Armored Vehicles General Purpose (AVGP) to the Canadian Armed

Forces. They were supplied in three variants – a Personnel Carrier, a Fire Support Vehicle and a Maintenance Recovery Vehicle.

Diesel Division is presently under contract to produce 75 Mine Clearance System Kits (MCSK) for interface on to the USMC's LVTP7's. There is an option for 55 additional kits.

In 1986, the USAF selected the logistics version of the USMC light armoured vehicle for the MARV/SMUD (Mobile Armoured Reconnaissance Vehicle/Stand Off Munitions Disrupter). An R&D contract was let for two prototype MARV vehicles. Diesel Division teamed with SACO, the winning SMUD contractor for the R&D phase of this program.

Diesel Division has also been under contract with the US Navy for a design study for a hybrid Mobile Protected Weapon System. In addition, they have also participated in the MX Missile Carrier Program through Delco Electronics and bid on the US Army Infantry Fighting Vehicle Second Source Program. They are producing 4 Midgetman carrier chassis for the USAF under a LORAL contract.

Diesel Division has designed an upgrade kit for the M113 Engineer Dozer Vehicle adding an auger and a hydraulic tool system. They have received a contract to produce 55 units to the Canadian Forces. Diesel Division have recently bid on the production of 1200 8-10 ton military trucks to the Canadian Forces teamed with MAN from Germany.

More than 3400 locomotives have been delivered to 32 domestic customers and over 1000 locomotives have been exported to 22 countries.

EQUIPMENT: GMC has the following kinds of special equipment:

- CAD/CAM
- Flexible Machining Cell – fully automatic, state-of-the-art, used for subassemblies
- Slant Bed Lathe – state-of-the-art in numerical control turning equipment
- Plasma Burner – used for cutting ballistic plate, computer numerically controlled
- Robotic Welding – majority of hull welding is performed by welding robots
- X-Rays – facilities for x-raying weld joints on the vehicle hull
- Machining Centers – state-of-the-art, computer numerically controlled, used for machining entire hulls

KEYWORDS: Air Defense Vehicle; Amphibious Vehicles; Anti-Tank Vehicle; Armoured Vehicles; Assault Gun Vehicle; Command & Control Vehicle; Fire Support Vehicle; GP Armoured Vehicles; Ground Transportation; Hybrid Mobile Protected Weapon System; LVTP7 Upgrades; Light Armoured Vehicles; Locomotives; Logistics Vehicle; M113 Upgrades; Maintenance Recovery Vehicle; Mine Clearance System Kit; Mobile Electronic Warfare Support Syst; Mortar Vehicle; Personnel Carrier; Recovery Vehicle; Transport System; Upgunned Weapon Station.

REVISED: January 88

GLOBAL THERMOELECTRIC POWER SYSTEMS Ltd

ADDRESS: P. O. Box 400
Bassano, Alberta, Canada
TOJ 0B0

CONTACT: Mr Gary Moore, Defence Products – (403) 641-3512

HISTORY: Global Thermoelectric Power Systems Ltd is a privately-held Canadian corporation. It is the successor to the 3M Company in the manufacturing of thermoelectric products, and in the research

and development of thermoelectric science and technology. The 3M Company's involvement in thermoelectrics dates from the early 1950's and culminated in a line of commercial generators, as well as radioisotope-fueled generators built for the Apollo moon missions.

Global's facilities opened in 1975 and since that time, the number of employees has grown to 75 and plant size has been enlarged to present 77,000 Sq Ft.

Global's corporate mission is the continuing application of thermoelectrics to industrial and military products. Over 4,000 of Global's industrial remote generator systems are operating in more than 40 countries around the world.

New thermoelectric products are being developed and Global continues to specialize in the design and manufacture of thermoelectric power sources which meet unique demands reliably and cost effectively.

CAPABILITY: During the past decade Global has conducted an extensive number of research and development programs. The unique goals of these programs have enabled Global to develop an expertise in: new multi-fuel burner systems, piezoelectric ultrasonic atomization, thermoelectric metallurgy, and thermoelectric converter design.

Specific development objectives include the development of liquid multi-fuel generators, thermoelectric powered heaters with self-sustaining capabilities, 600 watt and 2000 watt thermoelectric converters, and large thermoelectric modules for waste heat utilization projects.

Global's projects include: 120 Watt Manpack Generator, a lightweight unit capable of operating on diesel, kerosene, jet, or gasoline fuels. It is inaudible in field conditions and will operate unattended for periods generally only limited by fuel supply. As the only moving parts are two small DC motors, the unit required no operational maintenance. Its simple one switch operation and multi-fuel capability make it an ideal power source for operating tactical communication, computers, and other electronic equipment, in addition to field battery charging. Clean heat from the unit can be utilized for heating of shelters, tents, helicopters, etc.

AVERAGE WORK FORCE: Engineers - 5
Others - 70

GROSS SALES: 1986 - \$3.0M
1987 - \$5.0M

PLANT SIZE: 77,000 Sq Ft

EQUIPMENT: Global maintains complete production facilities at its Bassano headquarters. Their machine, sheet metal, and welding shops have full capabilities. Equipment includes: lathes, surface grinders, mills, a CNC machining center, NC shears and punches, and MIG/TIG welders. The semiconductor thermoelectric materials and hermetically sealed power units are also manufactured entirely on site.

Global's Quality Assurance Department is equipped with the latest computer-aided three axis coordinate measuring machine. Their facilities are presently able to meet MIL-I-45208 (AQAP-4) Quality Assurance Requirements.

R&D facilities include the latest in electronic test and measurement equipment, two walk-in environmental chambers (-50° to +70°C), and four combustion test rooms.

EXPERIENCE: Global's products are currently in use with a number of defense agencies around the world including the US Air Force, the US Navy, the US Coast Guard, the UK Royal Navy, and the New Zealand Royal Navy.

KEYWORDS: Auxiliary Power Units; Combustion Research; Generators; Portable Power Supplies; Power Sources; Remote Power Supplies; Thermoelectric Generators; Thermoelectric Power Units; Thermoelectric Research; Unattended Power Supplies.

REVISED: January 88

HALEY INDUSTRIES Ltd

ADDRESS: Haley, Ontario, Canada
K0J 1Y0

CONTACT: Mr H W Murray, Senior Vice President, Marketing -
(613) 432-8841

HISTORY: Haley Industries Ltd is an aluminum and magnesium aerospace sand casting foundry. The company was originally formed by the Canadian Government in 1952. In 1968, the facility was purchased by private interests. Plant expansions and modernizations took place in 1969 and 1974. In 1981, the company went public in order to finance a further \$7M modernization program. In 1982, a major research and development effort was initiated to produce premium quality aluminum sand castings by means of a low pressure pouring system. On 1 April 1984, Haley Industries purchased Presto Casting Company, located in Glendale, AZ. During 1986/87, an additional \$8.0M plant expansion was completed increasing the plant production area by 45,000 Sq Ft. This expansion will enable Haley to produce larger castings as well as participate in a larger way in the airframe structural market.

CAPABILITY: Haley Industries provides aerospace quality light alloy sand castings to an international customer base. Their castings are used in fixed wing and rotary wing aircraft for both military and civil applications. They specialize in producing complex gearbox and transmission castings in both aluminum and magnesium including constant speed drive housings (CSD), auxiliary power unit housings (APU), airframe mounted auxiliary drive system housings (AMADS), main propulsion engine gearbox housings and main transmission and tail rotor housings for helicopters. In order to supply lubricating oil to the gears in these various housings, Haley developed a sand pipe core process enabling them to cast internal oil passageways in the walls of the casting.

Haley Industries' premium quality casting area permits them to produce castings with superior mechanical properties and excellent radiographic qualities. If required, this also gives them the ability to cast thinner walls with a fine surface finish.

The company is completely self-sufficient for all foundry operations. They have in-house capability for pattern making, heat treating, destructive and non-destructive testing, dimensional inspection, sand testing, spectrographic analysis and tensile testing with high temperature capabilities. The extensive use of computers and microprocessors throughout the foundry has enabled Haley to retain its prominent position in the international aerospace foundry industry.

AVERAGE WORK FORCE: Staff - 92
Hourly - 260
Engineers - 18

GROSS SALES: 1986 - \$40.7M
1987 - \$35.9M

PLANT SIZE: 165,000 Sq Ft

EQUIPMENT: Haley Industries has the most modern foundry equipment available to meet or surpass the exacting aerospace material and design engineering requirements. Specific brochures will be furnished upon request.

EXPERIENCE: Haley Industries has 36 years in operation serving the following customers: Garrett Turbine Engine Co, Avco Lycoming, Boeing Vertol, Bell Helicopter, Detroit Diesel (Allison), General Electric (Engine Group), Hispano-Suiza (France), Klockner-Humboldt-Deutz (Germany), Kaman Aerospace, Litton Precision, Motoren-Und Turbinen-Union (Germany), Pratt & Whitney Aircraft (Hartford, Conn), Pratt & Whitney Aircraft of Canada Ltd, Sikorsky Aircraft, Spar Aerospace, Sundstrand Aviation, Westinghouse, Westland Helicopter (England), Fiat Aviazione (Italy), Agusta SpA (Italy), Aircraft Gear Corp, Hamilton Standard, and Northrop Corp.

KEYWORDS: Aluminum Sand Castings; Castings; Light Alloy Sand Castings; Magnesium Sand Castings; Precision Sand Castings; Premium Quality Sand Castings; Sand Castings.

REVISED: January 88

HAMMOND MANUFACTURING COMPANY Ltd

ADDRESS: Corporate Office
394 Edinburgh Road
Guelph, Ontario, Canada
N1H 1E5

CONTACT: Mrs Janice Husson, Marketing Services Manager -
(519) 822-2960

HISTORY: Hammond Manufacturing Company Ltd was formed in 1927. There are presently four divisions - Transformer Division, Cabinetry Division, Power Supply Division, and the Wiring Device Division. Sales and technical services offices are located in Montreal, Toronto, Winnipeg, Calgary, Vancouver and Buffalo, NY. Hammond Manufacturing is a publicly traded company and is listed on the Toronto Stock Exchange.

CAPABILITY: The company is involved in the manufacture of a wide range of magnetic devices for the electrical/electronic industry. Specific areas are outlined below:

- High Voltage Design and Fabrication - High voltage transformers are designed, wound, assembled, and tested at the Transformer Division (Guelph). Fabrication of sheet metal cases and special mechanical mountings are manufactured by the Cabinetry Division (Guelph). The company has been manufacturing custom designed high voltage transformers since 1940 for functions such as radar, dielectric testing, HV power supplies, medical electronics, modulation transformers, electrostatic speakers, and electronic air cleaners. They have design and manufacturing capability for single and three phase units.
- High Voltage Testing - The Transformer Division has in-house test capabilities up to 50 KV RMS, 60 Hz dielectric testing, Corona testing at 60 Hz to 400 Hz per MIL-T-27 specification. Testing capabilities available at the Transformer Division include: dielectric up to 80 KV RMS, up to 200 KV DC (high impedance loading), and up to 175 KV impulse. Test equipment is of commercial and custom manufacture.
- Case design for containing special transformers and fabrication is available to withstand pressure due to liquid expansion. Includes water cooling.
- Leak detection per MIL-T-27.
- Vacuum processing is available for silicone and mineral transformer oils as well as mineral and epoxy varnishes and potting epoxy, or compounds. Oil filling available. At present, there is no gas filling of high voltage transformers.
- Low Voltage Transformers - power, trigger, Audio High Frequency, pulse, and reactors are designed and fabricated at Transformer Division. Capabilities range from microwatt devices up to kilowatt level in single, two and three phase configurations at frequencies ranging from 10 Hz to 150 KHz. Physical characteristics range from standard EI laminations through "C" core, wound core, toroidal, pot core, etc., in materials of silicone steel, nickel alloy, mu metal, ferrite, powdered iron and air core transformers and reactors.
- Current and Pulse capabilities at the Transformer Division - Current to 10A, pulse to 10KV, and current up to 50,000A.
- Military requirements - Designed to meet MIL-T-27 available with certificate of conformance. The company inspection system is established to Department of National Defense specification DND 1016, (equivalent to MIL-I-45208). They are presently in the second stage of applying for recognition of a Quality Program to DND 1015 (equivalent to AQAP-1 NATO Quality Control Systems Requirement for Industry and Military Specification MIL-Q-9858A Quality Program Requirements).

• Source surveillance and government source inspection available by DND Canadian Forces Technical Service Depot 302 (Guelph).

AVERAGE WORK FORCE: Corporate (Total) - 1800
Electronic Division - 720

GROSS SALES: 1986 - \$110.0M
1987 - \$130.0M

PLANT SIZE: Transformer Division - 300,000 Sq Ft (9 Plants)
Electrical/Cabinetry Division - 175,000 Sq Ft
Other Manufacturing Plants - 275,000 Sq Ft
Warehouse Facilities - 100,000 sq ft

EQUIPMENT: Transformer Division - Multiple/gang coil winders, unit coil winders, toroidal coil winders, bobbin coil winders, RF choke winders, automated stacking/laminating machines, vacuum impregnating/potting encapsulating/casting tanks; baking and curing ovens. Environmental equipment includes A.G.R.E.E. chamber with dynamic shaker, thermal shock, heat, cold and humidity chambers. Also available on-site are variable AC and DC power sources, machining shop facilities and other standard related electrical testing facilities.

EXPERIENCE: Hammond Manufacturing has been involved with military projects since 1939. They are presently supplying magnetics to Canadian and US manufacturers of the power supply for the gun turret fire control computer for the M-1 Main Battle Tank. Hammond Manufacturing also supplies magnetics for/to Canadair Challenger Aircraft; Atomic Energy of Canada Ltd "THERAC" Series of Linear Accelerators; Satcomm Ground Communications Stations for NATO; Garrett Manufacturing; Collins Radio; Varian Canada; Bell Canada; Canadair; deHavilland Aircraft; Canadian General Electric; ITT; Computing Devices Company; National Research Council of Canada; Department of National Defence; Department of Supply & Services; Sperry Univac; Raytheon Canada; Atomic Energy of Canada; Ward Beck Systems; McCurdy Radio; McCurdy Communications; Litton Systems; and universities and research groups.

KEYWORDS: Audio Transformers; Corona Testing; Current/Pulse; Dielectric Testing; High Voltage Transformers; Low Voltage Transformers; Magnetic Devices; Mechanical Mounts; Oil Filling; Oil Vacuum Processing; Sheet Metal Cases; Transformers.

REVISED: May 88

HANDS FIREWORKS Inc

ADDRESS: c/o James C Bond Consultants Ltd
77 Metcalfe St, Suite #900
Ottawa, Ontario, Canada
K1P 5L6

CONTACT: Mr A Davitt, Product Mgr, Military Pyrotechnics -
(613) 563-0236

HISTORY: Hands Fireworks Inc was established in 1873 for the purpose of making domestic display fireworks. Early in World War II, the company converted completely to the manufacture of military pyrotechnics which have been a major product ever since. Hands Fireworks Inc became the major pyrotechnics and fireworks producer in Canada. During WW II, a wide range of pyrotechnics were manufactured for most of the allied countries and included such items as US BM 8Al Flare, the 4.5 inch Reconnaissance Flare, 2 inch Parachute Illuminating Flares, Verrey Pistol Cartridges of all types, and smoke signals.

In 1977, the company was purchased by Lorcon Inc and operated as a division, Hand Chemical Industries. Recently, the operations became an independent Canadian company and now operates as Hands Fireworks Inc.

CAPABILITY: Hands Fireworks Inc operates from two plants - the main plant at Papineauville, Quebec (between Ottawa and Montreal), and a new plant at Edwardsburgh (50 miles south of Ottawa). The new plant also includes an R&D facility, Environmental Testing Laboratory, Quality Control Laboratory, and the company's central

distribution warehouse. The production plants are typical for this industry, being constructed of fire resistant materials and consisting of many individual buildings thereby keeping the amount of explosive, flammable, dangerous or toxic materials and the number of operators involved to a minimum.

Each specific operation or storage area has been carefully analyzed for degree of hazard and is designed to minimize these hazards by steel or reinforced concrete walls, protective steel guards, remote control of operation, special protective devices such as explosive activated fire extinguishing equipment, protective screens between buildings, special electrical wiring, etc. The process, materials, quantities of explosive, type of protection, etc., are licensed yearly by the Federal Department of Energy, Mines and Resources, followed up by frequent plant inspections by this department throughout the year.

The Papineauville facility includes one laboratory/test building, one office building, 50 process buildings, 9 explosive storage magazines and 32 raw material storage buildings. The fireworks line is completely integrated starting with the basic raw materials, paper, and chemicals, and converting them into spiral wound paper tubes from 1/4 to 3 inch inside diameter, mixing the chemicals, pressing, drying, labelling and packaging. The plastic components which hold the delay charges and bursting charges are purchased from outside sources, but are produced from company molds. The smokeless and black powders used are purchased from outside sources.

AVERAGE WORK FORCE: Professionals - 15
Others - 120

GROSS SALES: No Data

PLANT SIZE: 100,000 Sq Ft (Total at all locations - 120 Buildings)

EXPERIENCE: Hands Fireworks Inc has worked very closely with the Department of National Defense (DND) and various Canadian design and development facilities such as the National Research Council; the Defense Research Establishments in Valcartier, Quebec and Suffield, Alberta; and the Chief Inspector of Explosives of the Department of Energy, Mines and Resources. Development work has been done for the Department of Agriculture. Some major projects have included:

- The design and development of the Grenade, Hand, Smoke (HC), and C1A1.
- The design and development of the Smoke Pot, SC39 and SC390. This long burning (11 to 18 minutes), high volume smoke pot has recently been tested by the DOD at Dugway, Utah.
- The design and development of the Disperser Chemical Groundburst, and Disperser Chemical Airburst, both of which are currently being used by DND.
- Design and development of a complete line of NBC Training Simulators with assorted chemical charges.
- The manufacture of the igniter for the Black Brant Rocket.
- The design, development and production of the Signal, Illumination 1 1/2 inch (plastic case) Red, Yellow, Green, etc., currently in service with the Canadian Forces.
- The design, development and manufacture of the Silver Rainmaker shell which was used successfully to produce rainfall to fill reservoirs for irrigation.
- The design, development and production of the 2 minute Smoke Pot Orange.
- The design and development of self-scuttling Marine Marker (Manual).

KEYWORDS: Ammunition Smoke; Armament; Chemical Airburst Simulators; Chemical Dispersers; Chemical Groundburst Simulators; Explosives; Flares; Green Signal; Grenades Smoke; HC Smoke; Hand Grenades Smoke; High Volume Smoke Pot; Igniters; Illumination

Signals; Markers; Orange Smoke; Ordnance; Practice Bomb Signal Cartridges; Pyrotechnics; Red Signal; Rocket Igniters; Signal Cartridges; Smoke Pots; Spotting Charges; Yellow Signal.

REVISED: April 88

HARBOUR INDUSTRIES (Canada) Ltd

ADDRESS: 460 Normandie Blvd
Farnham, Quebec, Canada
J2N 1W4

CONTACT: Mr Mark D Beauchamp, Marketing Manager -
(514) 293-5304

HISTORY: Harbour Industries (Canada) Ltd was incorporated in Canada in 1975 and is a wholly-owned subsidiary of Harbour Industries Inc, Shelburne, Vermont. The parent company was incorporated in 1964 and both companies manufacture high temperature wire and cable.

CAPABILITY: Harbour Industries (Canada) Ltd manufactures high-quality wire and cable to standards such as Mil Spec, CSA, UL, and individual company specifications. The conductors are solid or stranded bare copper, tin, nickel, silver plated copper and on occasion, thermocouple grade or high strength alloys. They service the Canadian market and the US market where offset credits are involved in Canadian contracts. The insulations are Teflon, Kapton, Tefzel, Fep, Pfa, and Silicone Rubber.

Harbour Industries (Canada) Ltd has a well equipped laboratory approved by the US Department of the Navy for OPL testing. Calibration is to MIL-C-45662 and the Quality Control program meets the requirements of MIL-I-45208A & MIL-Q-9858A as well as the NATO APAP-4 requirement. The quality program is registered under CSA quality management registration program and audited regularly by CSA.

AVERAGE WORK FORCE: Engineers - 1
Quality Control - 1
Others - 22

GROSS SALES: 1986 - \$4.1M
1987 - \$4.4M

PLANT SIZE: 14,500 Sq Ft

EQUIPMENT: Equipment includes Teflon paste and melt extruders, silicone rubber extruders, tape wrappers, striping/printing towers, cablers and braiders, and complete lab and test equipment.

EXPERIENCE: Harbour Industries (Canada) Ltd has experience in all areas of design and manufacture of high quality wire and cables.

KEYWORDS: Aerospace Wire; CSA Wire; Cables; Coaxial Cable; Communication Cable; Custom Made Cable; Fire Proof Wire; Flame Proof Wire; Heat Tracer Cable; High Temperature Wire; Hologene Free Wire; Low Hologene Wire; Plenum Cable; QPL Listed Wire; Radiation Resistant Wire; Thermocouple Wire; UL Wire; Wire.

REVISED: January 88

HAWKER SIDDELEY CANADA Inc (Orenda Division)

ADDRESS: Box 6001
Toronto AMF, Ontario, Canada
L5P 1B3

CONTACT: Mr C F Varney, Manager, Contracts & Admin -
(416) 677-3250

HISTORY: Hawker Siddeley Canada Inc is a Canadian public company, listed on the Stock Exchanges in Montreal, Toronto and Vancouver. The head office is in Toronto and the company normally

employs about 7,000 people in divisions across Canada, in the UK, and in the US. The company is engaged mainly in engineering and manufacture of heavy industrial products for domestic and export markets. The Orenda Division was established in 1946 to design, develop and manufacture jet engines for Canadian fighter aircraft. Orenda has built several thousand gas turbine engines of both its own design and under license for General Electric. They have designed and built the Lance Missile Launcher, conducted nuclear development work, and built parts for the Candu nuclear reactor; and designed and built industrial gas turbines for use in oil pipeline operations and for emergency power units.

CAPABILITY: The Hawker Siddeley Orenda Division's capabilities are outlined below:

- **Manufacturing** – The Orenda Division is now a sub-contract manufacturer of major components for aircraft and industrial gas turbines. The facility includes a large machine shop, an extensive sheet metal fabricating shop, a heat treating department, quality assurance to MILCQ-9858, AQAP-1 and a comprehensive non-destructive testing department.
- **Repair & Overhaul** – Orenda Division has contracts for the repair and overhaul of aircraft gas turbine engines, J85-15, J85Can40, and was recently awarded a contract for the repair and overhaul of the F404. Also overhauled and repaired are industrial gas turbine engines. The plant has facilities for testing all these engines.
- **Publications** – The Graphics Department prepares and prints manuals to Department of Defense standards, as well as commercial graphics work.
- **Laboratory** – The laboratory is fully qualified by the Department of National Defense and performs chemical metallurgical and mechanical testing, and analysis in support of other departments and also for other customers.

AVERAGE WORK FORCE: Technical Staff – 70
Total – 700

GROSS SALES: No Data

PLANT SIZE: 440,000 Sq Ft
117,000 Sq Ft adjacent space immediately available

EQUIPMENT: Machine Shop facilities include: Turning up to 12 ft dia; NC & CNC machining centers; and EDM broaches. NC programming uses access to GE and Sundstrand time-sharing computers. Sheet metal fabricating has mechanical and hydraulic presses to 600 tons; fusion and resistance welding; and facilities for forming, shaping and joining. There is an environmental room with control of temperature, humidity and dust. Heat treating has atmospheric, inert gas and vacuum furnaces, and plating and coating facilities. Non-destructive testing includes fluorescent penetrant, magnetic particle, x-ray and ultrasonic equipment. Assembly has dynamic rotor balancing machines, gas turbine engine test cells, and facilities for testing fuel systems.

EXPERIENCE: Orenda Division's customers for aeronautical parts and gas turbine repair and overhaul have included Pratt & Whitney, General Electric, Avco Lycoming, McDonnell Douglas, Rolls Royce, Lucas Aerospace, Canadian Department of National Defense, NAMSA, and the Air Forces of the Netherlands, Germany, Norway, Belgium, Pakistan, Italy, US and the US Army. Nuclear reactor component design and manufacture was performed for Atomic Energy of Canada.

KEYWORDS: Airframe Components; Engine Components; Engine Test; Forming; Gas Turbine Components; Heat Treating; Laboratory; Machining; Manuals; Metalworking; Nuclear Reactor Components; Plating; R&O (Engines); Stamping; Welding.

REVISED: January 88

HELI-FAB Ltd

ADDRESS: 150 Cree Crescent
Winnipeg, Manitoba, Canada
R3J 3W1

CONTACT: Mr Raymond Haydaman, President – (204) 889-0942

HISTORY: HELI-FAB Ltd is a privately-owned Company founded in November 1978 by Raymond and Isobel Haydaman from a rented 1,000 sq ft bay of a warehouse. Two years later, they and seven workers moved to a 1,500 sq ft warehouse. That space over the next two years enlarged to 5,000 sq ft and was supplemented by another 3,500 sq ft leased the same year. In 1985, construction began on a new 15,000 sq ft plant. Full production started in July 1986 bringing together all the operations from the other two sites.

CAPABILITY: HELI-FAB specializes in weldments, sheet metal fabrication, and heli-arc welding of aluminum products serving the aerospace, transportation and communication industries. HELI-FAB carries out cylinder head repairs and the overhaul and repair of heater cans and exhaust systems for the civil aviation industry, fabricates aircraft jigs, fixtures and tooling, the third man seat for deHavilland Beaver Aircraft, baggage carts, water tanks, air starter units, and other aircraft support equipment.

HELI-FAB fabricates many different assemblies, sub-assemblies, and details for the transportation segment including cross-walk signs for the Provincial and Municipal Governments. The company also manufactures signal equipment for railway companies, including bungalows, masts and ladders, signal arms, highway crossings signal cantilever structures, and equipment houses. HELI-FAB manufactures computer sub-details for several large computer companies and also makes the associated jigs and fixture tooling.

HELI-FAB works closely with the National Research Council (NRC) and clients to bring products of quality design and construction into production. Two current projects serve as illustrations. A need has been identified for a Canadian manufactured wheelchair lift to help the handicapped gain easier access to commercial and residential buildings. This work is under way and similarly, there is interest in developing a lift mechanism to load stretchers onto aircraft. This project is also progressing favorably.

HELI-FAB has researched, designed and produced communication shelters for Canadian Railways, and has a working design for a waterborne float system for use on houseboats and work platforms which is proving to be very successful. The company has designed and developed fuel tanks for marine applications in conjunction with our customers, prone board and tooling for a local rehabilitation center for children, and coin operated car wash equipment used and distributed in Canada and the US. This equipment can be installed in any self-operating car wash and is designed to meet the rigors of extremely harsh environments.

AVERAGE WORK FORCE: Production – 29
Support Staff – 6
Management – 3

GROSS SALES: 1986 – \$2.08M
1987 – \$2.01M

PLANT SIZE: 12,500 Sq Ft

EQUIPMENT: Three heli-Arc welders, 5 semi-automatic welders, 1 seam welder, 1 spot welder, machine shop (equipped for Tool & Die purposes), duplicating punching machines, punch presses, 12-ft router, fully automatic cold cutting saw, abrasive cut-off saw, band saw, photo cell plasma cutter, 10 ft x 1/4 ft shelters, 4 ft x 1/16 ft brake, 12 ft x 1/4 ft brake, pre-heat and stress relief furnace, and job costing computer system.

EXPERIENCE: HELI-FAB's valued customers include Boeing of Canada, Unisys Canada (Defence Products Gp & Peripheral Products Gp), Unisys US (Commercial Products), Bristol Aerospace, Otto Bock Orthopedics, Government of Canada, the Manitoba Government, Manitoba Hydro, CP Railway, CN Railway, General Electric, Monorail, SED Systems, Motor Coach, New Flyer, and WPG RH Institute.

KEYWORDS: Weldments; Sheet Metal Fabrication; Airframe Components; Heli-Arc Welding; Components (Aircraft); Components (Computers); Transportation Equipment; Shelter Fabrication.

REVISED: January 88

HERMES ELECTRONICS Ltd

ADDRESS: 40 Atlantic St
Dartmouth, Nova Scotia, Canada
B2Y 4A1

CONTACT: (US Contact) Mr J L Fortenberry, Director of US Business
(703) 560-3812

HISTORY: Hermes is the successor of the Canadian branch of EMI Electronics of the UK. It was established in 1949 and has specialized in anti-submarine warfare products, certain areas of HF Communications, and oceans/environmental data systems products.

CAPABILITY: The company's products include:

- Sonobuoys for ASW Application – production types include AN/SSQ-53B, AN/SSQ 525 VLA, and AN/SSQ 527B. Buoys coming into production are AN/SSQ-53D, miniature low cost sonobuoys and towed array sensors.

- Ionospheric Sounding Equipment – oblique sounding equipment is manufactured and is in service on a worldwide basis. The AN/FPT-11 transmitters, AN/UPR-2 receivers, and their commercial counterparts represent the latest generation of this equipment.

- HF Antennas – a unique active broadband aperiodic loop array is produced. Various configurations of this system are in service in twenty-three countries and fifty-four agencies of various governments. A compact system, designated as the OE-316A/TSC-99 Antenna Group, is produced for tactical applications.

- Moored and Drifting Data Buoy Systems – buoy vehicles for the collection, recording and retransmission of oceanographic, meteorological, and environmental data have been developed and systems engineered for government, institutional, and industrial users. Hermes developed the Canadian Ocean Data Systems Buoys for the Canadian Government in 1975.

- Environmental Data Systems – ice stations and automatic weather stations have been developed and manufactured for industrial and government users.

AVERAGE WORK FORCE: 500 (including 75 engineers, technicians, draftsmen and engineering support staff).

GROSS SALES: 1986 – \$24.0M
1987 – \$22.0M

PLANT SIZE: 137,600 Sq Ft

EQUIPMENT: Hermes has a fully equipped environmental testing laboratory as well as a comprehensive manufacturing facility. Their environmental laboratory is one of the largest in Eastern Canada and contains vibration equipment, humidity and temperature chambers, shock and tensile testers, as well as high pressure testing tanks. The equipment meets the requirements of MIL-STD-810 for Environmental Test Methods which is the prime military standard for establishing uniform environmental test methods used to determine the resistance of equipment to the effects of natural or induced environments, peculiar to military operations. The manufacturing facility is oriented to the high volume production, testing and integration of electro-mechanical sub-assemblies. The plant is also equipped with machining facilities to support prototype development manufacturing.

The company's quality control and inspection department has developed and implemented a complete quality assurance program, which ensures quality and compliance to customers specifications, and to military standard. A calibration and standards room is maintained

and supervised by quality control and inspection. This facility checks all company instruments to ensure their accuracy by using standards with certified values. These are traced to N.R.C. and N.B.S. and are checked at regular intervals to ensure their accuracy. A quality assurance manual in accordance with NATO QA standard and with AQAP-1 defines the QA operations of the company.

EXPERIENCE: Hermes is a large scale producer of sonobuoys for the Canadian and US Governments, as well as other governments. The company has recently completed a major order of AN/FPT-11 transmitters for the Government of France and a large order of portable HF Loop Antennas for the US Army. Advanced development programs are continuing in both sonobuoy and towed array products.

KEYWORDS: Antennas; ASW; Beacons; Communications; Environmental Laboratory; HF Antennas; Sonobuoys; Weather Stations.

REVISED: February 88

HEROUX Inc

ADDRESS: 755 Thurber
Longueuil, Quebec, Canada
J4H 3N2

CONTACT: Mr Emile L Desnoyers, VP, Marketing – (514) 679-5450

HISTORY: Heroux Inc was founded in 1942.

CAPABILITY: Heroux is a fully integrated company involved in the design manufacturing, repair and overhaul, assembly and the testing of aircraft landing gears and hydraulic systems for the military and commercial markets. This latter R&O facility handles such aircraft as the KC-135, C-130, P-3, L-100, DHC-6, DHC-5, DC-8, B-702 and other commercial aircraft landing gears. They have complete on-site electroplating facilities.

AVERAGE WORK FORCE: Total – 500

GROSS SALES: 1986 – \$28.0M
1987 – \$40.0M

PLANT SIZE: 250,000 Sq Ft

EQUIPMENT: All necessary equipment for the manufacture, repair and testing of landing gear and hydraulic systems.

EXPERIENCE: The company is involved in all major markets in North America, England, Europe and South America on both military and commercial basis. Major customers include the US Air Force, Canadian Forces, Canadair Inc, The deHavilland, McDonnell Douglas, Boeing, Lockheed, Grumman and airlines such as Air Canada, Avianca, Southern Air, Republic Airlines, and Northwest Territorials.

KEYWORDS: Hydraulics; Landing Gears; R&O (Hydraulics); R&O (Landing Gears).

REVISED: February 88

THE H. I. THOMPSON COMPANY (A Fleet Aerospace Company)

ADDRESS: 10 Kingsmill Ave, Box 906
Guelph, Ontario, Canada
N1H 6M6

CONTACT: Mr D E Roberts, Vice President & General Manager – (519) 822-6630

HISTORY: The H I Thompson Company was founded in 1952 as a subsidiary of a US company to supply high and low temperature insulation to the aerospace industry. In 1965, the company became solely Canadian-owned and in 1985 became part of the Fleet Aerospace Corporation. Most of the raw materials consumed are purchased from the US and after fabrication, are sold to Canadian and US customers in the aerospace industry.

CAPABILITY: The H I Thompson Company is capable of all thermal calculations, design and fabrication of heat shields, and insulation for gas turbine engines, airframe, and commercial applications. The insulation is generally encased in stainless or inconel foils .002" to .008" thick or sheet metal .010" to .032" thick. The foils or casings are spot or seam welded together to prevent the entry of liquids. The company also has the capability of producing sheet metal weldments, bracketry and assemblies and is qualified for TIG welding to the leading aircraft engine company specifications.

AVERAGE WORK FORCE: Engineers – 4
Others – 46

GROSS SALES: 1986 – \$3.2M
1987 – \$3.5M

PLANT SIZE: 31,000 Sq Ft

EQUIPMENT: Spot welders – 5 to 50 KVA, seam welders – 5 to 100 KVA, form dies to customer part numbers, 50 to 300 ton presses, various sheet metal fabricating equipment, MIG and TIG welding equipment.

EXPERIENCE: Customers include US and Canadian companies such as Pratt & Whitney Aircraft, deHavilland Aircraft, General Electric, Lockheed, Allison, and Canadair. Services are also provided to US and Canadian Governments such as Tinker AFB, OK; Kelly AFB, TX; DISC in Philadelphia; and Department of Supply and Services and Canadian Commercial Corp in Canada.

KEYWORDS: Blankets; Foil Heat Shields; Forming (Sheet Metal); Forming (Stainless Foils); Heat Shields; Insulation (Blankets); Insulation Systems; Sewing (Insulation); Sheet Metal Heat Shields; Welding (Sheet Metal); Welding (Stainless Foils).

REVISED: May 88

HONEYWELL Ltd (Defense & Systems Research Division)

ADDRESS: 1682 Woodward Drive
Ottawa, Ontario, Canada
K2C 3R7

CONTACT: Mr A P Stewart, Regional Manager – (613) 224-3822

HISTORY: Honeywell Ltd is a Canadian company established in 1930 and is a wholly-owned subsidiary of Honeywell Inc of Minneapolis. Currently, Honeywell employs over 3,700 employees in Canada in some 63 locations occupying about 1.3 million square feet. Consolidated revenues in 1987 rose to \$380 million, a 35% growth over 1986. Major manufacturing facilities are located in Scarborough, Ontario and Candiac, Quebec.

Honeywell Canada's Defense & Systems Research Division (DSRD) is a part of the Honeywell Worldwide Aerospace & Defense Group (A&D). Worldwide, A&D enjoyed 1986 sales of approximately \$3.0 billion, employing over 30,000. During 1987, Honeywell acquired the Sperry Aerospace Group which added about \$700 million (US) and 9,100 employees to the business.

CAPABILITY: The Defense & Systems Research Division is primarily involved in advanced research & development addressing the aerospace & defense markets.

The Advanced Technology Center (ATC) performs advanced R&D in the areas of Navigation and Guidance, Controls, Signal & Image Processing. The ATC now has a leading Canadian capability in the research and development of integrated navigation systems.

The DSRD also maintains an avionics repair and overhaul facility. The quality assurance function meets the requirements of AQAP-1, NATO Requirements for an Industrial Quality Control System. This division also markets all Honeywell worldwide aerospace and defense products and services to the Canadian government.

Honeywell also has capabilities for design and product engineering, including design, process development, process control, engineering support, automation and quality improvement, evaluation and reliability and quality functions.

AVERAGE WORK FORCE: ATC Scientists/Professionals – 20

There are 36 professionals in the design/product engineering group and an additional 38 engineers/technicians for the production/quality functions. Honeywell employs over 3,700 persons in Canada.

GROSS SALES: 1986 – \$280M
1987 – \$380M

PLANT SIZE: 260,000 Sq Ft (Scarborough, Ontario Plant)
110,000 Sq Ft (Another 5 Plants)
154,000 Sq Ft (Warehouse Space)

EQUIPMENT: Equipment includes top of the line Honeywell (Bull), DEC and SUN computers, a CAD/CAM facility, a modern mechanical design laboratory, electronic laboratory, and evaluation laboratory. Production facilities include a broad range of equipment including punch presses, automatic screw machines, electro-plating, painting and plastic molding machines, ultrasonic weld system, zinc plating, conformal coating and epoxy encapsulating facilities, custom sheet metal work, NC controlled tool room equipment, progressive dies, moulds design and build, and assembly and test fixtures.

EXPERIENCE: Present customers include various departments in the Canadian Government including DND as well as industry in the UK and the US. Some of the current programs include:

- Helicopter Integrated Navigation System (HINS) – development of an integrated multi-sensor navigation system for military helicopters.
- Variable Depth Sonar (VDS) – enhancement of VDS performance by high-rate data transmission on fiber optic cable and by compensation of towbody motion using inertial reference data.
- Marine Attitude Reference Systems (MARS) project to determine the attitude of a towbody as a first step to compensating sonar data for towbody motion.
- Detection of Target Formations (DTF) and Automatic Target Recognition (ATR) to develop advanced image processing algorithms, including artificial intelligence, leading to the development of automatic target detection and tracking systems.
- Synthetic Aperture Radar (SAR) Motion Compensation program to develop a system to compensate for antenna motion airborne SAR.

KEYWORDS: Computer Based Training; Control Systems; Guidance Systems; Image Processing; Man Machine Sciences; Microelectronics; Navigation Systems; R&O (Avionics); Signal Image Processing; Software Systems; Systems (Controls); Training Simulators; VLSI.

REVISED: February 88

HONEYWELL Ltd (Sperry Aerospace Division)

ADDRESS: Highway 17 P. O. Box 1300
Rockland, Ontario, Canada
K1A 3A0

CONTACT: Mr Ron Muir, General Manager – (613) 446-6011

HISTORY: Sperry Aerospace Division of Honeywell Ltd Canada started design, development and manufacturing in Canada in 1951.

CAPABILITY: Sperry Aerospace Division is primarily involved in the design, development and manufacture of Horizon Reference Systems, Air Traffic Control systems, Time Division Multiplexers and Computer Aided Simulated Training Systems.

Sperry Aerospace Division is also engaged in the logistic support, modification and repair & overhaul of airborne radar and all types of avionic systems, including air data computers, flight directors and gyros.

The Division's Air Traffic Control Systems are fitted at all control towers in Canada. The Horizon Reference systems are fitted on all helicopter carrying Canadian destroyers, and are presently in quantity production for the USN for use on the LAMPS III Program.

Honeywell's facilities are approved under Canadian Department of National Defence Quality Assurance, and staff resources permit Honeywell to cover the broad areas of Integrated Logistic Support (ILS) systems management, software design, reliability and maintainability analysis, configuration control and training.

AVERAGE WORK FORCE: Engineers - 40
Assembly - 140
Quality Assurance - 15
Field Service & Support - 30
Others - 100

GROSS SALES: 1986 - \$22.5M
1987 - \$25.5M

PLANT SIZE: 39,000 Sq Ft (Product Support Facility)
53,000 Sq Ft (Manufacturing Facility)

EQUIPMENT: Complete electronic assembly including semi-automatic printed wiring assembly capability.

EXPERIENCE: Sperry Aerospace Division's present customers include - the Canadian Government (National Defence, Ministry of Transport/Coast Guard, and Royal Canadian Mounted Police); the US Government (DOD - Navair); Canadian National Telecommunications; Aeritalia (Italy); and other Canadian and US industries.

KEYWORDS: Horizon Reference Systems; ATC; Multiplexers; ILS; Simulators (Marine Diesel); R&O (Avionics); R&O (Radar); Training.

REVISED: March 88

HOWLAND RUSSELL CONSULTANTS Ltd

ADDRESS: 200 LaFontaine Ave, Suite 910
Ottawa, Ontario, Canada
K1L 8K8

CONTACT: Mr Howland S Russell (Col USAF Ret), President -
(613) 749-0290

HISTORY: Howland Russell Consultants was formed and incorporated in 1985 subsequent to 30 year retirement, having spent 1976-85 as the Defense and Air Attache to Belgium and then Canada

CAPABILITY: HRC offers consultant services in the Aerospace market to assist clients in Marketing, Proposals, Project Research, and Strategic Planning. Our expertise results from both education and practical experience inside and outside the government. Contracted affiliations in both the US and Canada assure the availability of requisite technical skill and the use of tightly focused project manning.

AVERAGE WORK FORCE: MA - 1
BS - 1
BA - 1

GROSS SALES: 1986 - \$22K
1987 - \$67K (Est'd)

EQUIPMENT: HRC has computerized data banking, word-processing, spreadsheet analysis, on-line research and communications, and project accounting equipment.

EXPERIENCE: HRC has successfully assisted Canadian and US contractors in establishing corporate capabilities, organizing proposals

and successfully bidding on the North Warning Operations and Maintenance contract. Researching, writing, coordinating and negotiating the Air Carrier industry's positions on a Canadian Government proposal to establish a Cost Recovery system for Air Traffic Control services.

KEYWORDS: Airspace Management; ATC; Planning; Marketing; Subcontractor Search; Proposal Writing; Strategic Planning; Project Management.

REVISED: January 88

ICAM TECHNOLOGIES Corp

ADDRESS: 1900 Boul des Sources
Pointe Claire, Quebec, Canada
H9R 4Z3

CONTACT: Mr John J Nassr, Jr, GL, Applications Analysis -
(514) 697-8033

HISTORY: ICAM Technologies Corp is a Canadian-owned software development organization specializing in CAD/CAM, NC programming, and production and inventory control. The company was founded in 1971 and is located west of Montreal, Quebec. ICAM has been involved in numerous Canadian commercial and aerospace programs, and has distributed its software products world-wide.

CAPABILITY: ICAM Technologies Corp is primarily involved in the development of CAD/CAM software products, custom NC programming, and consulting for all levels of manufacturing. ICAM software products address both industrial and educational needs in the areas of part design and manufacturing, educating and training through Computer Aided Learning (CAL), complete CAM systems that include: APT processing (with sculptured surfaces); postprocessor generation (5 axis capabilities); plotting and tape punching; integrated CAD/CAM systems; as well as Flexible Manufacturing Systems. ICAM is currently a major supplier to Pratt and Whitney of Hartford, CN, and was Boeing's largest supplier of NC programs and fixture designs for their 767 and 757 airframe programs. ICAM software developments are available on mainframe, mini, and micro computer configurations, and allow all manufacturing institutions to increase their productivity to new levels.

AVERAGE WORK FORCE: Engineers and Scientists - 45
Others - 5

GROSS SALES: No Data

EQUIPMENT: In-house computer system includes: DEC VAX 11/785, VAX 11/730, HP 9000, and various microcomputer configurations. ICAM software is compatible with IBM, DEC, CDC, Data General, Sperry, and Hewlett Packard computer equipment.

EXPERIENCE: ICAM has 14 years experience in software development, NC programming, and consulting services. ICAM's participation in numerous aerospace projects includes the Canadair Challenger, Mecure II, DHC7, DC9 Super 80, DC10, L1011, 707, 747, 757, 767, F15, and NASA Space Shuttle. ICAM is a current supplier to Pratt and Whitney of Hartford, CN.

KEYWORDS: APT Processing; CAD; CAM; CL File; CNC Programming; Computer Aided Learning; Consulting (CAD/CAM); Flexible Automated Manufacturing; Integrated CAD/CAM Systems; NC Programming; Plotting Package (Postprocessed); Postprocessor (Multi-Axis); Programming (CNC/NC); Tape Punch System.

REVISED: February 88

IDACOM ELECTRONICS Ltd

ADDRESS: 9411 - 20th Avenue
Edmonton, Alberta, Canada
T6N 1E5

CONTACT: Mr Walter Stein, President & CEO - (403) 464-5937

HISTORY: IDACOM's original technology was developed at Alberta Government Telephones. AGT sold the technology to SIEMENS AG (Montreal, Que), who set up a group in Edmonton, including the original designers from AGT, to develop the product for marketing. In 1981, supported by Capital Markets West Inc., a leveraged buyout was negotiated and a privately held company IDACOM Electronics Ltd was founded. IDACOM's head office is located in Edmonton, Alberta, with nine offices in the US and West Germany.

CAPABILITY: IDACOM is in the business of designing, manufacturing and marketing data communications protocol test equipment for public, private and defense communication networks.

The company specializes in programmable products for the high-end of the market, such as R&D and other sophisticated applications. Our customers are primarily the designers, planners and operators of data communications networks, as well as scientists and engineers involved in the development and quality assurance of communications software and hardware. They use our product for conformance testing, simulation, diagnostic analysis, performance testing, and monitoring and trouble shooting of data communications networks, hosts and terminal equipment.

AVERAGE WORK FORCE: Edmonton - 70 (30 engineers, 40 others)
US - 13 (Sales Staff)
West Germany - 8 (Support Staff)

GROSS SALES: 1986 - \$ 7.0M Approx
1987 - \$10.0M Approx

PLANT SIZE: 14,500 Sq Ft

EQUIPMENT: Complete design, production and test facility for state-of-the-art computer-based electronic test equipment. In-house facilities include - Software Development System, Hardware Development System, and Manufacturing, Ordering & Scheduling System.

EXPERIENCE: IDACOM's current main customers include:

- Canada - Bank of Montreal
- US - Pacific Bell, US West, BELL Atlantic, NYNEX, IBM, BBN, MCI, AT&T, and Hughes
- Worldwide - Siemens AG (West Germany), NTT (Japan), and Telecom Australia.

KEYWORDS: Protocol; Monitor; Emulation; International Standards; Networks; Wide Area Networks; Multi-Port.

REVISED: February 88

I. M. P. GROUP Ltd (Aerospace Division)

ADDRESS: (Head Office)
7037 Mumford Road
Halifax, Nova Scotia, Canada
B3L 2J1

(Mailing)
IMP Group Ltd
2651 Dutch Village Road, Suite #400
Halifax, Nova Scotia, Canada
B3L 4T1

(Point of Contact)
IMP Group Ltd
1545 Carling Ave
Ottawa, Ontario, Canada
K1Z 8P9

CONTACT: Mr H L Connor, Marketing Director - (613) 729-5210

HISTORY: The company, Industrial Marine Products, was formed in 1967 to purchase the assets of a group of Nova Scotia companies

which had been manufacturing foundry and steel fabricated products since 1865. During the next few years, they expanded into the commercial fishing gear and marine equipment areas, and expanded operations into other locations in eastern Canada and the US. In the early 1970s, the company acquired the facilities, equipment, operational management and work force of a major aircraft company in the Halifax area, and thus, expanded into aircraft overhaul and repair, and aerospace manufacturing areas. The current operating divisions of IMP Group are:

- Aerospace Manufacturing
- Aerospace Engineering Services
- Aircraft Repair and Overhaul
- General Aviation Services
- Foundry
- Steel Fabrication & Machine Shop
- Tool and Plastics
- Marine
- Offshore Services
- Hotel
- Properties and Investments
- Research and Development

CAPABILITY: IMP Group's aerospace related capabilities are described in the eight divisions listed below:

- Aerospace Manufacturing Division - manufactures electronic wiring assemblies for various aircraft and electronics industries. Aerospace metal components are also manufactured.
- Aerospace Engineering Services Division - offers integrated services for the other aerospace divisions that include repair schemes, corrosion control, weight and balance, modification development, systems installation design, aeronautical engineering, aircraft maintenance, stress analyses, fatigue studies, structural design, electrical and avionics engineering, systems interface design, electromagnetic compatibility testing, systems ground and flight testing, configuration and modification program control, and maintenance and technical publications for military aircraft.
- Aircraft Repair and Overhaul Division - as the major fixed and rotary wing maintenance facility in eastern Canada, it offers repair and overhaul programs for military and commercial aircraft, as well as a full range of equipment modification.
- General Aviation Services Division - offers aircraft servicing maintenance, hangarage, crew and passenger lounges for large and small commercial aircraft. This Division supports a fleet of turbo and piston twin engines aircraft for charter anywhere in Canada and the US.
- Foundry Division - equipped to produce cast iron, steel and steel alloy castings up to 2-tons with both cupola and electric induction furnaces.
- Steel Fabrication and Machine Shop Division - essentially a custom shop, it is serviced by four 5-ton overhead cranes. Typical products include components for fishing trawlers from steel, stainless steel and aluminum, and a whole range of products, repairs and modifications for offshore oil industry.
- Tool and Plastics Division - manufactures molded plastic parts using the injection molding technique.
- Research and Development Division - the primary function is to identify and develop new products and processes related to the continued expansion of the IMP Group and the technical excellence of its products.

AVERAGE WORK FORCE: 1400 Total

GROSS SALES: 1986 - \$125M
1987 - \$150M

PLANT SIZE: Aircraft Repair & Overhaul Div - 200,000 Sq Ft (4 hangars)
Steel Fabrication & Machine Shop - 14,000 Sq Ft

EXPERIENCE: IMP Group's aerospace clients include the US Navy (P3 aircraft), Canadian Department of National Defense, Canadair, USAF, and McDonnell Douglas Canada.

KEYWORDS: Airframe Components; Airframe Structures; Avionics; Cable Assemblies; Corrosion Control; Electromagnetic Compatibility; Injection Molding; Machining; Modification (Aircraft); Non-Destructive Testing; Painting (Aircraft); R&O (Aircraft); R&O (Helicopters); Software Services; Structural Analysis; Systems Integration; Systems Testing; Testing (General); Wiring & Tubing.

REVISED: April 88

INDAL TECHNOLOGIES Inc

ADDRESS: 3570 Hawkestone Road
Mississauga, Ontario, Canada
L5C 2V8

CONTACT: Mr Roger Travis, Vice President, Marketing -
(416) 275-5300

HISTORY: Indal Technologies was originally incorporated under the name Dominion Aluminum Fabricating Ltd in 1951. The company became a member of the Toronto based Indal Group of companies in 1968 and changed its name to DAF Indal Ltd in 1977, then to Indal Technologies Inc in 1985. Indal Limited is a diversified industrial holding company with 35 operating subsidiaries and divisions in Canada and the US.

CAPABILITY: Since its incorporation, Indal Technologies has grown steadily through the development of facilities which provide a specialty range of engineered products. Indal Technologies maintains a large engineering department staffed by professional engineers of many disciplines, including mechanical, electrical, structural, aerodynamics and hydraulic engineering. The company is engaged in many activities involving one or more of these disciplines, and those related to the aerospace industry area as listed below:

- **Specialty Fabrication Work** - Indal Technologies is an acknowledged expert in the field of specialized aluminum structural fabrication work, and has been certified by the Canadian Welding Bureau as meeting the requirements of CSA Standard W47.2 "Aluminum Welding Qualification Code". Typical of the specialized structural design and fabrication work undertaken by Indal Technologies is a frangible ILS localizer support structure designed to break away on impact, now a designated fit where certain conditions prevail at Canadian airports. Indal Technologies was awarded a contract to build a prototype enclosure for the new MLS antenna system scheduled to replace ILS antennae across Canada by the year 2,000. Other work for Transport Canada has included the design and fabrication of a 100 ft telescopic mobile monitoring tower, design of a frangible glide path monitoring antenna mast and range towers for coastal navigation. Other work performed by Indal Technologies in this field includes the design and fabrication of other antenna support towers, the fabrication of radar reflectors, radomes and space frame hangar systems.

- **Shipboard Helicopter Support Systems** - Indal Technologies is a world leader in the development and supply of shipboard helicopter support systems as employed on helicopter carrying ships operated by navies and coast guards world-wide. The helicopter recovery assist systems built by Indal Technologies were originally developed in conjunction with the Department of National Defence for use on board Canadian Navy vessels. Variants of the systems are now employed on vessels operated by the Navies of the US, Japan, India, Spain, Australia, and Argentina - being a directed fit in many cases. These systems include any or all of the following: firefighting systems, helicopter recovery assist and transversing systems, and telescopic hangars and hangar doors. The Indal Technologies RAST (Recovery Assist, Securing and Traversing) system was selected as a key element of the US Navy's LAMPS III program; it is intended to equip over 100 ships with this system to operate in conjunction with the Sikorsky SH-60B Sea Hawk helicopter. A prototype system of a new configuration called ASIST, an acronym for Aircraft Ship Integrated Secure and

Traverse System has been assembled and tested at Indal Technologies' plant. This new system will revolutionize helicopter ship operations in such areas as cost, weight, space, complexity, integrated logistics support, reliability and maintainability and mission time requirements. Indal Technologies is the originator of the unique telescopic helicopter hangar that is employed on many navy and coast guard vessels that have flight deck space limitations. About 200 hangars and 400 doors supplied by the company are in service with numerous agencies, principally the US Navy, US Coast Guard and Canadian Coast Guard.

- **Vertical Axis Wind Turbines** - Indal Technologies has been a world leader in the design and manufacture of Vertical Axis Wind Turbines for over 10 years. The Indal Technologies 50 kW unit is the most technically advanced and proven VAWT in the world today. 500 kW machines modeled on a previous design of a 230 kW VAWT built by Indal Technologies are now also in operation and gaining acceptance as a very viable source of alternate energy. The company has also pioneered the development of a hybrid wind turbine/diesel power generation system for use in remote areas.

- **Program Management and Quality Control** - Indal Technologies has developed the appropriate project management control systems to administer large military contracts and is fully familiar with all aspects of government contracting. In fact, it is the first company outside the US to have received validation from the US Navy for its advanced total program management system. Quality assurance procedures are maintained in accordance with CSA Standard Z.299.2 and AQAP-1 requirements (equivalent to MIL-Q-9858A) are also met. There is a resident DND inspector staff based at the Indal Technologies' plant and the Department of Supply and Services Canada maintains an office adjacent to Indal Technologies' facility to monitor ongoing domestic and international contracts. Production scheduling, material requirements and financial analyses are all controlled by a computer based system which is capable of handling all work in progress at any one time.

AVERAGE WORK FORCE: Engineering - 52
Production - 146
Administration - 97

GROSS SALES: 1986 - \$61.0M
1987 - \$51.8M

Export sales represent more than 90% of Indal Technologies' annual sales of which a large percentage is for the US military, principally the US Navy.

PLANT SIZE: 120,000 Sq Ft (Manufacturing Plant)
42,000 Sq Ft (Office Complex)

The bays in the manufacturing plant have a headroom of 35' plus and are served by overhead gantry cranes.

EXPERIENCE: Indal Technologies serves many industries and their customers are invariably the leaders of those industries. The majority of Indal Technologies' sales are made to government customers, either directly or through a third party subcontract. Principal customers include the Navies and Coast Guards of Canada, the US, Japan, India, Spain, other NATO countries in Europe, Latin America, and Australia.

KEYWORDS: Aluminum Fabrication; Antenna Support Structures; Control Systems; Hangars; Helicopter Recovery Assist; ILS Structures; MLS Structures; Machining; Radar; Radar Reflectors; Radomes; Shipboard Support Systems; Specialized Fabrication; Vertical Axis Wind Turbines.

REVISED: February 88

Section III

COMPANY KEYWORD INDEX

KEYWORD	COMPANY	KEYWORD	COMPANY
1553 Data Buss	COMPUTING DEVICES COMPANY	Airborne Laser	BARRINGER RESEARCH Ltd
1553 Data Buss	DY-4 SYSTEMS Inc	Fluorosensor	
A-3	EXPRO CHEMICAL PRODUCTS Inc	Airborne Radars	BOLRIET TECHNOLOGIES Inc
A-4	EXPRO CHEMICAL PRODUCTS Inc	Airborne Surveys	BARRINGER RESEARCH Ltd
A-5	EXPRO CHEMICAL PRODUCTS Inc	Airborne Surveys	THE BERCHA GROUP
A/D and D/A	SPECTRUM SIGNAL PROCESSING Inc	Airconditioning (Aircraft)	CASEY COPTER ACCESSORIES Ltd
		Aircraft	AIRTECH CANADA (371892 Ontario Ltd)
Abradable Seals	SHERRITT GORDON MINES Ltd	Aircraft	BOEING OF CANADA (de Havilland Div)
Acceptance Testing	TELECONSULT Ltd	Aircraft	CANADAIR Inc
Accident Analysis	CARR-SAWYER Inc	Aircraft Accessories	TOWER AEROSPACE PRODUCTS Inc
Accounting	INTERNATIONAL AIRBORNE SYSTEMS Ltd	Aircraft Airconditioning	CASEY COPTER ACCESSORIES Ltd
	COMPUTING DEVICES COMPANY	Aircraft Analysis	CARR-SAWYER Inc
Acoustic Sensing	SPARTON OF CANADA Ltd	Aircraft Cabin Interiors	FLEXIBULB (1983) Inc
Acoustic Sensing	APREL Inc	Aircraft Control	BOEING OF CANADA (de Havilland Div)
Acoustic Testing	SPARTON OF CANADA Ltd		STANDARD AERO Ltd
Active Sonobuoys	AERO MACHINING Ltd	Aircraft Engine Overhaul	FULL LOTUS MANUFACTURING Inc
Actuators	DOWTY CANADA Ltd	Aircraft Floats	DEW ENGINEERING AND DEVELOPMENT Ltd
Actuators	NOVATRONICS OF CANADA Ltd		AEROTECH INTERNATIONAL Inc
Actuators	CANADIAN MARCONI COMPANY	Aircraft Ground Support Equipment	CASEY COPTER ACCESSORIES Ltd
Adapters	MILLER COMMUNICATIONS SYSTEMS Ltd	Aircraft Heating	FELL-FAB PRODUCTS
Adaptive Receivers	CIBA-GEIGY CANADA Ltd	Aircraft Heating	INTERNATIONAL AIRBORNE SYSTEMS Ltd
	TIMMINCO Ltd	Aircraft Interiors	DOWTY CANADA Ltd
Adhesives	BOEING OF CANADA Ltd (Winnipeg Div)	Aircraft Inventory	INTERNATIONAL AIRBORNE SYSTEMS Ltd
Adhesives	CIBA-GEIGY CANADA Ltd		WESTERN AEROSPACE TECHNOLOGY Ltd
Advanced Composites	FLEET INDUSTRIES	Aircraft Landing Gears	DECADE INDUSTRIES
	TELECONSULT Ltd	Aircraft Maintenance	
Advanced Composites	MAGNUS AEROSPACE CORPORATION	Aircraft Maintenance	LEIGH INSTRUMENTS Ltd
Advanced Composites	CONAIR AVIATION Ltd	Tooling	VADEKO INTERNATIONAL Inc
Advisory Services	FIELD AVIATION COMPANY Ltd		AWSM ENTERPRISES Ltd
Aerial Crane	SED SYSTEMS Inc	Aircraft Nav aids	AWSM ENTERPRISES Ltd (LES)
		Aircraft Painting	LEAVENS AVIATION Inc
Aerial Delivery Systems	(ATS) AERONAUTICAL TRAINING SYSTEMS	Aircraft Parts	PATLON AIRCRAFT & INDUSTRIES Ltd
Aerial Spray/Water Bombing	BOEING OF CANADA Ltd (Winnipeg Div)	Aircraft Parts	TOWER AEROSPACE PRODUCTS Inc
Aerial Survey Systems	MAGNUS AEROSPACE CORPORATION	Aircraft Performance Analysis	TW MANUFACTURING Inc
Aerial Target Tracking System	DSMA INTERNATIONAL Inc	Aircraft Power	AVIATION PLANNING SERVICES Ltd
Aerial Targets	CANADAIR Inc	Aircraft Scheduling	CARR-TECH SERVICES Ltd
	AASTRA AEROSPACE Inc	Aircraft Transparencies	INTERNATIONAL AIRBORNE SYSTEMS Ltd
Aerial Targets	AASTRA AEROSPACE Inc	Airframe Components	PLASTAL Inc
	INNOTECH AVIATION ENTERPRISES Ltd	Airframe Components	AVCORP INDUSTRIES Inc
Aerodynamic Research	HARBOUR INDUSTRIES (Canada) Ltd	Airframe Components	AWSM ENTERPRISES Ltd
		Airframe Components	BOEING OF CANADA (de Havilland Div)
Aerodynamic Test Facilities	AEROTECH INTERNATIONAL Inc	Airframe Components	BOEING OF CANADA Ltd (Winnipeg Div)
Aerodynamics	SIGNA + FLASH Ltd	Airframe Components	BRISTOL AEROSPACE Ltd
Aerodynamics Analysis	GENERAL MOTORS OF CANADA Ltd	Airframe Components	C.P.S. INDUSTRIES Inc (LES)
Aeronautical Engineering	BOEING OF CANADA (de Havilland Div)	Airframe Components	CANADAIR Inc
Aeronautical Engineering	3-L FILTERS Ltd	Airframe Components	CANADIAN AIRCRAFT PRODUCTS Ltd
	ALBERTA RESEARCH COUNCIL See ATC	Airframe Components	ENHEAT Inc
Aerospace Wire	SKYWAVE ELECTRONICS Ltd	Airframe Components	FLEET INDUSTRIES
	BARRINGER RESEARCH Ltd	Airframe Components	HAWKER SIDDELEY CANADA Inc

KEYWORD	COMPANY	KEYWORD	COMPANY
Cable Assemblies	BACHAN AEROSPACE OF CANADA Ltd	Chemistry	INRAD INDUSTRIAL RESEARCH & DEVELOPMENT
Cable Assemblies	I.M.P. GROUP Ltd	Chemistry	NOVA SCOTIA RESEARCH FOUNDATION Corp
Cable Carrier	TELECONSULT Ltd	Chemistry	THE ARMSTRONG MONITORING Corp
Cables	HARBOUR INDUSTRIES (Canada) Ltd	Chemistry	WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT
Cables	ITT CANNON ELECTRIC CANADA	Chlorine Gas Detection	THE ARMSTRONG MONITORING Corp
CAD	ICAM TECHNOLOGIES Corp	Circuit Boards	CANUTEL INDUSTRIES Ltd
CAD & Drafting Systems	RDS ENGINEERING	Circuit Card Assembly	SANDERS CANADA Inc
CAD/CAM	INVAR MANUFACTURING Ltd	Circuit Layout	CAD/CAM GRAPHICS Ltd
Calibration	CANADIAN MARCONI COMPANY	Circuit Packaging	CANADIAN MARCONI COMPANY
Calibration	DSMA INTERNATIONAL Inc	Circulators	MA ELECTRONICS CANADA Ltd
Calibration	QUANTUM INSPECTION AND TESTING Ltd	CL File	ICAM TECHNOLOGIES Corp
Calibration	ROLLS-ROYCE (CANADA) Ltd	Cladding	ALBERTA LASER INSTITUTE
Calibration Equipment	THE ARMSTRONG MONITORING Corp	Climatic Test Facilities	DSMA INTERNATIONAL Inc
CAM	CAMPAGNA ENGINEERING Inc	CMOS	CALMOS SYSTEMS Inc
CAM	ICAM TECHNOLOGIES Corp	CNC Forming	PRICE & KNOTT MANUFACTURING CO Ltd
Camera Systems	AVCORP INDUSTRIES Inc	CNC Input	RDS ENGINEERING
Components		CNC Machining	AWSM ENTERPRISES Ltd
Cameras (Digital)	ITRES RESEARCH Ltd	CNC Machining	BACHAN AEROSPACE OF CANADA Ltd
Canopies	PLASTAL Inc	CNC Machining	CAMPAGNA ENGINEERING Inc
Carbon Monoxide Gas Detection	THE ARMSTRONG MONITORING Corp	CNC Machining	CHICOPEE MANUFACTURING Ltd
Cargo Handling Equipment	AVCORP INDUSTRIES Inc	CNC Machining	DIEMASTER TOOL Inc
Cargo Handling Equipment	BOEING OF CANADA (de Havilland Div)	CNC Machining	INVAR MANUFACTURING Ltd
Cargo Handling Equipment	CANADIAN AIRCRAFT PRODUCTS Ltd	CNC Machining	J.J. CHARLTON COMPANY Ltd
Cargo Handling Equipment	FELL-FAB PRODUCTS	CNC Machining	KOSS MACHINE & TOOL CO
Carrier Systems		CNC Machining	LEAVENS AVIATION Inc
Cartography Processing & Database	NORTHERN TELECOM CANADA Ltd	CNC Machining	MONTREAL PRECISION CRAFTING Ltd
Cartridges	MYRIAS RESEARCH Corp	CNC Machining	STEVESTED MACHINERY & ENGINEERING Ltd
Cases (Custom)		CNC Machining	STRITE INDUSTRIES Ltd
Castings	3-L FILTERS Ltd	CNC Machining	THE ONTARIO AEROSPACE CONSORTIUM Inc
Castings	ZARGES AFC CANADA Ltd	CNC Machining	UDT INDUSTRIES Inc
Castings	CANADAIR Inc	CNC Milling	PRICE & KNOTT MANUFACTURING CO Ltd
Castings	CERCAST Inc	CNC Programming	ICAM TECHNOLOGIES Corp
Castings	DESIGNED PRECISION CASTINGS Inc	CNC Punching	PRICE & KNOTT MANUFACTURING CO Ltd
Castings	EASTERN PRECISION CASTING Inc	CNC Turning	PRICE & KNOTT MANUFACTURING CO Ltd
Castings	HALEY INDUSTRIES Ltd	CO2 Lasers	LUMONICS Inc
Castings	ROBERT MITCHELL Inc	CO2 Lasers	MPB TECHNOLOGIES Inc
Castings	SHELLCAST FOUNDRIES Inc	CO2 Lasers	ULTRA LASERTECH Inc
Castings	SHERRITT GORDON MINES Ltd	CO2 Optoacoustic Detector	ULTRA LASERTECH Inc
Catalytic Sensors	THE ARMSTRONG MONITORING Corp	Coal Liquefaction	ALBERTA RESEARCH COUNCIL
Cathode Ray Tube Displays	LITTON SYSTEMS CANADA Ltd	Coal Technology	NOVA SCOTIA RESEARCH FOUNDATION Corp
CCD's		Coal/Oil Agglomeration	ALBERTA RESEARCH COUNCIL
Center-Loaded Antennas	ITRES RESEARCH Ltd	Coalescer	3-L FILTERS Ltd
Centerless Grinding	SPILSBURY COMMUNICATIONS Ltd	Coalescing Filters	AIRCRAFT APPLIANCES AND EQUIPMENT Ltd
Ceramic Composites	J.J. CHARLTON COMPANY Ltd	Coatings	BRISTOL AEROSPACE Ltd
Ceramics	AASTRA AEROSPACE Inc	Coatings	CAMETOID Ltd
Ceramics	ALCAN INTERNATIONAL Ltd	Coatings	CANADAIR Inc
Ceramics	ATOMIC ENERGY OF CANADA Ltd	Coatings	EBCO AEROSPACE INDUSTRIES Inc
Ceramics	MURATA ERIE NORTH AMERICA Ltd	Coatings	McDONNELL DOUGLAS CANADA Ltd
Certification Testing	APREL Inc	Coatings (CODEP)	VAC-AERO INTERNATIONAL Inc
Certification Testing	DOWTY CANADA Ltd	Coatings (Optical)	CAMETOID Ltd
Charge Coupled Devices	ITRES RESEARCH Ltd	Coatings (Plasma Spray)	VAC-AERO INTERNATIONAL Inc
Chemical Airburst Simulators	HANDS FIREWORKS Inc	Coaxial Cable	HARBOUR INDUSTRIES (Canada) Ltd
Chemical Analysis		Coaxial Cable Systems	CANAC TELECOM
Chemical Analysis	ATOMIC ENERGY OF CANADA Ltd	Coaxial Ferrite Devices	MA ELECTRONICS CANADA Ltd
Chemical Dispersers	WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT	Cobalt-Samarium Magnets	SHERRITT GORDON MINES Ltd
Chemical Films	HANDS FIREWORKS Inc	Cockpit Displays	BOEING OF CANADA (de Havilland Div)
Chemical Groundburst Simulators	CAMETOID Ltd		
Chemical Processing	HANDS FIREWORKS Inc		
Chemical Processing	RAYLO CHEMICALS		
Chemistry	WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT		
	EXPRO CHEMICAL PRODUCTS Inc		

KEYWORD	COMPANY	KEYWORD	COMPANY
Computer Simulation	PRIOR DATA SCIENCES Ltd	Control Systems	SPAR AEROSPACE Ltd
Computer Simulation	THOMSON-CSF SYSTEMS	Control Systems	TRACKER INDUSTRIES Ltd
	CANADA Inc (TCSC)	Controllers	CALMOS SYSTEMS Inc
Computer Software	I. P. SHARP ASSOCIATES Ltd	Controllers	EPIC DATA Inc
Computer-Aided Design	LAVALIN Inc	Controllers (Propeller)	WESTERN PROPELLER COMPANY
Computer-Aided Teaching	LAVALIN Inc		Ltd
Computers	ATLANTIS AEROSPACE Corp	Converters	PYLON ELECTRONIC
Computers	BARON COMMUNICATIONS Ltd		DEVELOPMENT CO Ltd
Computers	CAE INDUSTRIES Ltd	Copper Cable Systems	CANAC TELECOM
Computers	CANADIAN ASTRONAUTICS Ltd	Core Memory Arrays	UNISYS CANADA Inc
Computers	COMPUTING DEVICES COMPANY	Core Wound Products	UNISYS CANADA Inc
Computers	DY-4 SYSTEMS Inc	Corona Testing	HAMMOND MANUFACTURING
Computers	INTERNATIONAL AIRBORNE		COMPANY Ltd
	SYSTEMS Ltd	Corrosion Control	ALBERTA LASER INSTITUTE
Computers	MYRIAS RESEARCH Corp	Corrosion Control	I.M.P. GROUP Ltd
Computers	NORTHERN TELECOM CANADA	Corrosion Control	INNTECH AVIATION
	Ltd		ENTERPRISES Ltd
Computers	PRIOR DATA SCIENCES Ltd	Corrosion Control	ROLLS-ROYCE (CANADA) Ltd
Computers	SED SYSTEMS Inc	Corrosion Science	ONTARIO HYDRO
Computers	TRACKER INDUSTRIES Ltd	Corrosion Science	WHITESHELL NUCLEAR
Computers	UNISYS CANADA Inc		RESEARCH ESTABLISH
Computers (Parallel)	MYRIAS RESEARCH Corp	Cost Estimating	TELECONSULT Ltd
Computers (Parallel)	TRIDEX SYSTEMS Inc	Coupler Systems	THE ONTARIO AEROSPACE
Concrete Technology	ONTARIO HYDRO		CONSORTIUM Inc
Condition Monitoring	SENSYS	Couplers	BOLRIET TECHNOLOGIES Inc
Conductive Parts	SHERRITT GORDON MINES Ltd	Couplers	MA ELECTRONICS CANADA Ltd
Conductive Plastics	SHERRITT GORDON MINES Ltd	Crash Position Indicator	GARRETT CANADA
Conductivity Sensors	APPLIED MICROSYSTEMS Ltd	Crash Position Indicator	LEIGH INSTRUMENTS Ltd
Conductivity Testing	CAMETOID Ltd	(Deployable)	
Configuration	CALIAN TECHNOLOGY Ltd	Crew Scheduling	INTERNATIONAL AIRBORNE
Management			SYSTEMS Ltd
Configuration	THE AMTEK GROUP	Crew Station Design	VIRTUAL PROTOTYPES Inc
Management		Cryptography	MYRIAS RESEARCH Corp
Connector Filters	MURATA ERIE NORTH AMERICA	Crystals	CROVEN CRYSTALS Ltd
	Ltd	CSA Wire	HARBOUR INDUSTRIES (Canada)
Connectors	ITT CANNON ELECTRIC CANADA		Ltd
Consulting	AVIATION PLANNING SERVICES	Current Meter Systems	APPLIED MICROSYSTEMS Ltd
	Ltd	Current/Pulse	HAMMOND MANUFACTURING
Consulting	BRUCE D. VALLILLEE		COMPANY Ltd
	ELECTRONICS Ltd	Custom Chips	MICROTEL Ltd
Consulting	CARR-SAWYER Inc	Custom Hardware	EPIC DATA Inc
Consulting	CONTRACTING ADVISORY	Custom Made Cable	HARBOUR INDUSTRIES (Canada)
	SERVICES Inc		Ltd
Consulting	FOOTIT MITCHELL AND	Custom Packaging	INRAD INDUSTRIAL RESEARCH &
	ASSOCIATES		DEVELOP
Consulting	PAI-PUBLIC AFFAIRS	Custom Packaging	ZARGES AFC CANADA Ltd
	INTERNATIONAL	Custom Software	EPIC DATA Inc
Consulting	PRIOR DATA SCIENCES Ltd	Custom Software	TELEMUS ELECTRONIC SYSTEMS
Consulting	TRACKER INDUSTRIES Ltd		Inc
Consulting (Aerospace)	INTERCON CONSULTANTS	Custom Software (ATE)	NAVAIR Ltd
Consulting (CAD/CAM)	ICAM TECHNOLOGIES Corp	Custom Synthesis	RAYLO CHEMICALS
Consulting (Canadian	INTERCON CONSULTANTS	Cutting	ALBERTA LASER INSTITUTE
Government)		Cutting (Laser)	LUMONICS Inc
Consulting	TELECONSULT Ltd	Cylinders	DONLEE PRECISION
(Communications)		Damping	DOWTY CANADA Ltd
Consulting (Engineering)	VADEKO INTERNATIONAL Inc	Data Acquisition	(ATS) AERONAUTICAL TRAINING
Consulting (Government	INTERCON CONSULTANTS		SYSTEMS
Procurement)		Data Acquisition	AIT ADVANCED INFORMATION
Consulting (Nav/Comm)	ADGA GROUP		TECHNOLOGIES
Consulting (RPV)	TARGETAIR Ltd	Data Acquisition	APPLIED MICROSYSTEMS Ltd
Consulting Engineers	RDS ENGINEERING	Data Acquisition	BRISTOL AEROSPACE Ltd
Continuous Casting	SHERRITT GORDON MINES Ltd	Data Acquisition	CAE INDUSTRIES Ltd
Continuous Wave CO2	ULTRA LASERTECH Inc	Data Acquisition	CHAMP-ARMSTRONG
Contract Management	THE AMTEK GROUP		COMMUNICATIONS Inc
Contract Management	DEW ENGINEERING AND	Data Acquisition	COMPUTING DEVICES COMPANY
Services	DEVELOPMENT Ltd	Data Acquisition	EPIC DATA Inc
Contract Research	RAYLO CHEMICALS	Data Acquisition	GasTOPS Ltd
Control Cables (Aircraft)	LEAVENS AVIATION Inc	Data Acquisition	INTERACTIVE CIRCUITS &
Control Cables (Aircraft)	NORTHWEST INDUSTRIES Ltd		SYSTEMS Ltd
Control Circuitry	VARIAN CANADA Inc	Data Acquisition	INTERNATIONAL AIRBORNE
Control Systems	AASTRA AEROSPACE Inc		SYSTEMS Ltd
Control Systems	CAE INDUSTRIES Ltd	Data Acquisition	LITTON SYSTEMS CANADA Ltd
Control Systems	GasTOPS Ltd	Data Acquisition	MILLER COMMUNICATIONS
Control Systems	HONEYWELL Ltd (Defense &		SYSTEMS Ltd
	Systems Research)	Data Acquisition	PRIOR DATA SCIENCES Ltd
Control Systems	INDAL TECHNOLOGIES Inc	Data Acquisition	QUESTOR SURVEYS Ltd
Control Systems	MENASCO AEROSPACE Ltd	Data Acquisition	SCI-TEC INSTRUMENTS Inc

KEYWORD**COMPANY**

Data Acquisition THE ARMSTRONG MONITORING Corp
 Data Acquisition TRACKER INDUSTRIES Ltd
 Data Analysis BARRINGER RESEARCH Ltd
 Data Analysis COMPUTING DEVICES COMPANY
 Data Analysis LITTON SYSTEMS CANADA Ltd
 Data Analysis QUESTOR SURVEYS Ltd
 Data Annotation Displays OPTOTEK Ltd
 Data Broadcasting Systems INTERNATIONAL DATACASTING CORPORATION
 Data Communication Test Equipment AEA ELECTRONIC Ltd
 Data Communications CANADIAN MARCONI COMPANY
 Data Communications NORTHERN TELECOM CANADA Ltd
 Data Communications RE: ACTION MARKETING SERVICES Ltd
 Data Control Systems CAE INDUSTRIES Ltd
 Data Conversion RE: ACTION MARKETING SERVICES Ltd
 Data Handling COMPUTING DEVICES COMPANY
 Data Handling MACDONALD DETTWILER
 Data Loggers TARGA ELECTRONICS SYSTEMS Inc
 Data Logging APPLIED MICROSYSTEMS Ltd
 Data Networking Computers INTERNATIONAL DATACASTING CORPORATION
 Data Processing AIT ADVANCED INFORMATION TECHNOLOGIES
 Data Processing INTERNATIONAL AIRBORNE SYSTEMS Ltd
 Data Processing MILLER COMMUNICATIONS SYSTEMS Ltd
 Data Recorders TARGA ELECTRONICS SYSTEMS Inc
 Data Reduction CANADIAN ASTRONAUTICS Ltd
 Data Reduction QUESTOR SURVEYS Ltd
 DC Powered Modules AVTECH ELECTROSYSTEMS Ltd
 DC-DC Converters CALMOS SYSTEMS Inc
 DEC KOM Inc
 Demolition Block EXPRO CHEMICAL PRODUCTS Inc
 Demonstrator Consoles GasTOPS Ltd
 Depth Systems APPLIED MICROSYSTEMS Ltd
 Derived Release Limits WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT
 Desalination Equipment ROBERT MITCHELL Inc
 Design Services DSMA INTERNATIONAL Inc
 Desk Top Publishing RE: ACTION MARKETING SERVICES Ltd
 Detailed parts AWSM ENTERPRISES Ltd
 Detectors OPTO-ELECTRONICS Inc
 Detonation WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT
 Diagnostic Systems SENSYS
 Die Fabrication AERO MACHINING Ltd
 Die Fabrication BRISTOL AEROSPACE Ltd
 Die Fabrication DIEMASTER TOOL Inc
 Die Fabrication EBCO AEROSPACE INDUSTRIES Inc
 Die Fabrication NORTHWEST INDUSTRIES Ltd
 Dielectric Testing HAMMOND MANUFACTURING COMPANY Ltd
 Diffusion Coatings VAC-AERO INTERNATIONAL Inc
 (CODEP)
 Digesters ROBERT MITCHELL Inc
 Digital Audio SPECTRUM SIGNAL PROCESSING Inc
 Digital Communications MILLER COMMUNICATIONS SYSTEMS Ltd
 Digital Communications NORTHERN TELECOM CANADA Ltd
 Digital Communications NORTHERN TELECOM CANADA Ltd
 Terminals
 Digital Data Processing ALBERTA RESEARCH COUNCIL
 Digital Electronics GARRETT CANADA
 Digital Filtering SPECTRUM SIGNAL PROCESSING Inc

KEYWORD**COMPANY**

Digital Graphics LAVALIN Inc
 Digital Image Analysis DIPIX TECHNOLOGIES Inc
 Digital Mapping SPAR AEROSPACE Ltd
 Digital Modems MILLER COMMUNICATIONS SYSTEMS Ltd
 Digital Order Wire CANADIAN MARCONI COMPANY
 Digital Recorders (ATS) AERONAUTICAL TRAINING SYSTEMS
 Digital Signal Processing CALMOS SYSTEMS Inc
 Digital Signal Processing SKYWAVE ELECTRONICS Ltd
 Digital Signal Processing SPECTRUM SIGNAL PROCESSING Inc
 Digital Switches SED SYSTEMS Inc
 Digital Terrain VIRTUAL PROTOTYPES Inc
 Digital Video Imaging INTERNATIONAL DATACASTING CORPORATION
 Digital Voice Loggers SPILSBURY COMMUNICATIONS Ltd
 Digital Voice Repeaters SPILSBURY COMMUNICATIONS Ltd
 Direct Mail RE: ACTION MARKETING SERVICES Ltd
 Direction Finder PELORUS NAVIGATION SYSTEMS Inc
 Dispersion Strengthened Alloys SHERRITT GORDON MINES Ltd
 Displays CANADIAN MARCONI COMPANY
 Displays LITTON SYSTEMS CANADA Ltd
 Displays MPB TECHNOLOGIES Inc
 Displays OPTOTEK Ltd
 Disposal (Nuclear Waste) WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT
 Distance Measuring PELORUS NAVIGATION SYSTEMS Inc
 Distance Measuring Equipment RAYTHEON CANADA Ltd
 Distributed Processing MYRIAS RESEARCH Corp
 Distributed Processing TRIDEX SYSTEMS Inc
 Distributed Processing UNISYS CANADA Inc
 Distribution (Aircraft Parts) AIRCRAFT APPLIANCES AND EQUIPMENT Ltd
 DME CANADIAN MARCONI COMPANY
 DME MICRONAV Ltd
 Documentation RE: ACTION MARKETING SERVICES Ltd
 Doppler Navigation CANADIAN MARCONI COMPANY
 Systems
 Dosimeters SCINTREX Ltd
 Double Base EXPRO CHEMICAL PRODUCTS Inc
 Drawing Preparation RDS ENGINEERING
 Drilling (Laser) LUMONICS Inc
 Drone Alignment Systems BENDIX AVELEX Inc
 Drones See RPV
 Drug Detection SCINTREX Ltd
 Dry Film Lubricants CAMETOID Ltd
 DSP INTERACTIVE CIRCUITS & SYSTEMS Ltd
 DSP SPECTRUM SIGNAL PROCESSING Inc
 Dye Lasers LUMONICS Inc
 Dye Lasers PRA LASER Inc
 Ear-Microphone MAGNUM DISTRIBUTION Ltd
 Earth Stations ANDREW ANTENNA COMPANY Ltd
 ECCM Radio CANADIAN MARCONI COMPANY
 ECM CANADIAN ASTRONAUTICS Ltd
 ECM M.E.L. DEFENCE SYSTEMS Ltd
 ECM TELEMUS ELECTRONIC SYSTEMS Inc
 Economic Analysis AVIATION PLANNING SERVICES Ltd
 Economic Studies SPIECE ASSOCIATES
 Editing RE: ACTION MARKETING SERVICES Ltd
 Effectiveness Evaluation THOMSON-CSF SYSTEMS CANADA Inc (TCSC)
 EHF Antennas TIL-TEK Ltd
 EHF Synthesizer RAYTHEON CANADA Ltd

KEYWORD	COMPANY	KEYWORD	COMPANY
Electrical Engineering	INNOTECH AVIATION ENTERPRISES Ltd	Electronics Research	ONTARIO HYDRO
Electrical Test Equipment	AVCORP INDUSTRIES Inc	Electroplating	CAMETOID Ltd
Electrical Test Equipment	DECADE INDUSTRIES	Elliptical Waveguide	ANDREW ANTENNA COMPANY Ltd
Electrical/Electronic Modification	BOEING OF CANADA Ltd (Arnprior Div)	Emergency Locator Beacons	GARRETT CANADA
Electro & Hydro-Mechanical Systems	PRECI SYSTEMS INTERNATIONAL Inc	Emergency Locator Beacons	LEIGH INSTRUMENTS Ltd
Electro-Optic Inspection	DIFFRACTO Ltd	Emergency Locator Beacons	TOWER AEROSPACE PRODUCTS Inc
Electro-Optical Instrumentation	PRA LASER Inc	Emergency Locator Transponders	CHAMP-ARMSTRONG COMMUNICATIONS Inc
Electro-Optics	ATOMIC ENERGY OF CANADA Ltd	Emergency Reporting Systems	GEC PLESSEY TELECOMMUNICATIONS
Electro-Optics	BARRINGER RESEARCH Ltd	EMI	APREL Inc
Electro-Optics	BENDIX AVELEX Inc	EMI	GARRETT CANADA
Electro-Optics	CANADIAN ASTRONAUTICS Ltd	EMI Filter	MURATA ERIE NORTH AMERICA Ltd
Electro-Optics	ERNST LEITZ CANADA Ltd	EMI Hardened Equipment	PYLON ELECTRONIC DEVELOPMENT CO Ltd
Electro-Optics	ITRES RESEARCH Ltd	EMI Shielding	SHERRITT GORDON MINES Ltd
Electro-Optics	OPTECH Inc	EMI-NEMP-EMP Shielding	NATIONAL ENGINEERING & SCIENCE ASSOC
Electro-Optics	OPTO-ELECTRONICS Inc	EMP Shielding	BRITCO BUILDING SYSTEMS Ltd
Electro-Optics	SPAR AEROSPACE Ltd	Emulation	IDACOM ELECTRONICS Ltd
Electrochemical Devices	THE ARMSTRONG MONITORING Corp	Enclosures (Electronic)	SHELLCAST FOUNDRIES Inc
Electrochemistry	WHITESHELL NUCLEAR RESEARCH ESTABLISH	Encryption	CALMOS SYSTEMS Inc
Electrodes	VORTEK INDUSTRIES Ltd	Energy Audits	RDS ENGINEERING
Electroforming	MA ELECTRONICS CANADA Ltd	Energy Conservation Studies	RDS ENGINEERING
Electromagnetic Compatibility	APREL Inc	Energy Conversion	ONTARIO HYDRO
Electromagnetic Compatibility	I.M.P. GROUP Ltd	Energy Systems	CHAMP-ARMSTRONG COMMUNICATIONS Inc
Electromagnetic Surveys	QUESTOR SURVEYS Ltd	Engine Component Simulator	ATLANTIS AEROSPACE Corp
Electromagnetics	MPB TECHNOLOGIES Inc	Engine Components	BOEING OF CANADA (de Havilland Div)
Electromagnetics	SCINTREX Ltd	Engine Components	BRISTOL AEROSPACE Ltd
Electromagnetics	TIL-TEK Ltd	Engine Components	HAWKER SIDDELEY CANADA Inc
Electromechanical Design	CANADIAN ASTRONAUTICS Ltd	Engine Components	PRATT & WHITNEY CANADA Ltd
Electromechanical Design	DOWTY CANADA Ltd	Engine Components	ROLLS-ROYCE (CANADA) Ltd
Electron Beam Welding	VAC-AERO INTERNATIONAL Inc	Engine Components	SHERRITT GORDON MINES Ltd
Electronic Controls	CASEY COPTER ACCESSORIES Ltd	Engine Components	SPAR AEROSPACE Ltd
Electronic Counter-Measures	See ECM	Engine Controls	SPECIALIZED WELDING & FABRICATION Ltd
Electronic Design	INTERACTIVE CIRCUITS & SYSTEMS Ltd	Engine Controls	BOEING OF CANADA (de Havilland Div)
Electronic Fabrication	W. R. DAVIS ENGINEERING Ltd	Engine Controls	COMPUTING DEVICES COMPANY
Electronic Gas Detectors	THE ARMSTRONG MONITORING Corp	Engine Emission Research	PRATT & WHITNEY CANADA Ltd
Electronic Mapping	INTERNATIONAL DATACASTING CORPORATION	Engine Fuel Control Systems	BENDIX AVELEX Inc
Electronic Publishing	RE: ACTION MARKETING SERVICES Ltd	Engine Health Monitoring	GasTOPS Ltd
Electronic Support Measures	M.E.L. DEFENCE SYSTEMS Ltd	Engine Health Monitoring	SENSYS
Electronic Systems Design	PARAMAX ELECTRONICS Inc	Engine Instruments	CANADIAN MARCONI COMPANY
Electronic Telephone Switching Equip	PYLON ELECTRONIC DEVELOPMENT CO Ltd	Engine Overhaul Equipment	DECADE INDUSTRIES
Electronic Test Equipment	OPTOTEK Ltd	Engine Research	PRATT & WHITNEY CANADA Ltd
Electronic Warfare	BOLRIET TECHNOLOGIES Inc	Engine Shipping Stands	DECADE INDUSTRIES
Electronic Warfare	CANADIAN ASTRONAUTICS Ltd	Engine Systems	BOEING OF CANADA (de Havilland Div)
Electronic Warfare	INNOTECH AVIATION ENTERPRISES Ltd	Engine Systems	BRISTOL AEROSPACE Ltd
Electronic Warfare	M.E.L. DEFENCE SYSTEMS Ltd	Engine Systems	PRATT & WHITNEY CANADA Ltd
Electronic Warfare	MILLER COMMUNICATIONS SYSTEMS Ltd	Engine Systems	ROLLS-ROYCE (CANADA) Ltd
Electronic Warfare	PRIOR DATA SCIENCES Ltd	Engine Test	SHERRITT GORDON MINES Ltd
Electronic Warfare	SANDERS CANADA Inc	Engine Test	HAWKER SIDDELEY CANADA Inc
Electronic Warfare	TELEMUS ELECTRONIC SYSTEMS Inc	Engine Thrust Measuring Device	MDS AERO SUPPORT CORPORATION
Electronics	GENELCOM Ltd	Engineering & Construction	COMPUTING DEVICES COMPANY
Electronics (Precision Parts)	CAMPAGNA ENGINEERING Inc	Engineering (Custom)	THE SNC GROUP
Electronics Assembly	THE ONTARIO AEROSPACE CONSORTIUM Inc	Engineering Consultants	INTERFAST Inc
Electronics Nuclear	WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT	Engineering Design	VADEKO INTERNATIONAL Inc
		Engineering Sciences	AEA ELECTRONIC Ltd
		Engineering Services	APREL Inc
			AVCORP INDUSTRIES Inc

KEYWORD**COMPANY**

Engineering Services
 Engineering Services
 Engineering Services
 Engineering Services
 Engineering Services
 Engineering Services
 Engineering Services
 Engineering Services
 Engineering Services
 Engines
 Environment
 Environment
 Environment
 Environment
 Environmental Analysis
 Environmental Analysis
 Environmental
 Assessment
 Environmental Chemistry
 Environmental Control
 Environmental Control
 Environmental Control
 Environmental Controls
 Environmental
 Instruments
 Environmental Laboratory
 Environmental Laboratory
 Environmental Sensors
 Environmental Sensors
 Environmental Testing
 Environmental Testing
 Environmental Testing
 Environmental Testing
 Environmental Testing
 Environmental Testing
 Equipment Procurement
 Equipment Selection
 Equipment Shelters
 ESM Products
 Evaporation Charges
 Excimer Lasers
 Exhaust Ducts
 Exhaust Intake
 Eximer Laser
 Expediting
 Expert Systems
 Expert Systems
 Expert Systems
 Expert Systems
 Explosions
 Explosives
 Explosives
 Extended Interaction
 Klystrons
 Extended Length
 Machining
 Extended Length
 Machining
 Extended Length
 Machining

BOEING OF CANADA Ltd (Arnprior Div)
 CALIAN TECHNOLOGY Ltd
 DEW ENGINEERING AND DEVELOPMENT Ltd
 DSMA INTERNATIONAL Inc
 GasTOPS Ltd
 NOVA SCOTIA RESEARCH FOUNDATION Corp
 ONTARIO HYDRO
 W. R. DAVIS ENGINEERING Ltd
 WARDROP ENGINEERING Inc
 PRATT & WHITNEY CANADA Ltd
 ROLLS-ROYCE (CANADA) Ltd
 ALBERTA RESEARCH COUNCIL
 SCI-TEC INSTRUMENTS Inc
 THE ARMSTRONG MONITORING Corp
 WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT
 BARRINGER RESEARCH Ltd
 THE BERCHA GROUP
 ONTARIO HYDRO
 NOVA SCOTIA RESEARCH FOUNDATION Corp
 ATOMIC ENERGY OF CANADA Ltd
 GARRETT CANADA
 MBB HELICOPTER CANADA Ltd
 BOEING OF CANADA (de Havilland Div)
 GARRETT CANADA
 DEVTEK CORPORATION
 HERMES ELECTRONICS Ltd
 INRAD INDUSTRIAL RESEARCH & DEVELOPMENT
 SPARTON OF CANADA Ltd
 APREL Inc
 CALIAN TECHNOLOGY Ltd
 CANADIAN ASTRONAUTICS Ltd
 DSMA INTERNATIONAL Inc
 MURATA ERIE NORTH AMERICA Ltd
 WARDROP ENGINEERING Inc
 AVIATION PLANNING SERVICES Ltd
 AVIATION PLANNING SERVICES Ltd
 ANDREW ANTENNA COMPANY Ltd
 TELEMUS ELECTRONIC SYSTEMS Inc
 COMINCO Ltd
 LUMONICS Inc
 ROBERT MITCHELL Inc
 ROBERT MITCHELL Inc
 ULTRA LASERTECH Inc
 QUANTUM INSPECTION AND TESTING Ltd
 AIT ADVANCED INFORMATION TECHNOLOGIES
 ALBERTA RESEARCH COUNCIL
 GasTOPS Ltd
 VIRTUAL PROTOTYPES Inc
 WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT
 EXPRO CHEMICAL PRODUCTS Inc
 HANDS FIREWORKS Inc
 VARIAN CANADA Inc
 BOEING OF CANADA (de Havilland Div)
 CANADAIR Inc
 EBCO AEROSPACE INDUSTRIES Inc

KEYWORD**COMPANY**

Extended Length
 Machining
 Fabric Structures
 Fabricated Aluminum Structures
 Fabrication (Fabrics)
 Fabrication Procedures
 Fabrication/Assembly/Test
 Fabrics (Composite)
 Facilities Construction
 Facilities Design
 Facsimile
 Failure & Maintainability Analysis
 Failure Analysis
 Failure Investigations
 Fast Fourier Transforms
 Fast Optical Detection
 Fast Optical Sources
 Fasteners (Precision)
 Fault Diagnosis
 Fault-Tolerant Systems
 Feasibility Studies
 Feasibility Studies
 Feasibility Studies
 Feasibility Studies
 Ferrite Devices
 Ferrous Castings
 Ferrous Metals
 Fiber Dispersion
 Measurement
 Fiber Optic Cable
 Systems
 Fiber Optic Gyros
 Fiber Optic Instruments
 Fiber Optic Rotary Joints
 Fiber Optics
 Fiber Optics
 Fiber Optics
 Communications
 Fiberglass Filament
 Winding
 Fiberglass/Composite
 Components
 Field Generators
 Field Service
 Filter Design
 Filter Manufacturer
 Filters
 Filters
 Filters
 Filters
 Filters
 Finite Element Analysis
 Fire Control
 Fire Control
 Fire Control Optics
 Fire Detection & Mapping
 Fire Fighting Equipment
 Fire Fighting Equipment (Aircraft)
 Fire Fighting Systems

McDONNELL DOUGLAS CANADA Ltd
 SEI INDUSTRIES Ltd
 ANDREW ANTENNA COMPANY Ltd
 FELL-FAB PRODUCTS
 QUANTUM INSPECTION AND TESTING Ltd
 MICROTEL Ltd
 CIBA-GEIGY CANADA Ltd
 MDS AERO SUPPORT CORPORATION
 MDS AERO SUPPORT CORPORATION
 NORTHERN TELECOM CANADA Ltd
 WARDROP ENGINEERING Inc
 ONTARIO HYDRO
 QUANTUM INSPECTION AND TESTING Ltd
 SPECTRUM SIGNAL PROCESSING Inc
 OPTO-ELECTRONICS Inc
 OPTO-ELECTRONICS Inc
 INTERFAST Inc
 SIMMONDS PRECISION CANADA Ltd
 TRIDEX SYSTEMS Inc
 PRIOR DATA SCIENCES Ltd
 TELECONSULT Ltd
 W. R. DAVIS ENGINEERING Ltd
 WARDROP ENGINEERING Inc
 MA ELECTRONICS CANADA Ltd
 EASTERN PRECISION CASTING Inc
 TIMMINCO Ltd
 OPTO-ELECTRONICS Inc
 CANAC TELECOM
 LITTON SYSTEMS CANADA Ltd
 OPTO-ELECTRONICS Inc
 NOVA SCOTIA RESEARCH FOUNDATION Corp
 FOUNDATION INSTRUMENTS Inc
 NORTHERN TELECOM CANADA Ltd
 MPB TECHNOLOGIES Inc
 BOEING OF CANADA Ltd (Winnipeg Div)
 NORTHWEST INDUSTRIES Ltd
 DEW ENGINEERING AND DEVELOPMENT Ltd
 MDS AERO SUPPORT CORPORATION
 MURATA ERIE NORTH AMERICA Ltd
 MURATA ERIE NORTH AMERICA Ltd
 3-L FILTERS Ltd
 AIRCRAFT APPLIANCES AND EQUIPMENT Ltd
 BOLRIET TECHNOLOGIES Inc
 MA ELECTRONICS CANADA Ltd
 TIL-TEK Ltd
 W. R. DAVIS ENGINEERING Ltd
 ADGA GROUP
 COMPUTING DEVICES COMPANY
 ERNST LEITZ CANADA Ltd
 CONAIR AVIATION Ltd
 SEI INDUSTRIES Ltd
 CONAIR AVIATION Ltd
 TOWER AEROSPACE PRODUCTS Inc

KEYWORD	COMPANY	KEYWORD	COMPANY
Fire Proof Wire	HARBOUR INDUSTRIES (Canada) Ltd	Fuel Control	BENDIX AVELEX Inc
Fire Support Vehicle	GENERAL MOTORS OF CANADA Ltd	Fuel Control	MDS AERO SUPPORT CORPORATION
Fixed Radios	SPILSBURY COMMUNICATIONS Ltd	Fuel Control (Parts)	C.P.S. INDUSTRIES Inc (LES)
Flame Proof Wire	HARBOUR INDUSTRIES (Canada) Ltd	Fuel Filters	AIRCRAFT APPLIANCES AND EQUIPMENT Ltd
Flaps	AVCORP INDUSTRIES Inc	Fuel Monitors	3-L FILTERS Ltd
Flaps	CANADIAN AIRCRAFT PRODUCTS Ltd	Fuel Research	BOEING OF CANADA (de Havilland Div)
Flares	HANDS FIREWORKS Inc	Fuel Research	PRATT & WHITNEY CANADA Ltd
Flares	SIGNA + FLASH Ltd	Fuel Storage	SEI INDUSTRIES Ltd
Flash Technology	CHAMP-ARMSTRONG COMMUNICATIONS Inc	Fuel Systems	BOEING OF CANADA (de Havilland Div)
Flat Panel Displays	LITTON SYSTEMS CANADA Ltd	Fuel Systems	McDONNELL DOUGLAS CANADA Ltd
Flat Panel Displays	OPTOTEK Ltd	Fuel Systems	SEI INDUSTRIES Ltd
Flaw Detection	DIFFRACTO Ltd	Fuel Systems Research	PRATT & WHITNEY CANADA Ltd
Flexible Automated Manufacturing	ICAM TECHNOLOGIES Corp	Fume Hoods	ROBERT MITCHELL Inc
Flight Control Actuation Systems	MENASCO AEROSPACE Ltd	Fuses	3-L FILTERS Ltd
Flight Control Interfaces	VIRTUAL PROTOTYPES Inc	Fusion Splicers	FOUNDATION INSTRUMENTS Inc
Flight Control Systems	NOVATRONICS OF CANADA Ltd	GaAs FET Amplifiers	MA ELECTRONICS CANADA Ltd
Flight Controls	DOWTY CANADA Ltd	Galley Equipment	ROBERT MITCHELL Inc
Flight Controls	PRECI SYSTEMS INTERNATIONAL Inc	Gamma Ray Monitors	SCINTREX Ltd
Flight Data Processing	RAYTHEON CANADA Ltd	Gantry Robot	CLAY-MILL TECHNICAL SYSTEMS Inc
Flight Data Recorders	ATLANTIS AEROSPACE Corp	Gas Detectors	THE ARMSTRONG MONITORING Corp
Flight Data Recorders	LEIGH INSTRUMENTS Ltd	Gas Lasers	LUMONICS Inc
Flight Dynamics	AASTRA AEROSPACE Inc	Gas Path Analysis	GasTOPS Ltd
Flight Operations	INTERNATIONAL AIRBORNE SYSTEMS Ltd	Gas Turbine Components	BRISTOL AEROSPACE Ltd
Flight Planning	INTERNATIONAL AIRBORNE SYSTEMS Ltd	Gas Turbine Components	HAWKER SIDDELEY CANADA Inc
Flight Simulation	VIRTUAL PROTOTYPES Inc	Gas Turbine Engines	PRATT & WHITNEY CANADA Ltd
Flight Simulators	CAE INDUSTRIES Ltd	Gas Turbine Engines	ROLLS-ROYCE (CANADA) Ltd
Flight Surface Manufacture	NORTHWEST INDUSTRIES Ltd	Gas Turbine Engines (R&D)	GasTOPS Ltd
Flight Test Equipment	BOEING OF CANADA Ltd (Arnprior Div)	Gauges	DIEMASTER TOOL Inc
Flight Testing	AASTRA AEROSPACE Inc	Gear Boxes	BACHAN AEROSPACE OF CANADA Ltd
Flight Testing (Helicopters)	MBB HELICOPTER CANADA Ltd	Gear Boxes	BRISTOL AEROSPACE Ltd
FLIRs	SPAR AEROSPACE Ltd	Gear Boxes	SPAR AEROSPACE Ltd
Floats (Aircraft)	FULL LOTUS MANUFACTURING Inc	Gear Inspection	DIFFRACTO Ltd
Floppy Disk Emulators	TARGA ELECTRONICS SYSTEMS Inc	Gears	BACHAN AEROSPACE OF CANADA Ltd
Fluid Dynamics	WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT	Generators	DONLEE PRECISION
Fluorescent Penetrant Inspection	SPECIALIZED WELDING & FABRICATION Ltd	Geochemical Equipment	GLOBAL THERMOELECTRIC POWER SYSTEMS
Flutter Analysis FM	CANADAIR Inc	Geographic Information Systems	SCINTREX Ltd
FM Receivers	INTERNATIONAL DATACASTING CORPORATION	Geographic/Geologic Analysis	ALBERTA RESEARCH COUNCIL
Foil Heat Shields	CALMOS SYSTEMS Inc	Geology	BARRINGER RESEARCH Ltd
Forest Products Testing	THE H. I. THOMPSON COMPANY	Geophysical Equipment	ALBERTA RESEARCH COUNCIL
Forgings	ALBERTA RESEARCH COUNCIL	Geophysical Instrumentation	SCINTREX Ltd
Forgings	CANADA FORGINGS Inc	Geophysics	APPLIED MICROSYSTEMS Ltd
Forgings	CANADAIR Inc	Geophysics	INRAD INDUSTRIAL RESEARCH & DEVELOPMENT
Forming	McDONNELL DOUGLAS CANADA Ltd	Geotechnical Engineering	SPARTON OF CANADA Ltd
Forming (Sheet Metal)	HAWKER SIDDELEY CANADA Inc	Global Positioning	ONTARIO HYDRO
Forming (Stainless Foils)	THE H. I. THOMPSON COMPANY	Government Relations	NORSTAR INSTRUMENTS Ltd
Foundry	SHELLCAST FOUNDRIES Inc	Government Relations	BRUCE D. VALLILLEE ELECTRONICS Ltd
Fracture Analysis	CANADAIR Inc	Government Relations	CONTRACTING ADVISORY SERVICES Inc
Fracture Mechanics	ONTARIO HYDRO	Governors (Propeller)	FOOTIT MITCHELL AND ASSOCIATES
Fracture Mechanics	WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT	GP Armoured Vehicles	PAI-PUBLIC AFFAIRS INTERNATIONAL
Frangible Towers	CARR-SAWYER Inc	Graphics	WESTERN PROPELLER COMPANY Ltd
Frequency Halver	TELEMUS ELECTRONIC SYSTEMS Inc	Graphics	GENERAL MOTORS OF CANADA Ltd
Frequency Counters	TELEMUS ELECTRONIC SYSTEMS Inc	Graphics	CAE INDUSTRIES Ltd
Frequency Stabilizers	ULTRA LASERTECH Inc	Graphics	MPB TECHNOLOGIES Inc
			PRIOR DATA SCIENCES Ltd
			RE: ACTION MARKETING SERVICES Ltd

KEYWORD	COMPANY	KEYWORD	COMPANY
High Temperature Wire	HARBOUR INDUSTRIES (Canada) Ltd	ILS	THOMSON-CSF SYSTEMS CANADA Inc (TCSC)
High Voltage Engineering	ONTARIO HYDRO	ILS Structures	INDAL TECHNOLOGIES Inc
High Voltage Power Supplies	MURATA ERIE NORTH AMERICA Ltd	Image Intensification	BENDIX AVELEX Inc
High Voltage Science	ONTARIO HYDRO	Image Processing	CANADIAN ASTRONAUTICS Ltd
High Voltage Transformers	HAMMOND MANUFACTURING COMPANY Ltd	Image Processing	CANADIAN MARCONI COMPANY
High Volume Smoke Pot	HANDS FIREWORKS Inc	Image Processing	DIPIX TECHNOLOGIES Inc
Higher Order Language Hinges	I. P. SHARP ASSOCIATES Ltd	Image Processing	ERNST LEITZ CANADA Ltd
Hologene Free Wire	AERO MACHINING Ltd	Image Processing	HONEYWELL Ltd (Defense & Systems Research)
Honeycomb Materials	HARBOUR INDUSTRIES (Canada) Ltd	Image Processing	MACDONALD DETTWILER
Honing	CIBA-GEIGY CANADA Ltd	Image Processing	SCI-TEC INSTRUMENTS Inc
Horizon Reference Systems	J.J. CHARLTON COMPANY Ltd	Image Recorder	MACDONALD DETTWILER
Human Engineering	HONEYWELL Ltd (Sperry Aerospace Div)	Imaging	ITRES RESEARCH Ltd
Human Factors Design	W. R. DAVIS ENGINEERING Ltd	Impedance Transformers	AVTECH ELECTROSYSTEMS Ltd
Hybrid Circuits	VIRTUAL PROTOTYPES Inc	Impulse Generators	AVTECH ELECTROSYSTEMS Ltd
Hybrid Circuits	CANADIAN MARCONI COMPANY	In-Orbit Real-Time Test Indicators	SED SYSTEMS Inc
Hybrid Circuits	GARRETT CANADA	Induction Hardening	NOVATRONICS OF CANADA Ltd
Hybrid Mobile Protected Weapon System	MICROTEL Ltd	Industrial Benefits	J.J. CHARLTON COMPANY Ltd
Hydraulic Actuators	GENERAL MOTORS OF CANADA Ltd	Industrial Control Instrumentation	CONTRACTING ADVISORY SERVICES Inc
Hydraulic Hose	CHICOPEE MANUFACTURING LIMITED	Industrial Engineering	INTERCON CONSULTANTS
Hydraulic Servos	LEAVENS AVIATION Inc	Industrial Tooling	OPTO-ELECTRONICS Inc
Hydraulic Systems	AERO MACHINING Ltd	Inertial Guidance Components	ALBERTA RESEARCH COUNCIL
Hydraulics	LUCAS INDUSTRIES CANADA Ltd	Inertial Navigation	INTERFAST Inc
Hydraulics	BOEING OF CANADA (de Havilland Div)	Inflatable Aircraft Floats	STRITE INDUSTRIES Ltd
Hydraulics	BRISTOL AEROSPACE Ltd	Inflatable Floats	LITTON SYSTEMS CANADA Ltd
Hydraulics	CAE INDUSTRIES Ltd	Inflatable Rescue Equipment	FULL LOTUS MANUFACTURING Inc
Hydraulics	CARR-TECH SERVICES Ltd	Inflight Engine Monitoring	SEI INDUSTRIES Ltd
Hydraulics	DOWTY CANADA Ltd	Information Handling Products	SEI INDUSTRIES Ltd
Hydraulics	EBCO AEROSPACE INDUSTRIES Inc	Infrared Diode Lasers	GasTOPS Ltd
Hydraulics	FIELD AVIATION COMPANY Ltd	Infrared Instrumentation	UNISYS CANADA Inc
Hydraulics	HEROUX Inc	Infrared Instrumentation	OPTO-ELECTRONICS Inc
Hydraulics	McDONNELL DOUGLAS CANADA Ltd	Infrared Instrumentation	BARRINGER RESEARCH Ltd
Hydraulics	MENASCO AEROSPACE Ltd	Infrared Instrumentation	OPTO-ELECTRONICS Inc
Hydraulics	NORTHWEST INDUSTRIES Ltd	Infrared Materials	OPTOTEK Ltd
Hydraulics	WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT	Infrared Signature Suppression	SPAR AEROSPACE Ltd
Hydrogen	INRAD INDUSTRIAL RESEARCH & DEVELOPMENT	Injection Molding	COMINCO Ltd
Hydrogen Embrittlement	CAMETOID Ltd	Injection Molding	W. R. DAVIS ENGINEERING Ltd
Hydrogen Gas Detection	INRAD INDUSTRIAL RESEARCH & DEVELOPMENT	Injection Molding Tools	CANADIAN MARCONI COMPANY
Hydrogen Production	INRAD INDUSTRIAL RESEARCH & DEVELOPMENT	Inspection	FLEXIBULB (1983) Inc
Hydrogen Sulfide Sensors	THE ARMSTRONG MONITORING Corp	Inspection	I.M.P. GROUP Ltd
Hydromechanical	DOWTY CANADA Ltd	Inspection	INRAD INDUSTRIAL RESEARCH & DEVELOPMENT
Hydrophones	SPARTON OF CANADA Ltd	Inspection Equipment	KOSS MACHINE & TOOL CO
ICAM	DIFFRACTO Ltd	Inspection Systems	ALBERTA LASER INSTITUTE
Ice Detection	PELORUS NAVIGATION SYSTEMS Inc	Inspection Systems	QUANTUM INSPECTION AND TESTING Ltd
Ice Detector	LEIGH INSTRUMENTS Ltd	Installations & Servicing	SPECIALIZED WELDING & FABRICATION Ltd
Ice Penetration	SPARTON OF CANADA Ltd	Installations (Avionics)	DIFFRACTO Ltd
Igniters	HANDS FIREWORKS Inc	Instructional Services	DIFFRACTO Ltd
Illuminated Panels	CANADIAN MARCONI COMPANY	Instrument Bearings	ROBERTSON PHOTOGRAMMETRIC Inc
Illuminated Panels	GARRETT CANADA	Instrument Manufacture	NORTHWEST INDUSTRIES Ltd
Illumination Signals	HANDS FIREWORKS Inc	Instrument Repair	NAVAIR Limited
ILS	ADGA GROUP	Instrument Repair	TELECONSULT Ltd
ILS	BENDIX AVELEX Inc	Instrumentation	FAG BEARINGS Ltd
ILS	BOEING OF CANADA Ltd (Arnprior Div)	Instrumentation	BARRINGER RESEARCH Ltd
ILS	CANADIAN MARCONI COMPANY	Instrumentation	CANADIAN MARCONI COMPANY
ILS	GARRETT CANADA	Instrumentation	NORTHWEST INDUSTRIES Ltd
ILS	HONEYWELL Ltd (Sperry Aerospace Div)	Instrumentation	SIMMONDS PRECISION CANADA Ltd
ILS	INTERNATIONAL AIRBORNE SYSTEMS Ltd	Instrumentation	BRISTOL AEROSPACE Ltd
ILS	LEIGH INSTRUMENTS Ltd	Instrumentation	DSMA INTERNATIONAL Inc
ILS	THE AMTEK GROUP	Instrumentation	MPB TECHNOLOGIES Inc

KEYWORD**COMPANY**

Instrumentation (Cases)
Instrumented Landing
Systems
Instruments
Instruments
Instruments
Instruments
Instruments
Instruments (Nuclear)
Insulation (Blankets)
Insulation Systems
Integrated CAD/CAM
Systems
Integrated Circuits
Integrated High Density
LED Displays
Integrated Logistic
Support
Integrated Naval
Communications
Integrated Systems
Management
Integration and Test
Facilities
Intelligent Instruments
Interactive Analysis
Interface Checking
(Electronically)
International Standards
International Trade
Relations
Intrusion Detection
Intrusion Detection
Inverters
Inverting Transformers
Investment Castings
Investment Castings
Investment Castings
Ion Plating
Ion Vapor Deposition
IR Detectors
IR Detectors
IR Sources
Irradiations
ISDN/DDS
Isolators
Isotope Dispensing
Equipment
Isotopes
Isotopic CO2
Ivadizing(TM)
Jamming
Jet Engine (Components)
Jig Fabrication
Jig Fabrication
Klystrons
Laboratory
Laminar Flow Work
Stations
Laminates
Laminates (Solid &
Sandwich)
Lamps (High Power)
Landing Aids
Landing Gear
(Retractable)

ZARGES AFC CANADA Ltd
See ILS
BENDIX AVELEX Inc
BOEING OF CANADA
(de Havilland Div)
COMPUTING DEVICES COMPANY
LITTON SYSTEMS CANADA Ltd
NOVATRONICS OF CANADA Ltd
PYLON ELECTRONIC
DEVELOPMENT CO Ltd
WHITESHELL NUCLEAR
RESEARCH ESTABLISHMENT
THE H. I. THOMPSON COMPANY
THE H. I. THOMPSON COMPANY
ICAM TECHNOLOGIES Corp
CALMOS SYSTEMS Inc
OPTOTEK Ltd
See ILS
LEIGH INSTRUMENTS Ltd
DOWTY CANADA Ltd
WARDROP ENGINEERING Inc
CANADIAN MARCONI COMPANY
MACDONALD DETTWILER
RDS ENGINEERING
IDACOM ELECTRONICS Ltd
FOOTIT MITCHELL AND
ASSOCIATES
COMPUTING DEVICES COMPANY
LITTON SYSTEMS CANADA Ltd
PYLON ELECTRONIC
DEVELOPMENT CO Ltd
AVTECH ELECTROSYSTEMS Ltd
CERCAST Inc
DESIGNED PRECISION CASTINGS
Inc
EASTERN PRECISION CASTING Inc
SHELLCAST FOUNDRIES Inc
CAMETOID Ltd
CAMETOID Ltd
OPTOTEK Ltd
OPTO-ELECTRONICS Inc
OPTO-ELECTRONICS Inc
WHITESHELL NUCLEAR
RESEARCH ESTABLISHMENT
AEA ELECTRONIC Ltd
MA ELECTRONICS CANADA Ltd
AVCORP INDUSTRIES Inc
WHITESHELL NUCLEAR
RESEARCH ESTABLISHMENT
ULTRA LASERTECH Inc
CAMETOID Ltd
MILLER COMMUNICATIONS
SYSTEMS Ltd
DONLEE PRECISION
AVCORP INDUSTRIES Inc
CANADIAN AIRCRAFT PRODUCTS
Ltd
VARIAN CANADA Inc
HAWKER SIDDELEY CANADA Inc
ROBERT MITCHELL Inc
CIBA-GEIGY CANADA Ltd
BOEING OF CANADA Ltd
(Winnipeg Div)
VORTEK INDUSTRIES Ltd
CANADIAN MARCONI COMPANY
FULL LOTUS MANUFACTURING
Inc

KEYWORD**COMPANY**

Landing Gear
Components
Landing Gear
Components
Landing Gear
Components
Landing Gear
Components
Landing Gear
Components
Landing Gear
Components
Landing Gear
Components
Landing Gears
Landing Gears
Landing Gears
Landsat
Large Scale Robotics
Laser Altimeter
Laser Applications
Laser Communications
Laser Communications
Laser Controllers
Laser Diodes
Laser Diodes
Laser Film Image
Recorder
Laser Instruments
Laser Marking Systems
Laser Materials
Processing
Laser Optics
Laser Optics
Laser Power Supplies
Laser Printing
Laser Radar
Laser Rangefinders
Laser Simulation
Lasers
Lasers
Lasers
Lasers
Lasers
Leak Detectors
LED Arrays
LED Displays
LED Materials
LED Technology
Lenses (Reconnaissance)
Lenses (Underwater)
Level of Repair Analysis
Library (Aircraft Parts)
Lidar Systems
Life Cycle Costing
Life Cycle Support
Life Cycle Support
Life Saving Equipment
Life Support Equipment
Lifejacket Lights
Lifejackets
Light Alloy Sand Castings
Light Armoured Vehicles
Light Assembly
Lighted Panels
Lighted Panels
Lighter-Than-Air
Lighting (High Power)
Lighting Equipment

AERO MACHINING Ltd
BACHAN AEROSPACE OF CANADA
Ltd
C.P.S. INDUSTRIES Inc (LES)
CHICOPEE MANUFACTURING Ltd
DEVTEK CORPORATION
DONLEE PRECISION
MENASCO AEROSPACE Ltd
BOEING OF CANADA
(de Havilland Div)
DOWTY CANADA Ltd
HEROUX Inc
MENASCO AEROSPACE Ltd
MACDONALD DETTWILER
VADEKO INTERNATIONAL Inc
OPTECH Inc
AASTRA AEROSPACE Inc
MPB TECHNOLOGIES Inc
TRACKER INDUSTRIES Ltd
ULTRA LASERTECH Inc
FOUNDATION INSTRUMENTS Inc
OPTO-ELECTRONICS Inc
MACDONALD DETTWILER
MPB TECHNOLOGIES Inc
LUMONICS Inc
LUMONICS Inc
DIFFRACTO Ltd
ERNST LEITZ CANADA Ltd
VARIAN CANADA Inc
RE: ACTION MARKETING
SERVICES Ltd
OPTECH Inc
OPTECH Inc
VORTEK INDUSTRIES Ltd
ALBERTA LASER INSTITUTE
LUMONICS Inc
MPB TECHNOLOGIES Inc
PRA LASER Inc
ULTRA LASERTECH Inc
THE ARMSTRONG MONITORING
Corp
OPTOTEK Ltd
LITTON SYSTEMS CANADA Ltd
OPTOTEK Ltd
W. R. DAVIS ENGINEERING Ltd
ERNST LEITZ CANADA Ltd
ERNST LEITZ CANADA Ltd
THE AMTEK GROUP
PATLON AIRCRAFT & INDUSTRIES
Ltd
OPTECH Inc
THOMSON-CSF SYSTEMS
CANADA Inc (TCSC)
PRIOR DATA SCIENCES Ltd
ROLLS-ROYCE (CANADA) Ltd
SEI INDUSTRIES Ltd
TUL SAFETY EQUIPMENT Ltd
SIGNA + FLASH Ltd
TUL SAFETY EQUIPMENT Ltd
HALEY INDUSTRIES Ltd
GENERAL MOTORS OF CANADA
Ltd
J.J. CHARLTON COMPANY Ltd
CANADIAN MARCONI COMPANY
GARRETT CANADA
MAGNUS AEROSPACE
CORPORATION
VORTEK INDUSTRIES Ltd
CARR-TECH SERVICES Ltd

KEYWORD	COMPANY	KEYWORD	COMPANY
Line Terminating Unit	CANADIAN MARCONI COMPANY	Machining	MICROTEL Ltd
Linear Pulse Amplifiers	AVTECH ELECTROSYSTEMS Ltd	Machining	MONTREAL PRECISION CRAFTING Ltd
Liquid Crystal Displays	LITTON SYSTEMS CANADA Ltd	Machining	PRECI SYSTEMS INTERNATIONAL Inc
Liquid Springs	DOWTY CANADA Ltd	Machining	PRICE & KNOTT MANUFACTURING CO Ltd
Lithium Batteries	MOLI ENERGY Ltd	Machining	SCI-TEC INSTRUMENTS Inc
Local Area Networking	UNISYS CANADA Inc	Machining	STEVESTED MACHINERY & ENGINEERING Ltd
Locating Devices	SIGNA + FLASH Ltd	Machining	STRITE INDUSTRIES Ltd
Locomotives	GENERAL MOTORS OF CANADA Ltd	Machining	THE ONTARIO AEROSPACE CONSORTIUM Inc
Logistic Support	BOEING OF CANADA Ltd (Arnprior Div)	Machining	TW MANUFACTURING Inc
Logistic Support	KAYCOM Inc	Machining	UDT INDUSTRIES Inc
Logistic Support Analysis	THE AMTEK GROUP	Machining	VAC-AERO INTERNATIONAL Inc
Logistics Engineering	THOMSON-CSF SYSTEMS CANADA Inc (TCSC)	Machining	VICTRIX Ltd
Logistics Support	FRONTEC LOGISTICS Corp	Machining	ROLLS-ROYCE (CANADA) Ltd
Logistics Vehicle	GENERAL MOTORS OF CANADA Ltd	Machining	HALEY INDUSTRIES Ltd
Loop Back Units	PYLON ELECTRONIC DEVELOPMENT CO Ltd	Magnesium	
Loopless Memories	TELEMUS ELECTRONIC SYSTEMS Inc	Magnesium Sand Castings	CAE INDUSTRIES Ltd
Low Frequency Beacon Systems	SPILSBURY COMMUNICATIONS Ltd	Magnetic Anomaly Detection	
Low Hologene Wire	HARBOUR INDUSTRIES (Canada) Ltd	Magnetic Couplings	NOVA SCOTIA RESEARCH FOUNDATION Corp
Low Noise Amplifiers	MA ELECTRONICS CANADA Ltd	Magnetic Devices	CANADIAN MARCONI COMPANY
Low Voltage Transformers	HAMMOND MANUFACTURING COMPANY Ltd	Magnetic Devices	HAMMOND MANUFACTURING COMPANY Ltd
Low-Pass Filters	MURATA ERIE NORTH AMERICA Ltd	Magnetic Gradiometer	QUESTOR SURVEYS Ltd
LTA Systems	MAGNUS AEROSPACE CORPORATION	Magnetic Sensors	SCINTREX Ltd
LVTP7 Upgrades	GENERAL MOTORS OF CANADA Ltd	Magnetic Tape Transports	UNISYS CANADA Inc
M113 Upgrades	GENERAL MOTORS OF CANADA Ltd	Magnetometers	CAE INDUSTRIES Ltd
Machine Vision	DIFFRACTO Ltd	Magnetometers	QUESTOR SURVEYS Ltd
Machining	AERO MACHINING Ltd	Magnets	SHERRITT GORDON MINES Ltd
Machining	AVCORP INDUSTRIES Inc	Magnus Effect	MAGNUS AEROSPACE CORPORATION
Machining	BACHAN AEROSPACE OF CANADA Ltd	Maintenance	See R&O
Machining	BENDIX AVELEX Inc	Maintenance & Overhaul Facility Plan	AVIATION PLANNING SERVICES Ltd
Machining	BOEING OF CANADA (de Havilland Div)	Maintenance Consoles	UNISYS CANADA Inc
Machining	BOEING OF CANADA Ltd (Arnprior Div)	Maintenance Planning	TELECONSULT Ltd
Machining	BRISTOL AEROSPACE Ltd	Maintenance Recovery Vehicle	GENERAL MOTORS OF CANADA Ltd
Machining	C.P.S. INDUSTRIES Inc (LES)	Man Machine Sciences	HONEYWELL Ltd (Defense & Systems Research)
Machining	CAMPAGNA ENGINEERING Inc	Man/Machine Interface	VIRTUAL PROTOTYPES Inc
Machining	CANADA FORGINGS Inc	Management Consulting	SPIECE ASSOCIATES
Machining	CANADAIR Inc	Management Services	NORTHERN TELECOM CANADA Ltd
Machining	CANADIAN AIRCRAFT PRODUCTS Ltd	Management Support	FRONTEC LOGISTICS Corp
Machining	CANADIAN MARCONI COMPANY	Manuals	HAWKER SIDDELEY CANADA Inc
Machining	CHICOPEE MANUFACTURING Ltd	Manufacturing	W. R. DAVIS ENGINEERING Ltd
Machining	DECADE INDUSTRIES	Manufacturing	Consulting Services AEA ELECTRONIC Ltd
Machining	DEVTEK CORPORATION	Manufacturing	Technology CLAY-MILL TECHNICAL SYSTEMS Inc
Machining	DIEMASTER TOOL Inc	Manufacturing	Technology DIFFRACTO Ltd
Machining	DONLEE PRECISION	Mapping	QUESTOR SURVEYS Ltd
Machining	DOWTY CANADA Ltd	Mapping	SPAR AEROSPACE Ltd
Machining	EBCO AEROSPACE INDUSTRIES Inc	Mapping	THE BERCHA GROUP
Machining	ENHEAT Inc	Marine Signalling Devices	SIGNA + FLASH Ltd
Machining	HAWKER SIDDELEY CANADA Inc	Markers	HANDS FIREWORKS Inc
Machining	I.M.P. GROUP Ltd	Market Research	SPIECE ASSOCIATES
Machining	INDAL TECHNOLOGIES Inc	Market Surveys	AVIATION PLANNING SERVICES Ltd
Machining	INRAD INDUSTRIAL RESEARCH & DEVELOPMENT	Marketing	BRUCE D. VALLILLEE ELECTRONICS Ltd
Machining	INVAR MANUFACTURING Ltd	Marketing	FOOTTIT MITCHELL AND ASSOCIATES
Machining	J.J. CHARLTON COMPANY Ltd	Marketing	HOWLAND RUSSELL CONSULTANTS Ltd
Machining	KOSS MACHINE & TOOL CO	Marketing	RE: ACTION MARKETING SERVICES Ltd
Machining	LEAVENS AVIATION Inc	Marketing Research	BRUCE D. VALLILLEE ELECTRONICS Ltd
Machining	McDONNELL DOUGLAS CANADA Ltd	Mass Storage	KOM Inc
Machining	METRO MACHINING CORPORATION	Mass Storage Systems	TARGA ELECTRONICS SYSTEMS Inc

KEYWORD**COMPANY**

Master Planning AVIATION PLANNING SERVICES Ltd
 Materials Development BOEING OF CANADA Ltd (Winnipeg Div)
 Material Handling Trailers DEW ENGINEERING AND DEVELOPMENT Ltd
 Materials ALCAN INTERNATIONAL Ltd
 Materials Characterization WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT
 Materials Processing CAMETOID Ltd
 Materials R&D (Connectors) ITT CANNON ELECTRIC CANADA
 Materials Research AASTRA AEROSPACE Inc
 Materials Sciences ONTARIO HYDRO
 Materials Testing ALBERTA RESEARCH COUNCIL
 Materials Testing & Development WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT
 Measurement & Control Systems DIFFRACTO Ltd
 Measurement & Control Systems GARRETT CANADA
 Measurement & Control Systems UNISYS CANADA Inc
 Measurement Systems OPTO-ELECTRONICS Inc
 Measurement Systems ROBERTSON PHOTOGRAMMETRIC Inc
 Mechanical Arms SPAR AEROSPACE Ltd
 Mechanical Assembly EBCO AEROSPACE INDUSTRIES Inc
 Mechanical Fabrication W. R. DAVIS ENGINEERING Ltd
 Mechanical Fuel System LUCAS INDUSTRIES CANADA Ltd
 Mechanical Mounts HAMMOND MANUFACTURING COMPANY Ltd
 Mechanical Systems AASTRA AEROSPACE Inc
 Mechanical Testing WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT
 Medical Biophysics WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT
 Medical Equipment (Cases) ZARGES AFC CANADA Ltd
 Medical Evacuation AIRTECH CANADA (371892 Ontario Ltd)
 Medium Power Amplifiers MA ELECTRONICS CANADA Ltd
 Memory TARGA ELECTRONICS SYSTEMS Inc
 Memory Devices CALMOS SYSTEMS Inc
 Merger & Acquisition INTERCON CONSULTANTS
 Message Systems NORTHERN TELECOM CANADA Ltd
 Metal Coatings CAMETOID Ltd
 Metal Coatings VAC-AERO INTERNATIONAL Inc
 Metal Detection BARRINGER RESEARCH Ltd
 Metal Finishing CAMETOID Ltd
 Metal Plating ROLLS-ROYCE (CANADA) Ltd
 Metal Powders SHERRITT GORDON MINES Ltd
 Metallography WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT
 Metallurgy COMINCO Ltd
 Metallurgy WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT
 Metals TIMMINCO Ltd
 Metalworking AVCORP INDUSTRIES Inc
 Metalworking BRISTOL AEROSPACE Ltd
 Metalworking CANADAIR Inc
 Metalworking EBCO AEROSPACE INDUSTRIES Inc
 Metalworking HAWKER SIDDELEY CANADA Inc
 Metalworking McDONNELL DOUGLAS CANADA Ltd
 Meteorological APPLIED MICROSYSTEMS Ltd
 Instruments
 Meteorological Satellite MACDONALD DETTWILER
 Processing
 Meteorological Stations PELORUS NAVIGATION SYSTEMS Inc
 Meteorological Stations/Equipment BRISTOL AEROSPACE Ltd

KEYWORD**COMPANY**

Meteorology MYRIAS RESEARCH Corp
 Metrology QUANTUM INSPECTION AND TESTING Ltd
 MIC Design & Production TELEMUS ELECTRONIC SYSTEMS Inc
 Microbiology ALBERTA RESEARCH COUNCIL
 Microcircuits CANADIAN MARCONI COMPANY
 Microcircuits (Thick & Thin Film) CAD/CAM GRAPHICS Ltd
 Microcomputer RE: ACTION MARKETING SERVICES Ltd
 Programming LAVALIN Inc
 Microcomputers TRACKER INDUSTRIES Ltd
 Microcomputers COM DEV Ltd
 Microelectronics HONEYWELL Ltd (Defense & Systems Research)
 Microelectronics NORTHERN TELECOM CANADA Ltd
 Microgravity COMINCO Ltd
 Microgravity Equipment WARDROP ENGINEERING Inc
 Microprocessor Control DOWTY CANADA Ltd
 Units
 Microprocessors BARON COMMUNICATIONS Ltd
 Microprocessors CALMOS SYSTEMS Inc
 Microprocessors CANADIAN ASTRONAUTICS Ltd
 Microprocessors EPIC DATA Inc
 Microprocessors SCI-TEC INSTRUMENTS Inc
 Microwave INTERNATIONAL DATACASTING CORPORATION
 Microwave Amplifiers MA ELECTRONICS CANADA Ltd
 Microwave Components BOLRIET TECHNOLOGIES Inc
 Microwave Components MA ELECTRONICS CANADA Ltd
 Microwave Filters MA ELECTRONICS CANADA Ltd
 Microwave Instruments MPB TECHNOLOGIES Inc
 Microwave Landing Systems See MLS
 Microwave Packaging BOLRIET TECHNOLOGIES Inc
 Microwave Prescalers TELEMUS ELECTRONIC SYSTEMS Inc
 Microwave Printed Circuits BOLRIET TECHNOLOGIES Inc
 Microwave Products and Systems NORTHERN TELECOM CANADA Ltd
 Microwave Subassemblies MA ELECTRONICS CANADA Ltd
 Microwave Substrates BOLRIET TECHNOLOGIES Inc
 Microwave Subsystems COM DEV Ltd
 Microwave Systems BARON COMMUNICATIONS Ltd
 Microwave CANAC TELECOM
 Telecommunications DEW ENGINEERING AND DEVELOPMENT Ltd
 Military Pattern Trailers LAVALIN Inc
 Military Trucks W. R. DAVIS ENGINEERING Ltd
 Military Vehicle Engineering DEW ENGINEERING AND DEVELOPMENT Ltd
 Military Vehicle Kits (Special) BOLRIET TECHNOLOGIES Inc
 Millimeter Wave Components VARIAN CANADA Inc
 Millimeter Wave Subsystems
 Millimeter Wave Systems COM DEV Ltd
 Milling DIEMASTER TOOL Inc
 Mine Clearance System GENERAL MOTORS OF CANADA Ltd
 Kit FAG BEARINGS Ltd
 Miniature Bearings ULTRA LASERTECH Inc
 Mirror Mounts BACHAN AEROSPACE OF CANADA Ltd
 Missile Components GARRETT CANADA
 Missile Control Systems AERO MACHINING Ltd
 Missile Parts CANADIAN MARCONI COMPANY
 MLS MICRONAV Ltd
 MLS PELORUS NAVIGATION SYSTEMS Inc
 MLS INDAL TECHNOLOGIES Inc
 MLS Structures

KEYWORD	COMPANY	KEYWORD	COMPANY
MMICs	OPTOTEK Ltd	Navigation Systems	HONEYWELL Ltd (Defense & Systems Research)
Mobile	ATC LNS SYSTEMS Inc	Navigation Systems	PELORUS NAVIGATION SYSTEMS Inc
Mobile Control Heads	BARON COMMUNICATIONS Ltd	Navigation Aids	AVIATION PLANNING SERVICES Ltd
Mobile Control Towers	(ATS) AERONAUTICAL TRAINING SYSTEMS	Navstar GPS	CANADIAN MARCONI COMPANY
Mobile Electronic Warfare Support Syst	GENERAL MOTORS OF CANADA Ltd	NBC Decontamination Systems	DEW ENGINEERING AND DEVELOPMENT Ltd
Mobile Radios	SPILSBURY COMMUNICATIONS Ltd	NC Programming	ICAM TECHNOLOGIES Corp
Modelling Mapping (3-D)	RDS ENGINEERING	Needs Analysis	TELECONSULT Ltd
Modems	FOUNDATION INSTRUMENTS Inc	Network Management	LAVALIN Inc
Modems	MILLER COMMUNICATIONS SYSTEMS Ltd	Network Management Systems	AIT ADVANCED INFORMATION TECHNOLOGIES
Modems	SKYWAVE ELECTRONICS Ltd	Networks	IDACOM ELECTRONICS Ltd
Modification (Aircraft)	AIRTECH CANADA (371892 Ontario Ltd)	Neutron Activation	WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT
Modification (Aircraft)	AVCORP INDUSTRIES Inc	New Product Development	AVIATION PLANNING SERVICES Ltd
Modification (Aircraft)	CANADIAN AIRCRAFT PRODUCTS Ltd	Nickel	SHERRITT GORDON MINES Ltd
Modification (Aircraft)	CONAIR AVIATION Ltd	Nickel Coinage	SHERRITT GORDON MINES Ltd
Modification (Aircraft)	FIELD AVIATION COMPANY Ltd	Nickel Powders	SHERRITT GORDON MINES Ltd
Modification (Aircraft)	I.M.P. GROUP Ltd	Nickel Strip	SHERRITT GORDON MINES Ltd
Modification (Aircraft)	INNOTECH AVIATION ENTERPRISES Ltd	Night Vision	BENDIX AVELEX Inc
Modification (Aircraft/Avionics)	NAVAIR Limited	Nitrocellulose	EXPRO CHEMICAL PRODUCTS Inc
Modification (Helicopters)	BOEING OF CANADA Ltd (Arnprior Div)	Nitrogen Lasers	PRA LASER Inc
Modifications (Analysis)	CARR-SAWYER Inc	Non-Destructive Testing	AVCORP INDUSTRIES Inc
Modular Clean Rooms	ROBERT MITCHELL Inc	Non-Destructive Testing	BRISTOL AEROSPACE Ltd
Modular Design	EPIC DATA Inc	Non-Destructive Testing	CANADA FORGINGS Inc
Modular Design	NATIONAL ENGINEERING & SCIENCE ASSOC	Non-Destructive Testing	DECADE INDUSTRIES
Modular Practice Bomb	VICTRIX Ltd	Non-Destructive Testing	DONLEE PRECISION
Module Design	PRIOR DATA SCIENCES Ltd	Non-Destructive Testing	FIELD AVIATION COMPANY Ltd
Moisture Content	FOUNDATION INSTRUMENTS Inc	Non-Destructive Testing	I.M.P. GROUP Ltd
Monitor	IDACOM ELECTRONICS Ltd	Non-Destructive Testing	INNOTECH AVIATION ENTERPRISES Ltd
Monitoring (Microprocessors-Based)	PYLON ELECTRONIC DEVELOPMENT CO Ltd	Non-Destructive Testing	NORTHWEST INDUSTRIES Ltd
Monitors (Gas)	THE ARMSTRONG MONITORING Corp	Non-Destructive Testing	ONTARIO HYDRO
Monocycle Generators	AVTECH ELECTROSYSTEMS Ltd	Non-Destructive Testing	QUANTUM INSPECTION AND TESTING Ltd
Monomers	RAYLO CHEMICALS	Non-Destructive Testing	ROLLS-ROYCE (CANADA) Ltd
Mortar Vehicle	GENERAL MOTORS OF CANADA Ltd	Non-Destructive Testing	WESTERN PROPELLER COMPANY Ltd
Motions Compensation	DOWTY CANADA Ltd	Non-Directional Beacon	WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT
Motor Speed Control	CASEY COPTER ACCESSORIES Ltd	Non-Directional Beacon Systems	MICRONAV Ltd
Multi-Layer Coatings	CAMETOID Ltd	Non-Ferrous Castings	SPILSBURY COMMUNICATIONS Ltd
Multi-Layered Board Assemblies	UNISYS CANADA Inc	Non-Ferrous Metals	EASTERN PRECISION CASTING Inc
Multi-Port	IDACOM ELECTRONICS Ltd	Non-Routine Analysis	TIMMINCO Ltd
Multicolor LED Displays	OPTOTEK Ltd	Nozzles	RAYLO CHEMICALS
Multiplexer	CANADIAN MARCONI COMPANY	Nuclear	3-L FILTERS Ltd
Multiplexers	HONEYWELL Ltd (Sperry Aerospace Div)	Nuclear Engineering	ATOMIC ENERGY OF CANADA Ltd
Multiplexers	MA ELECTRONICS CANADA Ltd	Nuclear Engineering	ONTARIO HYDRO
Munitions	THE SNC GROUP	Nuclear Industry (Machining)	WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT
Nanosecond Devices	AVTECH ELECTROSYSTEMS Ltd	Nuclear Instrumentation	CAMPAGNA ENGINEERING Inc
Naval Combat Systems	PARAMAX ELECTRONICS Inc	Nuclear Reactor Components	PYLON ELECTRONIC DEVELOPMENT CO Ltd
Navigation	BENDIX AVELEX Inc	Nuclear Reactor Components	BRISTOL AEROSPACE Ltd
Navigation	BOEING OF CANADA (de Havilland Div)	Nuclear Repair Equipment	HAWKER SIDDELEY CANADA Inc
Navigation	CANADIAN ASTRONAUTICS Ltd	Nuclear Simulation	VADEKO INTERNATIONAL Inc
Navigation	CANADIAN MARCONI COMPANY	Nuclear Waste Management	CAE INDUSTRIES Ltd
Navigation	COMPUTING DEVICES COMPANY	Nuclear Waste Management	ONTARIO HYDRO
Navigation	LITTON SYSTEMS CANADA Ltd	Numerical Modelling	WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT
Navigation	NORSTAR INSTRUMENTS Ltd	O&M	ALBERTA RESEARCH COUNCIL
Navigation Aids	SPILSBURY COMMUNICATIONS Ltd	O&M (Telecommunications)	FRONTEC LOGISTICS Corp
Navigation Aids	CANADIAN MARCONI COMPANY	O&M Planning	CANAC TELECOM
Navigation Software	SPILSBURY COMMUNICATIONS Ltd	Oceanographic Instrumentation	WARDROP ENGINEERING Inc
Navigation Systems	INTERNATIONAL DATACASTING CORPORATION		APPLIED MICROSYSTEMS Ltd
	BENDIX AVELEX Inc		

KEYWORD**COMPANY**

Off-Line Programming
Office Automation
Offsets
Oil Filling

Oil Sands
Oil Spill Control
Oil Vacuum Processing

Omega Navigation Systems
Operability Prototype
Operational Analysis

Operational Studies

Operations & Maintenance
Operations Manuals

Optical Character Recognition
Optical Coatings
Optical Coatings
Optical Communications
Optical Communications
Optical Disk
Optical Inspection
Optical Instruments
Optical Monitors
Optical Research & Development
Optical Switches
Optical Systems
Optics
Optics
Optics
Optics Infrared
Optics Visual
Optoacoustic Trace Gas Analyzer
Optomechanical Precision Assemblies
Orange Smoke
Ordnance
Ordnance
Ordnance Detectors
Ordnance Inspection Equipment
Organic Materials Research
Out-of-Window Displays
Overhaul
PABX Systems

Packaging (Custom)
Painting (Aircraft)

Painting (Aircraft)
Painting (Aircraft)

Parallel Processing
Parallel Processing
Parts (Aircraft)

Passive Sonobuoys
Patterns
Payload Design
Payload Test Services
PC Board Design & Fabrication
PC Board Design & Fabrication
PC Board Design & Fabrication
PC Board Design & Fabrication
PC Board Design & Fabrication

VADEKO INTERNATIONAL Inc
LAVALIN Inc
INTERCON CONSULTANTS
HAMMOND MANUFACTURING COMPANY Ltd
ALBERTA RESEARCH COUNCIL
CONAIR AVIATION Ltd
HAMMOND MANUFACTURING COMPANY Ltd
CANADIAN MARCONI COMPANY

VIRTUAL PROTOTYPES Inc
THOMSON-CSF SYSTEMS CANADA Inc (TCSC)
AVIATION PLANNING SERVICES Ltd
See O&M

RE: ACTION MARKETING SERVICES Ltd
AIT ADVANCED INFORMATION TECHNOLOGIES
CAMEOID Ltd
ERNST LEITZ CANADA Ltd
FOUNDATION INSTRUMENTS Inc
OPTO-ELECTRONICS Inc
KOM Inc
VADEKO INTERNATIONAL Inc
MPB TECHNOLOGIES Inc
VADEKO INTERNATIONAL Inc
ERNST LEITZ CANADA Ltd

OPTO-ELECTRONICS Inc
ALBERTA LASER INSTITUTE
ATOMIC ENERGY OF CANADA Ltd
DIFFRACTO Ltd
VORTEK INDUSTRIES Ltd
ERNST LEITZ CANADA Ltd
ERNST LEITZ CANADA Ltd
ULTRA LASERTECH Inc
ERNST LEITZ CANADA Ltd

HANDS FIREWORKS Inc
HANDS FIREWORKS Inc
IVI Inc
SCINTREX Ltd
DIFFRACTO Ltd

ONTARIO HYDRO

VIRTUAL PROTOTYPES Inc
See R&O
GEC PLESSEY TELECOMMUNICATIONS
ZARGES AFC CANADA Ltd
BOEING OF CANADA Ltd (Arnprior Div)
I.M.P. GROUP Ltd
INNOTECH AVIATION ENTERPRISES Ltd
MYRIAS RESEARCH Corp
TRIDEX SYSTEMS Inc
PATLON AIRCRAFT & INDUSTRIES Ltd
SPARTON OF CANADA Ltd
ROBERT MITCHELL Inc
SED SYSTEMS Inc
SED SYSTEMS Inc
CAD/CAM GRAPHICS Ltd

CAE INDUSTRIES Ltd

CANADIAN MARCONI COMPANY
CANUTEL INDUSTRIES Ltd

KEYWORD**COMPANY**

PC Board Design & Fabrication
PC Board Design & Fabrication
PC Board Design & Fabrication
PC Board Design & Fabrication
PC Emulators
PCB Fabrication

Performance Evaluation
Performance Measuring Devices
Performance Measuring Devices
Peripheral Equipment

Peripheral Mass Storage

Peripheral Vision Display
Peripherals
Personnel Carrier

Personnel
Survival/Restraint
Phase Shifters
Phased Array
Phased Array Radar
Photoacoustics
Photocatalyst

Photodetectors
Photogrammetry
Photogrammetry

Photography
Photoplatting
Physical Chemistry
Physics

Pilot Training (RPV)
Pin Diode Switches
Pipe & Fittings
Pipeline Control Components
Planar Array
Planar Circuits
Planning

Plasma Spray Coating
Plastic Extrusion
Plastic Fabrication
Plastic Fabrication
Plastic Fabrication
Plastic Molding
Plastic Molding
Plastic Molding
Plastics
Plastics Parts
Plate & Sheet Metal Fabrication
Plating
Plenum Cable

Plotting Package (Postprocessed)
Pollution
Pollution Control
Pollution Detection
Pollution Monitoring Equipment
Polymer Chemistry
Polypropylene Wet Stations
Porous Titania Glass

DEVTEK CORPORATION
GARRETT CANADA
MICROTEL Ltd
UNISYS CANADA Inc
UNISYS CANADA Inc
DOWTY CANADA ELECTRONICS Ltd
VIRTUAL PROTOTYPES Inc
BOEING OF CANADA (de Havilland Div)
COMPUTING DEVICES COMPANY
GEC PLESSEY TELECOMMUNICATIONS
TARGA ELECTRONICS SYSTEMS Inc
GARRETT CANADA
CALMOS SYSTEMS Inc
GENERAL MOTORS OF CANADA Ltd
BOEING OF CANADA (de Havilland Div)
BOLRIET TECHNOLOGIES Inc
CANADIAN ASTRONAUTICS Ltd
BOLRIET TECHNOLOGIES Inc
ULTRA LASERTECH Inc
INRAD INDUSTRIAL RESEARCH & DEVELOPMENT
OPTO-ELECTRONICS Inc
CANADIAN MARCONI COMPANY
ROBERTSON PHOTOGRAMMETRIC Inc
ERNST LEITZ CANADA Ltd
CANADIAN MARCONI COMPANY
RAYLO CHEMICALS
WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT
TARGETAIR Ltd
MA ELECTRONICS CANADA Ltd
ROBERT MITCHELL Inc
AVCORP INDUSTRIES Inc

CANADIAN ASTRONAUTICS Ltd
BOLRIET TECHNOLOGIES Inc
HOWLAND RUSSELL CONSULTANTS Ltd
VAC-AERO INTERNATIONAL Inc
FLEXIBULB (1983) Inc
AVCORP INDUSTRIES Inc
PLASTAL Inc
VICTRIX Ltd
AVCORP INDUSTRIES Inc
MICROTEL Ltd
PLASTAL Inc
CIBA-GEIGY CANADA Ltd
FLEXIBULB (1983) Inc
INVAR MANUFACTURING Ltd

HAWKER SIDDELEY CANADA Inc
HARBOUR INDUSTRIES (Canada) Ltd
ICAM TECHNOLOGIES Corp

QUESTOR SURVEYS Ltd
ONTARIO HYDRO
ULTRA LASERTECH Inc
THE ARMSTRONG MONITORING Corp
RAYLO CHEMICALS
ROBERT MITCHELL Inc

INRAD INDUSTRIAL RESEARCH & DEVELOPMENT

KEYWORD	COMPANY	KEYWORD	COMPANY
Portable Antenna Masts (Surface)	VICTRIX Ltd	Precision Parts	ALBERTA LASER INSTITUTE
Portable Heaters	AEROTECH INTERNATIONAL Inc	Precision Parts	CHICOPEE MANUFACTURING Ltd
Portable Power Supplies	GLOBAL THERMOELECTRIC POWER SYSTEMS	Precision Sand Castings	HALEY INDUSTRIES Ltd
Portable Shielded Rooms	NATIONAL ENGINEERING & SCIENCE ASSOC	Precision Tooling	AVCORP INDUSTRIES Inc
Portable Terminals	EPIC DATA Inc	Precision Tooling	DECADE INDUSTRIES
Postprocessor (Multi-Axis)	ICAM TECHNOLOGIES Corp	Predictive Maintenance	SENSYS
Powder Metallurgy	SHERRITT GORDON MINES Ltd	Premium Quality Sand Castings	HALEY INDUSTRIES Ltd
Power Amplifiers	VARIAN CANADA Inc	Presentations	BRUCE D. VALLILLEE ELECTRONICS Ltd
Power Converters	CANADIAN ASTRONAUTICS Ltd	Pressure Piping	ROBERT MITCHELL Inc
Power Dividers	BOLRIET TECHNOLOGIES Inc	Pressure Vessel Filters	3-L FILTERS Ltd
Power Generators	FRONTEC LOGISTICS Corp	Pressure Vessels	ROBERT MITCHELL Inc
Power Klystrons	VARIAN CANADA Inc	Primary Surveillance Radar	RAYTHEON CANADA Ltd
Power Measurement	FOUNDATION INSTRUMENTS Inc	Prime Power Generating Equipment	CARR-TECH SERVICES Ltd
Power Sources	GLOBAL THERMOELECTRIC POWER SYSTEMS	Printed Circuit Board	See PC Board
Power Splitters	AVTECH ELECTROSYSTEMS Ltd	Printheads (LED)	OPTOTEK Ltd
Power Supplies	CANADIAN MARCONI COMPANY	Printing	RE: ACTION MARKETING SERVICES Ltd
Power Supplies	CHAMP-ARMSTRONG COMMUNICATIONS Inc	Process Control	ATOMIC ENERGY OF CANADA Ltd
Power Supplies	GARRETT CANADA	Process Control	LAVALIN Inc
Power Supplies	SANDERS CANADA Inc	Process Development	RAYLO CHEMICALS
Power Supplies	SPARTON OF CANADA Ltd	Processing (EW)	INTERACTIVE CIRCUITS & SYSTEMS Ltd
Power Supplies	ULTRA LASERTECH Inc	Processing (Radar)	INTERACTIVE CIRCUITS & SYSTEMS Ltd
Power Supplies	UNISYS CANADA Inc	Processing (Sensor)	INTERACTIVE CIRCUITS & SYSTEMS Ltd
Power Supply Monitors	VARIAN CANADA Inc	Processing (Signal)	INTERACTIVE CIRCUITS & SYSTEMS Ltd
Power Systems	CALMOS SYSTEMS Inc	Processing (Sonar)	INTERACTIVE CIRCUITS & SYSTEMS Ltd
Practice Bomb	ONTARIO HYDRO	Procurement (Courses)	CONTRACTING ADVISORY SERVICES Inc
Practice Bomb Signal Cartridges	VICTRIX Ltd	Procurement Advice	PAI-PUBLIC AFFAIRS INTERNATIONAL
Pre-Wired Board Assemblies	HANDS FIREWORKS Inc	Product Characterization	RAYLO CHEMICALS
Precision Approach Radar	UNISYS CANADA Inc	Product Development	CAMPAGNA ENGINEERING Inc
Precision Approach System	RAYTHEON CANADA Ltd	Product Development	NOVA SCOTIA RESEARCH FOUNDATION Corp
Precision Assembly	MICRONAV Ltd	Product Development	W. R. DAVIS ENGINEERING Ltd
Precision Bearings	CAMPAGNA ENGINEERING Inc	Product Surveillance	QUANTUM INSPECTION AND TESTING Ltd
Precision Electromechanical Devices	FAG BEARINGS Ltd	Program Management	AIT ADVANCED INFORMATION TECHNOLOGIES
Precision Engraving	NOVATRONICS OF CANADA Ltd	Program Management	M.E.L. DEFENCE SYSTEMS Ltd
Precision Machining	INRAD INDUSTRIAL RESEARCH & DEVELOPMENT	Program Management	PARAMAX ELECTRONICS Inc
Precision Machining	AERO MACHINING Ltd	Program Management	PRIOR DATA SCIENCES Ltd
Precision Machining	BACHAN AEROSPACE OF CANADA Ltd	Program Management	SED SYSTEMS Inc
Precision Machining	BENDIX AVELEX Inc	Program Management	SPIECE ASSOCIATES
Precision Machining	BOEING OF CANADA Ltd (Arnprior Div)	Program Management	TELECONSULT Ltd
Precision Machining	CAMPAGNA ENGINEERING Inc	Program Management	THE AMTEK GROUP
Precision Machining	CANADIAN MARCONI COMPANY	Program Management	THE ONTARIO AEROSPACE CONSORTIUM Inc
Precision Machining	CHICOPEE MANUFACTURING Ltd	Program Management	THOMSON-CSF SYSTEMS CANADA Inc (TCSC)
Precision Machining	DIEMASTER TOOL Inc	Programming	INTERNATIONAL AIRBORNE SYSTEMS Ltd
Precision Machining	EBCO AEROSPACE INDUSTRIES Inc	Programming (CNC/NC)	ICAM TECHNOLOGIES Corp
Precision Machining	INRAD INDUSTRIAL RESEARCH & DEVELOPMENT	Project Management	HOWLAND RUSSELL CONSULTANTS Ltd
Precision Machining	INVAR MANUFACTURING Ltd	Project Management	RDS ENGINEERING
Precision Machining	J.J. CHARLTON COMPANY Ltd	Project Management	THE SNC GROUP
Precision Machining	KOSS MACHINE & TOOL CO	Project Management	W. R. DAVIS ENGINEERING Ltd
Precision Machining	MONTREAL PRECISION CRAFTING Ltd	Project Management	WARDROP ENGINEERING Inc
Precision Machining	PRECI SYSTEMS INTERNATIONAL Inc	Project Scheduling	RDS ENGINEERING
Precision Machining	PRICE & KNOTT MANUFACTURING CO Ltd	Projected Map Displays	COMPUTING DEVICES COMPANY
Precision Machining	STEVESD MACHINERY & ENGINEERING Ltd	Propellants	EXPRO CHEMICAL PRODUCTS Inc
Precision Machining	STRITE INDUSTRIES Ltd	Proposal Writing	HOWLAND RUSSELL CONSULTANTS Ltd
Precision Machining	THE ONTARIO AEROSPACE CONSORTIUM Inc	Protective Coatings	CAMETOID Ltd
Precision Machining	TW MANUFACTURING Inc	Protocol	IDACOM ELECTRONICS Ltd
Precision Machining	UDT INDUSTRIES Inc	Prototyping	W. R. DAVIS ENGINEERING Ltd
Precision Measurement	DIFFRACTO Ltd	Prototyping	WARDROP ENGINEERING Inc
Precision Measurement	QUANTUM INSPECTION AND TESTING Ltd	Prototyping (Rapid)	VIRTUAL PROTOTYPES Inc

KEYWORD**COMPANY**

Public Relations RE: ACTION MARKETING SERVICES Ltd
 Publication Service BOEING OF CANADA Ltd (Arnprior Div)
 Pulp & Paper Instruments ROBERT MITCHELL Inc
 Pulse Amplifiers AVTECH ELECTROSYSTEMS Ltd
 Pulse Generators AVTECH ELECTROSYSTEMS Ltd
 Pulsed Gas Lasers LUMONICS Inc
 Pulsers VARIAN CANADA Inc
 Pyrotechnics HANDS FIREWORKS Inc
 Pyrotechnics VICTRIX Ltd
 QPL Listed Wire HARBOUR INDUSTRIES (Canada) Ltd
 Qualified Test Facility MURATA ERIE NORTH AMERICA Ltd
 Quality Assurance CALIAN TECHNOLOGY Ltd
 Quality Assurance LAVALIN Inc
 Quality Assurance QUANTUM INSPECTION AND TESTING Ltd
 Quality Assurance RDS ENGINEERING
 Quality Assurance WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT ALBERTA LASER INSTITUTE
 Quality Assurance Instrumentation BRUCE D. VALLILLEE ELECTRONICS Ltd
 Quality Assurance Programs MYRIAS RESEARCH Corp
 Quantum Chemical Modelling CROVEN CRYSTALS Ltd
 Quartz Crystals LEAVENS AVIATION Inc
 R&O (Accessories) LUCAS INDUSTRIES CANADA Ltd
 R&O (Accessories) AIRCRAFT APPLIANCES AND EQUIPMENT Ltd
 R&O (Aircraft Components) AVCORP INDUSTRIES Inc
 R&O (Aircraft Components) CANADIAN AIRCRAFT PRODUCTS Ltd
 R&O (Aircraft Components) ENHEAT Inc
 R&O (Aircraft) AIRTECH CANADA (371892 Ontario Ltd)
 R&O (Aircraft) BOEING OF CANADA (de Havilland Div)
 R&O (Aircraft) BOEING OF CANADA Ltd (Arnprior Div)
 R&O (Aircraft) BRISTOL AEROSPACE Ltd
 R&O (Aircraft) CONAIR AVIATION Ltd
 R&O (Aircraft) FIELD AVIATION COMPANY Ltd
 R&O (Aircraft) I.M.P. GROUP Ltd
 R&O (Aircraft) INNOTECH AVIATION ENTERPRISES Ltd
 R&O (Aircraft) NORTHWEST INDUSTRIES Ltd
 R&O (Aircraft) SPAR AEROSPACE Ltd
 R&O (Aircraft) WESTERN AEROSPACE TECHNOLOGY Ltd
 R&O (Avionics) AIRCRAFT APPLIANCES AND EQUIPMENT Ltd
 R&O (Avionics) BENDIX AVELEX Inc
 R&O (Avionics) CAE INDUSTRIES Ltd
 R&O (Avionics) CANADIAN MARCONI COMPANY
 R&O (Avionics) GARRETT CANADA
 R&O (Avionics) GENELCOM Ltd
 R&O (Avionics) HONEYWELL Ltd (Defense & Systems Research)
 R&O (Avionics) HONEYWELL Ltd (Sperry Aerospace Div)
 R&O (Avionics) LEIGH INSTRUMENTS Ltd
 R&O (Avionics) LITTON SYSTEMS CANADA Ltd
 R&O (Avionics) NAVAIR Ltd
 R&O (Avionics) NORTHWEST INDUSTRIES Ltd
 R&O (Avionics) SANDERS CANADA Inc
 R&O (Avionics) SPAR AEROSPACE Ltd
 R&O (Coatings) CAMETOID Ltd
 R&O (Components) BENDIX AVELEX Inc
 R&O (Components) BOEING OF CANADA Ltd (Arnprior Div)
 R&O (Components) GENELCOM Ltd

KEYWORD**COMPANY**

R&O (Components) PRECI SYSTEMS INTERNATIONAL Inc
 R&O (Components) SPECIALIZED WELDING & FABRICATION Ltd
 R&O (Components) THE ONTARIO AEROSPACE CONSORTIUM Inc
 R&O (Electronics) GENELCOM Ltd
 R&O (Electronics) MILLER COMMUNICATIONS SYSTEMS Ltd
 R&O (Engine Components) VAC-AERO INTERNATIONAL Inc
 R&O (Engine Test Facilities) MDS AERO SUPPORT CORPORATION
 R&O (Engines) AVCORP INDUSTRIES Inc
 R&O (Engines) BRISTOL AEROSPACE Ltd
 R&O (Engines) HAWKER SIDDELEY CANADA Inc
 R&O (Engines) LEAVENS AVIATION Inc
 R&O (Engines) PRATT & WHITNEY CANADA Ltd
 R&O (Engines) ROLLS-ROYCE (CANADA) Ltd
 R&O (Engines) STANDARD AERO Ltd
 R&O (Envionics) THE ARMSTRONG MONITORING Corp
 R&O (Equipment) AVCORP INDUSTRIES Inc
 R&O (Equipment) DECADE INDUSTRIES
 R&O (Ground Power) AIRCRAFT APPLIANCES AND EQUIPMENT Ltd
 R&O (Helicopters) BOEING OF CANADA Ltd (Arnprior Div)
 R&O (Helicopters) BRISTOL AEROSPACE Ltd
 R&O (Helicopters) I.M.P. GROUP Ltd
 R&O (Helicopters) INNOTECH AVIATION ENTERPRISES Ltd
 R&O (Helicopters) MBB HELICOPTER CANADA Ltd
 R&O (Hydraulics) CARR-TECH SERVICES Ltd
 R&O (Hydraulics) HEROUX Inc
 R&O (Instruments) SIMMONDS PRECISION CANADA Ltd
 R&O (Landing Gears) HEROUX Inc
 R&O (Lifejackets) TUL SAFETY EQUIPMENT Ltd
 R&O (Parts) KAYCOM Inc
 R&O (Propellers) LEAVENS AVIATION Inc
 R&O (Propellers) WESTERN PROPELLER COMPANY Ltd
 R&O (Radar) HONEYWELL Ltd (Sperry Aerospace Div)
 R&O (Rafts) TUL SAFETY EQUIPMENT Ltd
 R&O (Refueling Systems) 3-L FILTERS Ltd
 R&O (RPV) TARGETAIR Ltd
 R&O (Small Arms) DEVTEK CORPORATION
 Rad-Hardened Microprocessors CANADIAN ASTRONAUTICS Ltd
 Radar ADGA GROUP
 Radar BENDIX AVELEX Inc
 Radar CAE INDUSTRIES Ltd
 Radar CANADIAN ASTRONAUTICS Ltd
 Radar CANADIAN MARCONI COMPANY
 Radar COM DEV Ltd
 Radar COMPUTING DEVICES COMPANY
 Radar FOUNDATION INSTRUMENTS Inc
 Radar INDAL TECHNOLOGIES Inc
 Radar LITTON SYSTEMS CANADA Ltd
 Radar MILLER COMMUNICATIONS SYSTEMS Ltd
 Radar MPB TECHNOLOGIES Inc
 Radar PRIOR DATA SCIENCES Ltd
 Radar RAYTHEON CANADA Ltd
 Radar (Laser) OPTECH Inc
 Radar (Space) AASTRA AEROSPACE Inc
 Radar Antennas FLEET INDUSTRIES
 Radar Augmentation (ATS) AERONAUTICAL TRAINING SYSTEMS
 Radar Data Processing RAYTHEON CANADA Ltd
 Radar Drives BACHAN AEROSPACE OF CANADA Ltd
 Radar Navigation Aids ANDREW ANTENNA COMPANY Ltd
 Radar Processing DY-4 SYSTEMS Inc
 Radar Processing TRIDEX SYSTEMS Inc

KEYWORD	COMPANY	KEYWORD	COMPANY
Radar Reflectors	INDAL TECHNOLOGIES Inc	Refueling Hose	3-L FILTERS Ltd
Radar Signature Analysis	AIT ADVANCED INFORMATION TECHNOLOGIES	Refueling Systems	3-L FILTERS Ltd
Radar Signature Analysis	TELEMUS ELECTRONIC SYSTEMS Inc	Regulators (Hi/Lo Voltage)	GARRETT CANADA
Radar Simulation	CAE INDUSTRIES Ltd	Relational Processors	DY-4 SYSTEMS Inc
Radar Systems Analysis	AIT ADVANCED INFORMATION TECHNOLOGIES	Relays	MICROTEL Ltd
Radar Weather Radiation	ANDREW ANTENNA COMPANY Ltd WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT	Reliability Analysis	WARDROP ENGINEERING Inc
Radiation Hard Radiation Monitoring Systems	RAM CALMOS SYSTEMS Inc	Reliability Engineering	CALIAN TECHNOLOGY Ltd
Radiation Resistant Wire	SCINTREX Ltd	Remote Control Systems	SCI-TEC INSTRUMENTS Inc
Radiation Shielding	HARBOUR INDUSTRIES (Canada) Ltd WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT	Remote Gas Detection	BARRINGER RESEARCH Ltd
Radio Ancillaries	CANADIAN MARCONI COMPANY	Remote Handling	WARDROP ENGINEERING Inc
Radio Communication Gear	GARRETT CANADA	Remote Inspection Systems	BRISTOL AEROSPACE Ltd
Radio Communications	ADGA GROUP	Remote Manipulator Systems	SPAR AEROSPACE Ltd
Radio Communications	CANADIAN MARCONI COMPANY	Remote Operations	FRONTEC LOGISTICS Corp
Radio Communications	MILLER COMMUNICATIONS SYSTEMS Ltd	Remote Power Supplies	GLOBAL THERMOELECTRIC POWER SYSTEMS
Radio Wire Integrator	CANADIAN MARCONI COMPANY	Remote Sensing	AASTRA AEROSPACE Inc
Radio/Radar Altimeters	ATLANTIS AEROSPACE Corp	Remote Sensing	AIT ADVANCED INFORMATION TECHNOLOGIES
Radioactive Gas Generators	PYLON ELECTRONIC DEVELOPMENT CO Ltd	Remote Sensing	BARRINGER RESEARCH Ltd
Radioactive Waste Containment	AVCORP INDUSTRIES Inc	Remote Sensing	CANADIAN ASTRONAUTICS Ltd
Radioactive Wastes	WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT	Remote Sensing	ERNST LEITZ CANADA Ltd
Radiographic Penetrant Inspection	SPECIALIZED WELDING & FABRICATION Ltd	Remote Sensing	ITRES RESEARCH Ltd
Radiotelephone Equipment	SPILSBURY COMMUNICATIONS Ltd	Remote Sensing	LAVALIN Inc
Radomes	BOLRIET TECHNOLOGIES Inc	Remote Sensing	MACDONALD DETTWILER
Radomes	INDAL TECHNOLOGIES Inc	Remote Sensing	OPTECH Inc
Rafts	TUL SAFETY EQUIPMENT Ltd	Remote Sensing	QUESTOR SURVEYS Ltd
Rail Transport	WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT	Remote Sensing	SCI-TEC INSTRUMENTS Inc
Railway Fittings	ROBERT MITCHELL Inc	Remote Sensing	SCINTREX Ltd
Range Finder	OPTECH Inc	Remote Sensing	SPAR AEROSPACE Ltd
Rapid Prototyping	VIRTUAL PROTOTYPES Inc	Remotely Piloted Vehicle	THE BERCHA GROUP
Rare Earth Magnets	INRAD INDUSTRIAL RESEARCH & DEVELOPMENT	Removable Media Mass Storage Systems	See RPV
Rare Earth Magnets	SHERRITT GORDON MINES Ltd	Repair & Overhaul	TARGA ELECTRONICS SYSTEMS Inc
RDX	EXPRO CHEMICAL PRODUCTS Inc	Repair Capability	See R&O
Re-Engining (DHC-2 & 3)	AIRTECH CANADA (371892 Ontario Ltd)	Machining	EBCO AEROSPACE INDUSTRIES Inc
Reactors	ROBERT MITCHELL Inc	Repair Equipment	NORTHERN TELECOM CANADA Ltd
Reactors	WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT	Services	RE: ACTION MARKETING SERVICES Ltd
Real Time Control Systems	CAE INDUSTRIES Ltd	Reports	PRIOR DATA SCIENCES Ltd
Real Time Data Acquisition	SPECTRUM SIGNAL PROCESSING Inc	Requirements Analysis	SEI INDUSTRIES Ltd
Real Time Graphics	CAE INDUSTRIES Ltd	Rescue Equipment	MYRIAS RESEARCH Corp
Real Time Monitor Systems	CAE INDUSTRIES Ltd	Reservoir Modelling	NOVATRONICS OF CANADA Ltd
Reboilers	ROBERT MITCHELL Inc	Resolvers	VADEKO INTERNATIONAL Inc
Receivers	FOUNDATION INSTRUMENTS Inc	Reverse Vending Machines	GARRETT CANADA
Rechargeable Batteries	MOLI ENERGY Ltd	RF Communications	SKYWAVE ELECTRONICS Ltd
Recovery Vehicle	GENERAL MOTORS OF CANADA Ltd	RF Memory (Digital)	TELEMUS ELECTRONIC SYSTEMS Inc
Recycling Equipment	VADEKO INTERNATIONAL Inc	RF Shielding	BRITCO BUILDING SYSTEMS Ltd
Red Signal	NATIONAL FIREWORKS Inc	RF Subsystems	CANADIAN ASTRONAUTICS Ltd
Red-Black Enclosures	NATIONAL ENGINEERING & SCIENCE ASSOC	RF Subsystems	TIL-TEK Ltd
Reference Library (Aircraft Parts)	PATLON AIRCRAFT & INDUSTRIES Ltd	RFP Response	RE: ACTION MARKETING SERVICES Ltd
Reference Manuals	RE: ACTION MARKETING SERVICES Ltd	Ring Laser Gyros	LITTON SYSTEMS CANADA Ltd
Reflectometry (High Resolution)	OPTO-ELECTRONICS Inc	Ringing (Telephone Circuits)	PYLON ELECTRONIC DEVELOPMENT CO Ltd
Reflex Klystrons	VARIAN CANADA Inc	Risk Analysis	SPIECE ASSOCIATES
		Risk Analysis	WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT
		Robot Guidance	DIFFRACTO Ltd
		Robotic Aircraft Painting	VADEKO INTERNATIONAL Inc
		Robotics	ALBERTA RESEARCH COUNCIL
		Robotics	ATOMIC ENERGY OF CANADA Ltd
		Robotics	CARR-SAWYER Inc
		Robotics	CLAY-MILL TECHNICAL SYSTEMS Inc
		Robotics	DIFFRACTO Ltd
		Robotics	WARDROP ENGINEERING Inc
		Rock Sciences	ONTARIO HYDRO
		Rocket Engines	BRISTOL AEROSPACE Ltd
		Rocket Igniters	HANDS FIREWORKS Inc
		Rocket Motor Robotics	VADEKO INTERNATIONAL Inc
		Rocket Propellant	BRISTOL AEROSPACE Ltd

KEYWORD**COMPANY**

Rockets
 Roller Bearings
 Route Analysis

RPV

RPV

RPV
 RPV
 RPV Antennas
 RPV Ground Control
 RSX11-M Plus
 Rudder Assemblies
 Rudder Assemblies

Ruggedized Mass Storage Systems
 Runway Lighting
 Runway Markers
 Runway Supervision
 RVDTs
 Safety Equipment

Safety Harnesses
 Sales Representation

Salt Spray (Fog) Testing
 Sand Castings
 Sandwich Components

SAR
 SAR
 Satellite Communications
 Satellite Communications
 Satellite Communications

Satellite Communications
 Satellite Communications
 Satellite Communications
 Satellite Communications
 Power Amp
 Satellite Earth Stations
 Satellite Electronics
 Satellite Ground Station

Satellite Receivers

Satellite Structures
 Satellite Subsystems

Satellite Subsystems
 Satellite Subsystems
 Satellite Subsystems
 Satellite
 Telecommunications
 Satellite Telemetry
 Tracking Stations
 Satellite Terminals
 Satellites
 Scope Probes
 Screen Rooms
 SCSl
 Sealed CO2
 Sealed-Off Lasers
 Search & Rescue
 Search & Rescue
 Search & Rescue
 Search Radar
 Seat Covers (Fire-Block)
 Seat Manufacture
 Secondary Surveillance
 Radar
 Secure Communications
 Secure Communications

BRISTOL AEROSPACE Ltd
 PRATT & WHITNEY CANADA Ltd
 AVIATION PLANNING SERVICES
 Ltd
 (ATS) AERONAUTICAL TRAINING
 SYSTEMS
 BOEING OF CANADA Ltd
 (Winnipeg Div)
 CANADAIR Inc
 TARGETAIR Ltd
 TIL-TEK Ltd
 COMPUTING DEVICES COMPANY
 KOM Inc
 AVCORP INDUSTRIES Inc
 CANADIAN AIRCRAFT PRODUCTS
 Ltd
 TARGA ELECTRONICS SYSTEMS
 Inc
 LNS SYSTEMS Inc
 SIGNA + FLASH Ltd
 LNS SYSTEMS Inc
 NOVATRONICS OF CANADA Ltd
 THE ARMSTRONG MONITORING
 Corp
 TUL SAFETY EQUIPMENT Ltd
 PAI-PUBLIC AFFAIRS
 INTERNATIONAL
 CAMETOID Ltd
 HALEY INDUSTRIES Ltd
 BOEING OF CANADA Ltd
 (Winnipeg Div)
 CANADIAN ASTRONAUTICS Ltd
 MACDONALD DETTWILER
 ADGA GROUP
 BOLRIET TECHNOLOGIES Inc
 MILLER COMMUNICATIONS
 SYSTEMS Ltd
 MPB TECHNOLOGIES Inc
 SED SYSTEMS Inc
 TELECONSULT Ltd
 VARIAN CANADA Inc

RAYTHEON CANADA Ltd
 CANADIAN ASTRONAUTICS Ltd
 PYLON ELECTRONIC
 DEVELOPMENT CO Ltd
 INTERNATIONAL DATACASTING
 CORPORATION
 FLEET INDUSTRIES
 AIT ADVANCED INFORMATION
 TECHNOLOGIES
 COM DEV Ltd
 FELL-FAB PRODUCTS
 SPAR AEROSPACE Ltd
 CANAC TELECOM

SED SYSTEMS Inc

SKYWAVE ELECTRONICS Ltd
 SPAR AEROSPACE Ltd
 AVTECH ELECTROSYSTEMS Ltd
 BRITCO BUILDING SYSTEMS Ltd
 CALMOS SYSTEMS Inc
 ULTRA LASERTECH Inc
 MPB TECHNOLOGIES Inc
 CANADIAN ASTRONAUTICS Ltd

SEI INDUSTRIES Ltd

LITTON SYSTEMS CANADA Ltd
 FELL-FAB PRODUCTS
 FIELD AVIATION COMPANY Ltd
 RAYTHEON CANADA Ltd

ADGA GROUP
 NORTHERN TELECOM CANADA
 Ltd

KEYWORD**COMPANY**

Secure Communications

Secure Identity
 Documents
 Self-Skinning Foam
 Products
 Semiconductor
 Processing
 Semiconductor Wafers
 Semiconductors
 Semiconductors
 Semiconductors
 Semiconductors
 Sensing (IR)
 Sensing (UV)
 Sensor Systems
 Sensors
 Sensors
 Sensors
 Sensors
 Sensors
 Sensors

Separation Processes

Separator Cartridges
 Separators
 Separators (Oily Water)

Servo Motors
 Sewing (Fabric)
 Sewing (Insulation)
 Shaft Assemblies

Shafts
 Sheet Metal
 Sheet Metal Cases

Sheet Metal Detailed
 Parts
 Sheet Metal Fabrication
 Sheet Metal Fabrication

Sheet Metal Fabrication
 Sheet Metal Fabrication

Sheet Metal Fabrication
 Sheet Metal Heat Shields
 Shell Castings
 Shelter Fabrication
 Shielded Rooms
 Shielded Rooms

Shipboard Support
 Systems
 Shipborne Helicopter
 Support Systems
 Shock Mitigation
 Shock/Vibration Analysis
 Shuttle Valves

Side-Looking Airborne
 Radar

Sights
 Signal Cartridges
 Signal Identification
 Systems
 Signal Image Processing

Signal Processing
 Signal Processing
 Signal Processing
 Signal Processing

Simulation
 Simulation
 Simulation Facilities
 Simulation Programs

SPECTRUM SIGNAL PROCESSING
 Inc
 AIT ADVANCED INFORMATION
 TECHNOLOGIES
 FLEXIBULB (1983) Inc

VORTEK INDUSTRIES Ltd

COMINCO Ltd
 CALMOS SYSTEMS Inc
 COMINCO Ltd
 OPTOTEK Ltd
 ITRES RESEARCH Ltd
 ITRES RESEARCH Ltd
 SENSYS
 ALBERTA LASER INSTITUTE
 DIFFRACTO Ltd
 NOVATRONICS OF CANADA Ltd
 OPTO-ELECTRONICS Inc
 QUESTOR SURVEYS Ltd
 THE ARMSTRONG MONITORING
 Corp
 WHITESHELL NUCLEAR
 RESEARCH ESTABLISHMENT
 3-L FILTERS Ltd
 3-L FILTERS Ltd
 AIRCRAFT APPLIANCES AND
 EQUIPMENT Ltd
 NOVATRONICS OF CANADA Ltd
 FELL-FAB PRODUCTS
 THE H. I. THOMPSON COMPANY
 BACHAN AEROSPACE OF CANADA
 Ltd
 DONLEE PRECISION
 AWSM ENTERPRISES Ltd
 HAMMOND MANUFACTURING
 COMPANY Ltd
 BOEING OF CANADA Ltd (Arnprior
 Div)
 HELI-FAB Ltd
 INNOTECH AVIATION
 ENTERPRISES Ltd
 MICROTREL Ltd
 NATIONAL ENGINEERING &
 SCIENCE ASSOC
 NORTHWEST INDUSTRIES Ltd
 THE H. I. THOMPSON COMPANY
 SHELLCAST FOUNDRIES Inc
 HELI-FAB Ltd
 BRITCO BUILDING SYSTEMS Ltd
 NATIONAL ENGINEERING &
 SCIENCE ASSOC
 INDAL TECHNOLOGIES Inc

THE ONTARIO AEROSPACE
 CONSORTIUM Inc
 DOWTY CANADA Ltd
 W. R. DAVIS ENGINEERING Ltd
 PRECI SYSTEMS INTERNATIONAL
 Inc
 CANADIAN ASTRONAUTICS Ltd

ERNST LEITZ CANADA Ltd
 HANDS FIREWORKS Inc
 MILLER COMMUNICATIONS
 SYSTEMS Ltd
 HONEYWELL Ltd (Defense &
 Systems Research)
 BARRINGER RESEARCH Ltd
 CANADIAN ASTRONAUTICS Ltd
 COMPUTING DEVICES COMPANY
 MILLER COMMUNICATIONS
 SYSTEMS Ltd
 CAE INDUSTRIES Ltd
 PRIOR DATA SCIENCES Ltd
 AASTRA AEROSPACE Inc
 CAE INDUSTRIES Ltd

KEYWORD	COMPANY	KEYWORD	COMPANY
Simulation Programs	SED SYSTEMS Inc	Soil Sciences	ONTARIO HYDRO
Simulators	ATLANTIS AEROSPACE Corp	Soils	ALBERTA RESEARCH COUNCIL
Simulators	BENDIX AVELEX Inc	Solar Simulation	VORTEK INDUSTRIES Ltd
Simulators	BOEING OF CANADA (de Havilland Div)	Solder Preforms	COMINCO Ltd
Simulators	CAE INDUSTRIES Ltd	Solenoid Valves	PRECISI SYSTEMS INTERNATIONAL Inc
Simulators	CANADIAN ASTRONAUTICS Ltd	Solid Mould Castings	SHELLCAST FOUNDRIES Inc
Simulators	LITTON SYSTEMS CANADA Ltd	Solid State Devices	AVTECH ELECTROSYSTEMS Ltd
Simulators (ATC)	(ATS) AERONAUTICAL TRAINING SYSTEMS	Solid State Devices	CALMOS SYSTEMS Inc
Simulators (Marine Diesel)	HONEYWELL Ltd (Sperry Aerospace Div)	Solid State Devices	CANADIAN ASTRONAUTICS Ltd
Single Base	EXPRO CHEMICAL PRODUCTS Inc	Solid State Devices	CARR-TECH SERVICES Ltd
Single Sideband Radios	SPILSBURY COMMUNICATIONS Ltd	Solid State Devices	EPIC DATA Inc
Singlechip DSP	SPECTRUM SIGNAL PROCESSING Inc	Solid State Devices	GARRETT CANADA
Site Engineering	RDS ENGINEERING	Solid State Devices	LITTON SYSTEMS CANADA Ltd
Site Selection	AVIATION PLANNING SERVICES Ltd	Solid State Memory	OPTOTEK Ltd
Sleeping Bags	FELL-FAB PRODUCTS	Solid State Recording Heads	THE ARMSTRONG MONITORING Corp
Small Arm Caliber Ammunition	IVI Inc	Solid State Recording Heads	VARIAN CANADA Inc
Small Arms Components	DEVTEK CORPORATION	Sonar Equipment	TARGA ELECTRONICS SYSTEMS Inc
Small Gas Turbine Engines	PRATT & WHITNEY CANADA Ltd	Sonar Training Systems	OPTOTEK Ltd
Smart Structures	AASTRA AEROSPACE Inc	Sonobuoys	FLEET INDUSTRIES
Smoke Markers	VICTRIX Ltd	Sonobuoys	CAE INDUSTRIES Ltd
Smoke Pots	HANDS FIREWORKS Inc	Sonobuoys	DEVTEK CORPORATION
Software Development	(ATS) AERONAUTICAL TRAINING SYSTEMS	Sounding Velocity Systems	HERMES ELECTRONICS Ltd
Software Development	AASTRA AEROSPACE Inc	Sourcing	SPARTAN OF CANADA Ltd
Software Development	AEA ELECTRONIC Ltd	Space Based Radar	APPLIED MICROSYSTEMS Ltd
Software Development	ATLANTIS AEROSPACE Corp	Space Based Radar	BRUCE D. VALLILLEE ELECTRONICS Ltd
Software Development	CAE INDUSTRIES Ltd	Space Based Radar	AASTRA AEROSPACE Inc
Software Development	DIPIX TECHNOLOGIES Inc	Space instrumentation	CANADIAN ASTRONAUTICS Ltd
Software Development	GasTOPS Ltd	Space Mission Planning	SPAR AEROSPACE Ltd
Software Development	INTERNATIONAL AIRBORNE SYSTEMS Ltd	Space Qualified Systems	ITRES RESEARCH Ltd
Software Development	M.E.L. DEFENCE SYSTEMS Ltd	Space Systems	AIT ADVANCED INFORMATION TECHNOLOGIES
Software Development	PRIOR DATA SCIENCES Ltd	Space Systems	MACDONALD DETTWILER
Software Development	SCI-TEC INSTRUMENTS Inc	Space Systems	CAE INDUSTRIES Ltd
Software Development	TRACKER INDUSTRIES Ltd	Space Systems	CANADIAN ASTRONAUTICS Ltd
Software Development	W. R. DAVIS ENGINEERING Ltd	Space Systems	COM DEV Ltd
Software Engineering	WARDROP ENGINEERING Inc	Space Systems	FOUNDATION INSTRUMENTS Inc
Software Quality Assurance	CALIAN TECHNOLOGY Ltd	Space Systems (Composites)	SCI-TEC INSTRUMENTS Inc
Software Rehosting	VIRTUAL PROTOTYPES Inc	Spare Parts	SPAR AEROSPACE Ltd
Software Services	ADGA GROUP	Spare Parts (Aircraft)	VADEKO INTERNATIONAL Inc
Software Services	ATLANTIS AEROSPACE Corp	Spare Parts (Engines)	BOEING OF CANADA Ltd (Winnipeg Div)
Software Services	AVCORP INDUSTRIES Inc	Spares Supply	MDS AERO SUPPORT CORPORATION
Software Services	CAD/CAM GRAPHICS Ltd	Spatial Audition Displays	KAYCOM Inc
Software Services	CAE INDUSTRIES Ltd	Special Purpose Antennas	KAYCOM Inc
Software Services	CANADAIR Inc	Specialized Controls	FIELD AVIATION COMPANY Ltd
Software Services	CANADIAN AIRCRAFT PRODUCTS Ltd	Specialized Fabrication	GEHRING RESEARCH CORPORATION
Software Services	CANADIAN ASTRONAUTICS Ltd	Specialized Fabrication	ANDREW ANTENNA COMPANY Ltd
Software Services	DIPIX TECHNOLOGIES Inc	Specialized Test Equipment	LUCAS INDUSTRIES CANADA Ltd
Software Services	EPIC DATA Inc	Specialty Alloys	INDAL TECHNOLOGIES Inc
Software Services	GARRETT CANADA	Specialty Forgings	THE ONTARIO AEROSPACE CONSORTIUM Inc
Software Services	I. P. SHARP ASSOCIATES Ltd	Specifications	DOWTY CANADA ELECTRONICS Ltd
Software Services	I.M.P. GROUP Ltd	Spectrographic Imager	SHERRITT GORDON MINES Ltd
Software Services	INTERNATIONAL AIRBORNE SYSTEMS Ltd	Spectrometric Technology	CANADA FORGINGS Inc
Software Services	PRIOR DATA SCIENCES Ltd	Spectroscopy	RE: ACTION MARKETING SERVICES Ltd
Software Services	SCI-TEC INSTRUMENTS Inc	Spectroscopy	ITRES RESEARCH Ltd
Software Services	TRACKER INDUSTRIES Ltd	Spectroscopy	ATOMIC ENERGY OF CANADA Ltd
Software Services	UNISYS CANADA Inc	Spectrum Analysis	BARRINGER RESEARCH Ltd
Software Specification	I. P. SHARP ASSOCIATES Ltd	Spectrum Analysis	ITRES RESEARCH Ltd
Software Systems	HONEYWELL Ltd (Defense & Systems Research)	Spectrum Management	ULTRA LASERTECH Inc
Software Systems	INTERNATIONAL AIRBORNE SYSTEMS Ltd	Spectrum Monitoring	MILLER COMMUNICATIONS SYSTEMS Ltd
Software Systems	MACDONALD DETTWILER	Speech Recognition	SPECTRUM SIGNAL PROCESSING Inc
Software Training	ROBERTSON PHOTOGRAMMETRIC Inc		THE SNC GROUP
Software Verification	I. P. SHARP ASSOCIATES Ltd		LNS SYSTEMS Inc
			SPECTRUM SIGNAL PROCESSING Inc

KEYWORD	COMPANY	KEYWORD	COMPANY
Speech Synthesis	SPECTRUM SIGNAL PROCESSING Inc	Subcontract Manufacturing	LEIGH INSTRUMENTS Ltd
Spherical Airships	MAGNUS AEROSPACE CORPORATION	Subcontract Manufacturing	LITTON SYSTEMS CANADA Ltd
Spin Forming	BRISTOL AEROSPACE Ltd	Subcontractor Search	HOWLAND RUSSELL CONSULTANTS Ltd
Spot	MACDONALD DETTWILER	Supercritical Gas Technology	RAYLO CHEMICALS
Spotting Charges	HANDS FIREWORKS Inc	Supervisory & Control Systems	TELECONSULT Ltd
Spread Spectrum Modems	MILLER COMMUNICATIONS SYSTEMS Ltd	Support Activities	ROCKWELL INTERNATIONAL OF CANADA Ltd
Sputtering Targets	COMINCO Ltd	Support Services	CALIAN TECHNOLOGY Ltd
Stability and Control	AASTRA AEROSPACE Inc	Surface Acoustic Wave Subsystems	COM DEV Ltd
Stamping	BRISTOL AEROSPACE Ltd	Surface Chemistry	WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT
Stamping	DIEMASTER TOOL Inc	Surface Finishing	CAMETOID Ltd
Stamping	EBCO AEROSPACE INDUSTRIES Inc	Surface Water	ALBERTA RESEARCH COUNCIL
Stamping	HAWKER SIDDELEY CANADA Inc	Surveillance	CANADIAN MARCONI COMPANY
Standard Products	EPIC DATA Inc	Surveillance	PRIOR DATA SCIENCES Ltd
Standards and Specifications	CALIAN TECHNOLOGY Ltd	Survey Systems	FIELD AVIATION COMPANY Ltd
Standby Power	CARR-TECH SERVICES Ltd	Surveys	BRUCE D. VALLILLEE ELECTRONICS Ltd
Generating Equipment	ULTRA LASERTECH Inc	Swiss Type Screw Machining	J.J. CHARLTON COMPANY Ltd
Stark Cell	RAM CALMOS SYSTEMS Inc	Switches	MA ELECTRONICS CANADA Ltd
Static	ALBERTA RESEARCH COUNCIL	Switches	UNISYS CANADA Inc
Statistical Analysis	BARON COMMUNICATIONS Ltd	Switching	GEC PLESSEY TELECOMMUNICATIONS
Status Systems	ATOMIC ENERGY OF CANADA Ltd	Switching Systems	NORTHERN TELECOM CANADA Ltd
Steam Quality Stack-Gas Scrubbing	DOWTY CANADA ELECTRONICS Ltd	Synchros	NOVATRONICS OF CANADA Ltd
Steer by Wire Systems	DOWTY CANADA Ltd	Synthesizers	MILLER COMMUNICATIONS SYSTEMS Ltd
Steering (Ground) Systems	DOWTY CANADA Ltd	Synthesizers	TELEMUS ELECTRONIC SYSTEMS Inc
Steering Systems	DOWTY CANADA Ltd	Synthetic Aperture Radar	CANADIAN ASTRONAUTICS Ltd
Still Columns	ROBERT MITCHELL Inc	Synthetic Aperture Radar	MACDONALD DETTWILER
STOL Aircraft	BOEING OF CANADA (de Havilland Div)	Synthetic Pulsed Radar	MPB TECHNOLOGIES Inc
Manufacture	DIPIX TECHNOLOGIES Inc	System Integration	LAVALIN Inc
Storage of Digital Imagery	FELL-FAB PRODUCTS	System Receivers	NORSTAR INSTRUMENTS Ltd
Storage Systems (Dry & Liquid)	HOWLAND RUSSELL CONSULTANTS Ltd	Systems (Controls)	HONEYWELL Ltd (Defense & Systems Research)
Strategic Planning	CARR-SAWYER Inc	Systems Analysis	AIT ADVANCED INFORMATION TECHNOLOGIES
Stress Analysis	CAMETOID Ltd	Systems Analysis	PRIOR DATA SCIENCES Ltd
Stress Relieving	SIGNA + FLASH Ltd	Systems Design	MILLER COMMUNICATIONS SYSTEMS Ltd
Strobe Light	AVCORP INDUSTRIES Inc	Systems Design	ROCKWELL INTERNATIONAL OF CANADA Ltd
Structural Analysis	CANADIAN AIRCRAFT PRODUCTS Ltd	Systems Design	SCI-TEC INSTRUMENTS Inc
Structural Analysis	CANADIAN ASTRONAUTICS Ltd	Systems Design	TELECONSULT Ltd
Structural Components	I.M.P. GROUP Ltd	Systems Engineering	AASTRA AEROSPACE Inc
Structural Components Manufacture	CHICOPEE MANUFACTURING LIMITED	Systems Engineering	BOEING OF CANADA Ltd (Winnipeg Div)
Structural Design	NORTHWEST INDUSTRIES Ltd	Systems Engineering	MDS AERO SUPPORT CORPORATION
Structural Design	AVCORP INDUSTRIES Inc	Systems Engineering	SCI-TEC INSTRUMENTS Inc
Structural Design	CANADIAN AIRCRAFT PRODUCTS Ltd	Systems Engineering	SED SYSTEMS Inc
Structural Design	CANADIAN ASTRONAUTICS Ltd	Systems Engineering	TELECONSULT Ltd
Structural Dynamics	INNTECH AVIATION ENTERPRISES Ltd	Systems Engineering	THOMSON-CSF SYSTEMS CANADA Inc (TCSC)
Structural Dynamics	AASTRA AEROSPACE Inc	Systems Engineering	TRIDEX SYSTEMS Inc
Structural Fittings (Helicopters)	ATOMIC ENERGY OF CANADA Ltd	Systems Engineering	VADEKO INTERNATIONAL Inc
Structural Integrity	CAMPAGNA ENGINEERING Inc	Systems Engineering	WARDROP ENGINEERING Inc
Structural Modification	DIFFRACTO Ltd	Systems Engineering (Nav/Comm)	ADGA GROUP
Structural Testing	NORTHWEST INDUSTRIES Ltd	Systems Facility Management	RE: ACTION MARKETING SERVICES Ltd
Structures	ROBERTSON PHOTOGRAMMETRIC Inc	Systems Facility Services	RE: ACTION MARKETING SERVICES Ltd
Structures	ALCAN INTERNATIONAL Ltd	Systems Flight Testing	INNTECH AVIATION ENTERPRISES Ltd
Structures	McDONNELL DOUGLAS CANADA Ltd	Systems Ground Testing	INNTECH AVIATION ENTERPRISES Ltd
Structures	SPAR AEROSPACE Ltd		
Studies	CARR-SAWYER Inc		
Studies	TELECONSULT Ltd		
Subcontract Management	QUANTUM INSPECTION AND TESTING Ltd		
Subcontract Manufacturing	GARRETT CANADA		

KEYWORD

Systems Installation
Design
Systems Integration

Systems Integration
Systems Integration
Systems Integration
Systems Integration
Systems Integration

Systems Integration
Systems Integration
Systems Integration
Systems Intergration
Systems Management

Systems Planning

Systems Simulation
Systems Studies
Systems Studies
Systems Studies

Systems Testing
Taber Abrasion Testing
Tactical Communications
Tactical Console
Tactical Radio Relay
Tactical Signal Simulator
Tactical Simulation
Tactical Switchboards
Tactical Team Trainers
Tactical Training Systems
Tailings

Talk and Signal Supplies

Tanks (Collapsible)
Tape Punch System
Tactical Team Trainers
TEA Lasers
Technical Illustration
Technical Investigations

Technical Manuals

Technical Publications
Production

Technical Services
Technical Writing
Technology Assessment
Teflon^(TM) Coatings
Telecommunications
Telecommunications

Telecommunications

Telecommunications

Telecommunications
Telecommunications
Components
Telecommunications Test
Equipment
Telegraphy
Telemetry Systems
Telephone Channel
Simulators
Telephone
Communications
Telephone
Communications
Telephone
Communications
Telephone
Communications

COMPANY

INNOTECH AVIATION
ENTERPRISES Ltd
AIT ADVANCED INFORMATION
TECHNOLOGIES
CANAC TELECOM
COMPUTING DEVICES COMPANY
DY-4 SYSTEMS Inc
GARRETT CANADA
I.M.P. GROUP Ltd
INNOTECH AVIATION
ENTERPRISES Ltd
M.E.L. DEFENCE SYSTEMS Ltd
PARAMAX ELECTRONICS Inc
WARDROP ENGINEERING Inc
TRACKER INDUSTRIES Ltd
THOMSON-CSF SYSTEMS
CANADA Inc (TCSC)
FOOTTIT MITCHELL AND
ASSOCIATES
ATLANTIS AEROSPACE Corp
CANADIAN ASTRONAUTICS Ltd
SED SYSTEMS Inc
THOMSON-CSF SYSTEMS
CANADA Inc (TCSC)
I.M.P. GROUP Ltd
CAMETOID Ltd
ANDREW ANTENNA COMPANY Ltd
VIRTUAL PROTOTYPES Inc
CANADIAN MARCONI COMPANY
CANADIAN ASTRONAUTICS Ltd
VIRTUAL PROTOTYPES Inc
CANADIAN MARCONI COMPANY
CAE INDUSTRIES Ltd
CAE INDUSTRIES Ltd
WHITESHELL NUCLEAR
RESEARCH ESTABLISHMENT
PYLON ELECTRONIC
DEVELOPMENT CO Ltd
SEI INDUSTRIES Ltd
ICAM TECHNOLOGIES Corp
CAE INDUSTRIES Ltd
LUMONICS Inc
NORTHWEST INDUSTRIES Ltd
BOEING OF CANADA Ltd (Arnprior
Div)
RE: ACTION MARKETING
SERVICES Ltd
NORTHWEST INDUSTRIES Ltd

FRONTEC LOGISTICS Corp
NORTHWEST INDUSTRIES Ltd
W. R. DAVIS ENGINEERING Ltd
CAMETOID Ltd
CANAC TELECOM
GEC PLESSEY
TELECOMMUNICATIONS
MILLER COMMUNICATIONS
SYSTEMS Ltd
RE: ACTION MARKETING
SERVICES Ltd
TELECONSULT Ltd
TW MANUFACTURING Inc

NAVAIR Limited
TELECONSULT Ltd
SCI-TEC INSTRUMENTS Inc
AEA ELECTRONIC Ltd

BARON COMMUNICATIONS Ltd
FOUNDATION INSTRUMENTS Inc

GEC PLESSEY
TELECOMMUNICATIONS
PYLON ELECTRONIC
DEVELOPMENT CO Ltd

KEYWORD

Telephone
Communications
Telephone
Communications

Telephone Equipment

Telephone Interconnect
Terminals
Telephone Rectifiers

Telephone Systems

Telerobotic Products
Temperature Control
Temperature Sensors
TEMPEST
TEMPEST
TEMPEST Enclosures

Tempest Modifications

Tents
Terminals
Terminals

Terrain Profiler
Terrestrial
Communications
Terrestrial Microwave
Antennas
Test Equipment

Test Equipment

Test Equipment (Cases)
Test Equipment (Data
Communications)
Test Equipment (Digital
1553)
Test Facilities
Test Instrumentation
Test Instrumentation

Test Instrumentation
Test Management
Test Rigs
Testing
Testing (Certification)
Testing (Environmental)
Testing (General)
Testing (High Pressure)
Testing (Materials)
Testing/Test Equipment
Testing/Test Equipment
Testing/Test Equipment
Testing/Test Equipment
Testing/Test Equipment
Testing/Test Equipment
Testing/Test Equipment
Testing/Test Equipment
Testing/Test Equipment
Testing/Test Equipment
Testing/Test Equipment

Testing/Test Equipment
Testing/Test Equipment
Testing/Test Equipment

Testing/Test Equipment
Text Management

Thermal Analysis

Thermal Conductivity
Devices
Thermal Imaging

COMPANY

SKYWAVE ELECTRONICS Ltd

TELECONSULT Ltd

NORTHERN TELECOM CANADA
Ltd
BARON COMMUNICATIONS Ltd

PYLON ELECTRONIC
DEVELOPMENT CO Ltd
NORTHERN TELECOM CANADA
Ltd
SPAR AEROSPACE Ltd
CASEY COPTER ACCESSORIES Ltd
APPLIED MICROSYSTEMS Ltd
GARRETT CANADA
M.E.L. DEFENCE SYSTEMS Ltd
NATIONAL ENGINEERING &
SCIENCE ASSOC
NORTHERN TELECOM CANADA
Ltd
FELL-FAB PRODUCTS
EPIC DATA Inc
MILLER COMMUNICATIONS
SYSTEMS Ltd
OPTTECH Inc
TELECONSULT Ltd

ANDREW ANTENNA COMPANY Ltd

DOWTY CANADA ELECTRONICS
Ltd
NORTHERN TELECOM CANADA
Ltd
ZARGES AFC CANADA Ltd
AEA ELECTRONIC Ltd

ATLANTIS AEROSPACE Corp

DSMA INTERNATIONAL Inc
GARRETT CANADA
MILLER COMMUNICATIONS
SYSTEMS Ltd
PRATT & WHITNEY CANADA Ltd
DSMA INTERNATIONAL Inc
CANADIAN ASTRONAUTICS Ltd
ATOMIC ENERGY OF CANADA Ltd
APREL Inc
DSMA INTERNATIONAL Inc
I.M.P. GROUP Ltd
ITT CANNON ELECTRIC CANADA
ALCAN INTERNATIONAL Ltd
ALBERTA RESEARCH COUNCIL
ATLANTIS AEROSPACE Corp
CANADAIR Inc
CANADIAN ASTRONAUTICS Ltd
CANADIAN MARCONI COMPANY
CARR-SAWYER Inc
EPIC DATA Inc
GARRETT CANADA
GENELCOM Ltd
MILLER COMMUNICATIONS
SYSTEMS Ltd
PRATT & WHITNEY CANADA Ltd
SCI-TEC INSTRUMENTS Inc
SIMMONDS PRECISION CANADA
Ltd
W. R. DAVIS ENGINEERING Ltd
RE: ACTION MARKETING
SERVICES Ltd
WHITESHELL NUCLEAR
RESEARCH ESTABLISHMENT
THE ARMSTRONG MONITORING
Corp
BENDIX AVELEX Inc

KEYWORD	COMPANY	KEYWORD	COMPANY
Ultra Fine Metal Powders	SHERRITT GORDON MINES Ltd	Water Purification Systems	3-L FILTERS Ltd
Ultra Violet Imagers	CANADIAN ASTRONAUTICS Ltd	Water Reservoirs	SEI INDUSTRIES Ltd
Ultraviolet Fluorescence Systems	SCINTREX Ltd	Water Storage	SEI INDUSTRIES Ltd
Unattended Power Supplies	GLOBAL THERMOELECTRIC POWER SYSTEMS	Water Transport	SEI INDUSTRIES Ltd
Underwater Acoustics	APPLIED MICROSYSTEMS Ltd	Water/Hydrogen Conversion	INRAD INDUSTRIAL RESEARCH & DEVELOPMENT
Underwater Instrumentation	APPLIED MICROSYSTEMS Ltd	Waterpump Shaft Assemblies	FAG BEARINGS Ltd
Underwater Ring Shell Sound Projectors	SPARTON OF CANADA Ltd	Waveform Generators	AVTECH ELECTROSYSTEMS Ltd
Underwater Salvage Equipment	SEI INDUSTRIES Ltd	Waveform	AVTECH ELECTROSYSTEMS Ltd
Underwater Vehicles	VADEKO INTERNATIONAL Inc	Instrumentation	
Uninterruptable Power Supplies	PYLON ELECTRONIC DEVELOPMENT CO Ltd	Waveguide Attenuators	MA ELECTRONICS CANADA Ltd
UNIX	KOM Inc	Waveguide Lasers	ULTRA LASERTECH Inc
Ungunned Weapon Station	GENERAL MOTORS OF CANADA Ltd	Waveguide Structures	BOLRIET TECHNOLOGIES Inc
User Manuals	RE: ACTION MARKETING SERVICES Ltd	Waveguide Transducers	MA ELECTRONICS CANADA Ltd
Vacuum Brazing	VAC-AERO INTERNATIONAL Inc	Waveguides	ANDREW ANTENNA COMPANY Ltd
Vacuum Coatings	CAMETOID Ltd	Waveguides	MA ELECTRONICS CANADA Ltd
Vacuum Forming	FLEXIBULB (1983) Inc	Waveguides	VARIAN CANADA Inc
Vacuum Furnaces	VAC-AERO INTERNATIONAL Inc	Weapon System Controls	VICTRIX Ltd
Vacuum Heat Treating	VAC-AERO INTERNATIONAL Inc	Wear Resistant Materials	SHERRITT GORDON MINES Ltd
Variable Tuned Antennas	SPILSBURY COMMUNICATIONS Ltd	Weather Forecasting	ALBERTA RESEARCH COUNCIL
VAX	KOM Inc	Weather Forecasting Systems	PELORUS NAVIGATION SYSTEMS Inc
Vehicle Systems Engineering	DEW ENGINEERING AND DEVELOPMENT Ltd	Weather Image Processor	MACDONALD DETTWILER
Vehicle Training Simulators	AIT ADVANCED INFORMATION TECHNOLOGIES	Weather Stations	MACDONALD DETTWILER DEVTEK CORPORATION
Vehicular Intercom Systems	MAGNUM DISTRIBUTION Ltd	Weather Stations	HERMES ELECTRONICS Ltd
Vehicular Mobile Systems	TELECONSULT Ltd	Webbing	FELL-FAB PRODUCTS
Vendor Surveillance	QUANTUM INSPECTION AND TESTING Ltd	Webbing Straps	TUL SAFETY EQUIPMENT Ltd
Vertical Axis Wind Turbines	INDAL TECHNOLOGIES Inc	Weight & Balance	INNOTECH AVIATION ENTERPRISES Ltd
Vertical Take-Off and Landing	MAGNUS AEROSPACE CORPORATION	Weld Overlaying	ALBERTA LASER INSTITUTE
Very Small Aperture Terminals (VSAT's)	INTERNATIONAL DATACASTING CORPORATION	Welding	ALBERTA LASER INSTITUTE
VHF Antennas	TIL-TEK Ltd	Welding	AWSM ENTERPRISES Ltd
VHF Navigation Systems	ATLANTIS AEROSPACE Corp	Welding	CANADIAN MARCONI COMPANY
VHF Omnidirectional	RAYTHEON CANADA Ltd	Welding	DEVTEK CORPORATION
VHF Radio Telecommunications	CANAC TELECOM	Welding	HAWKER SIDDELEY CANADA Inc
VHF/FM	SPILSBURY COMMUNICATIONS Ltd	Welding	INNOTECH AVIATION ENTERPRISES Ltd
Vibration/Acoustic Intensity Measure	UNISYS CANADA Inc	Welding (Advanced)	PRICE & KNOTT MANUFACTURING CO Ltd
Video Display Systems	CAE INDUSTRIES Ltd	Welding (Fabric)	ROLLS-ROYCE (CANADA) Ltd
Video Display Systems	COMPUTING DEVICES COMPANY	Welding (Laser)	SPECIALIZED WELDING & FABRICATION Ltd
Video Display Systems	UNISYS CANADA Inc	Welding (Sheet Metal)	W. R. DAVIS ENGINEERING Ltd
Video Systems	FOUNDATION INSTRUMENTS Inc	Welding (Sheet Metal)	STEVESTED MACHINERY & ENGINEERING Ltd
Virtual Cockpits	VIRTUAL PROTOTYPES Inc	Welding (Stainless Foils)	FELL-FAB PRODUCTS
Visual Signalling Devices	SIGNA + FLASH Ltd	Welding (Stainless Foils)	LUMONICS Inc
Vitrification	WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT	Welding Procedures	AWSM ENTERPRISES Ltd
VLSI	HONEYWELL Ltd (Defense & Systems Research)	Welding Technology	THE H. I. THOMPSON COMPANY
VLSI Simulation	MYRIAS RESEARCH Corp	Weldments	AWSM ENTERPRISES Ltd
VME Computer Modules	DY-4 SYSTEMS Inc	Wheel Parts	THE H. I. THOMPSON COMPANY
Voice & Data Communications	SKYWAVE ELECTRONICS Ltd	Whip Antennas	QUANTUM INSPECTION AND TESTING Ltd
Voice Privacy Communications	MILLER COMMUNICATIONS SYSTEMS Ltd	Wide Area Alarm Units	ONTARIO HYDRO
Voltage Transformers	GARRETT CANADA	Wide Area Networks	HELI-FAB Ltd
VOR	CANADIAN MARCONI COMPANY	Wideband	BENDIX AVELEX Inc
Waste Management	WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT	Wind Tunnels	THE ONTARIO AEROSPACE CONSORTIUM Inc
Water	ALBERTA RESEARCH COUNCIL	Wire	PYLON ELECTRONIC DEVELOPMENT CO Ltd
Water Bombing	FIELD AVIATION COMPANY Ltd	Wire and Cable	IDACOM ELECTRONICS Ltd
		Wireline Simulators	FOUNDATION INSTRUMENTS Inc
		Wiring	DSMA INTERNATIONAL Inc
		Wiring	HARBOUR INDUSTRIES (Canada) Ltd
		Wiring & Tubing	INTERFAST Inc
			AEA ELECTRONIC Ltd
			BOEING OF CANADA (de HAVILLAND DIV)
			ITT CANNON ELECTRIC CANADA
			McDONNELL DOUGLAS CANADA Ltd
			I.M.P. GROUP Ltd

KEYWORD

Wiring Harness
Fabrication
Wiring Harness
Fabrication
Wiring Harness
Fabrication
Word Processing

Writing

X-Ray Inspection
X-Ray Inspection

X-Ray Power Supplies
Yellow Signal

COMPANY

DOWTY CANADA ELECTRONICS
Ltd
MICROTEL Ltd

NORTHWEST INDUSTRIES Ltd

RE: ACTION MARKETING
SERVICES Ltd
RE: ACTION MARKETING
SERVICES Ltd
NORTHWEST INDUSTRIES Ltd
SPECIALIZED WELDING &
FABRICATION Ltd
VARIAN CANADA Inc
HANDS FIREWORKS Inc

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Section II

COMPANY PROFILES

(Continued)

INNOTECH AVIATION ENTERPRISES Ltd

ADDRESS: (Head Office)
Cargo Road "C"
P. O. Box 130
Montreal International Airport
Dorval, Quebec, Canada
H4Y 1A6

CONTACT: Mr. Douglas M McGregor, VP Government Marketing & Relations (514) 636-8484

HISTORY: Innotech Aviation Ltd was incorporated in 1955 as Timmins Aviation Ltd. In 1967, the latter was acquired by Atlantic Aviation Corp of Wilmington, Delaware, resulting in a further name change to Atlantic Aviation of Canada Ltd. The present name came into being in 1974 when a group of the company's Canadian executives together with Innocan Investments Ltd purchased the shares held by Atlantic Aviation Corp. The company has offices and aircraft service facilities in 5 Canadian cities: Vancouver, Toronto, Montreal, Ottawa and Calgary.

CAPABILITY: The current operating divisions of Innotech Aviation Ltd include Aircraft Sales and Brokerage; Aircraft Management Services and Charter Operations; and Technical Services. This profile describes only the Technical Services Division which consists of:

- **Engineering & Design** – A full range of aerospace related engineering services are offered which include repair schemes; corrosion control; weight and balance; systems installation design; aeronautical engineering; aircraft maintenance; modification development; structural design; electrical and avionics engineering; systems interface design; systems ground and flight testing; and custom designed aircraft interiors for commercial and military aircraft including executive transport, air evacuation, and hospital interiors; plus maintenance and technical publications for a wide range of commercial and military aircraft.
- **Aircraft Repair & Overhaul** – This department's maintenance and service capabilities cover twin engine aircraft, multi-engine turbo-props, turbo jets, and helicopters for civilian and military customers, as well as a full range of equipment modifications and non-destructive testing.
- **Modification** – This department specializes in sheet metal work, aircraft welding, aircraft painting, cabinet making and upholstery of aircraft interiors and furnishings. As well, this department installs the avionics systems, electronic warfare systems and auxiliary power units described in "Engineering and Design".
- **Quality Assurance** – Innotech's quality assurance personnel hold Canadian Department of Transport (DOT) and the Department of National Defense AQAP-1 Shop approvals (DND). All aircraft inspectors are licensed by DOT and, thence, through agreements between Canada and other countries, can approve work done for customers from outside Canada.

AVERAGE WORK FORCE: Total – 500 (all locations)

GROSS SALES: 1986 – \$58.0M
1987 – \$60.0M

PLANT SIZE: 500,000 Sq Ft (all locations)

EXPERIENCE: Innotech Aviation customers include the US Coast Guard (Falcon Aircraft), Canadian Department of National Defense (and other departments of the Canadian Government), Canadair, deHavilland Aircraft of Canada, Government of Malaysia and many other corporate operators.

KEYWORDS: Aeronautical Engineering; Avionics; Corrosion Control; Electrical Engineering; Electronic Warfare; Modification (Aircraft); Non-Destructive Testing; Painting (Aircraft); R&O (Aircraft); R&O (Helicopters); Sheet Metal Fabrication; Structural Design; Systems Flight Testing; Systems Ground Testing; Systems Installation Design; Systems Integration; Weight & Balance; Welding.

REVISED: February 88

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Winnipeg, Manitoba, Canada
R3A 0W5

CONTACT: Mr Edward A Speers, P.Eng, President – (204) 943-6870

HISTORY: Inrad is a wholly-owned Canadian company incorporated in 1975. There are no other Canadian locations. An affiliate company, Speers McGonigal (1980) Ltd, custom packager and plastic fabrication, is located at the same site.

CAPABILITY: The Inrad group is interested in new product development, particularly in the plastics, petroleum, chemical engineering, agricultural and energy spheres. They are also in the commercial packaging business. Some of their products include: a study of rare earth magneto-strictive materials for underwater transducers; photocatalytic conversion of water to hydrogen; the development of a high voltage fluorescent light switch; a farm fertilizer generator; and work on a high temperature solar collector suitable for a national grid system and for central heating.

A new material, porous titania glass, is available in research quantities. This acts as a photocatalyst when exposed to sunlight in the production of hydrogen from water at NTP. This material can be doped as required. Based on this technology, a portable hydrogen "sniffer" has been developed. The resistance of the detector changes on exposure to as little as 0.05% hydrogen in air. This instrument serves as an alarm for use near hydrogen producers such as batteries, hydrogen furnaces, and fuel cells. Silicodizing of aluminum is available wherein a layer of glass is joined directly to the aluminum, making it corrosion resistant and insulated. Different coatings are available. A dendritic silica "undercoat" causes paint to adhere firmly. A smooth hardcoat is available.

Inrad is currently working on a micro-propagation program transferring ORCHID growing techniques to conifers.

Other capabilities include precision machining and engraving, plastic fabrication (vacuum forming), custom packaging, and skin and blister packaging.

AVERAGE WORK FORCE: PhDs – 4
Engineer – 2
Physicist – 1
Chemist – 1
Others – 12/16

GROSS SALES: 1986 – \$480K
1987 – \$340K

PLANT SIZE: 25,000 Sq Ft

EXPERIENCE: Inrad has worked with the Canadian Department of National Defense, the National Research Council, Atomic Energy of Canada Ltd, universities, and with private industry. They have low sales to the US. They have been in contact with USAF primarily in the area of rare earth magnets.

KEYWORDS: Alternate Fuels Research; Blister Packaging; Chemistry; Custom Packaging; Environmental Sensors; Geophysics;

Hazardous Gas Alarm System; Hazardous Gas Detection; Hydrogen; Hydrogen Gas Detection; Hydrogen Production; Injection Molding; Machining; Photocatalyst; Porous Titania Glass; Precision Engraving; Precision Machining; Rare Earth Magnets; Titania Glass; Trace Gas Detection; Water/Hydrogen Conversion.

REVISED: January 88

INTERACTIVE CIRCUITS & SYSTEMS Ltd

ADDRESS: 3101 Hawthorne Road
Ottawa, Ontario, Canada
K1G 3V8

CONTACT: Dr D Roy, President - (613) 521-0590

HISTORY: ICS is a Canadian-owned high technology electronics company founded in 1980.

CAPABILITY: ICS offers unique expertise design and manufacture of high-speed digital signal processing and data acquisition equipment for applications in Sonar, Radar, EW and off-the-shelf and custom products. At present, the standard products include a family of VMEbus real-time digital signal processing and data acquisition boards. ICS also offers a complete line of sonar signal processing equipment as standard products. The company's SBF-256 system, which performs in excess of 2 billion arithmetic operations/sec is considered to be the world's most powerful sonar beamformer. ICS also provides custom R&D services to government and defense industries in the development of advanced systems in Radar, Sonar, EW, space and other areas. In the past, the company has successfully developed such sophisticated systems as A Digital EW Receiver, Phased Array Radar Beamformer, Star-Tracker for Satellite Navigation, Space-Mirror calibration system, 3-D Sound System for aircraft cockpit applications, etc.

AVERAGE WORK FORCE: PhD - 1
MEng - 1
Beng - 4
Others - 10

GROSS SALES: 1987 - \$1.0M
1988 - \$2.0M (Est'd)

EXPERIENCE: ICS has a highly diversified international customer base including - NATO (Italy), DREO (Canada), DREA (Canada), DREV (Canada), NADC (the US), NOSC (the US), NUSC (the US), NSA (the US), NASA (the US), Lockheed (the US), TRW/ESL (the US), GTE (the US), Ford Aero (the US), GM (the US), and Unisys (the US), etc.

KEYWORDS: Electronic Design; Data Acquisition; DSP; Processing (Sensor); Processing (Signal); Processing (Radar); Processing (Sonar); Processing (EW).

REVISED: January 88

INTERCON CONSULTANTS

ADDRESS: 275 Slater Street, Suite #705
Ottawa, Ontario, Canada
K1P 5H9

CONTACT: Mr R Campbell, Partner - (613) 236-4451

HISTORY: InterCon Consultants is an Ottawa-based consulting firm. The partnership was founded in 1983 to assist and advise companies, domestic and foreign, in doing business with the Federal Government.

CAPABILITY: InterCon Consultants' clients are primarily defence, communications and energy industries seeking contracts with the Federal Government and, in the case of foreign companies, with Canadian private sector industry. The latter may be in the form of purchases, sales, or mergers, licensing arrangements or takeovers. The partners and associates of the company are experienced in government and industry.

EXPERIENCE: InterCon Consultants' clients include large foreign and Canadian aerospace and defence companies, a large space industry company, and a nuclear industry company. The company has associate firms in Europe and the US and has an arrangement with another Ottawa-based consulting firm which comes into play when either company requires additional or specialty support.

KEYWORDS: Consulting (Government Procurement); Consulting (Canadian Government); Consulting (Aerospace); Merger & Acquisition; Industrial Benefits; Offsets.

REVISED: January 88

INTERFAST Inc

ADDRESS: Toronto
Head Office
21 Constellation Court
Rexdale, Ontario, Canada
M9W 1K4

Montreal
Branch Office
72B Brunswick Boulevard
Dollard des Ormeaux, Quebec, Canada
H9B 2C5

Vancouver
Branch Office
2936 Spring Street, Unit 8
Port Moody, British Columbia, Canada
V3H 1Z7

CONTACT: Mr S Douglas Woollings, President & Gen Manager - (416) 674-0770

HISTORY: Since our inception in 1966, we have been the leading Canadian supplier for Aerospace Precision Fastener Systems, representing - Allfast Fastening Systems Inc, Blanc Aero Industries, Briles Rivet Corp, Deutsch Fastener Corp, Deutsch Metal Components, Dzus Fastener Company Inc, Freeman Company, Hi-Shear Corp, General Aircraft Supplies, Mercury Aerospace Division of Blanc Aero Industries, Monogram Aerospace Fasteners, Rexnord Aerospace Mechanisms (RAM), Rexnord Specialty Fasteners Division with Camloc and Tridair products, Ruart Bearing Co, TA Mfg Corp, Toronto Fastener Industries (Forfas), BFM Transport Dynamics, and Western Sky Industries. We also supply Custom Engineered Systems representing - Continental Forge Co, Kaiser Electroprecision, Kaiser-Roylyn, Stainless Steel Products Inc, Teledyne Thermatics, and Tyee Aircraft Inc. We supply Aerospace and Industrial Tooling representing Aerospace Tools Div of Voi-Shan, Air Tuf Products Inc, CompTool, Deutsch Metal Components, Hemco Corporation, L&F Industries, Lok-Fast Inc, Monogram Aerospace Fasteners, P V Tool Inc, Schaefer Machine Company, E A Selzer & Associates, Superior Carbide Tools, and Zephyr Manufacturing Co. We also supply high Tech Wire and Cable to Teledyne Thermatics.

AVERAGE WORK FORCE: Technical Sales Reps - 14
Quality Control - 1
Quality Assurance - 1
Inside Sales Support Staff - 26
Other Support Staff - 43

GROSS SALES: 1986 - \$12.0M
1987 - \$15.0M

PLANT SIZE: 25,000 Sq Ft (Warehouse)
10,000 Sq Ft (Offices)

EQUIPMENT: Computerized inventory and order systems, Bar Coding, Specialized Quantity Packaging, Telex, TWX and FAX.

EXPERIENCE: Since 1966, we have been serving customers including - Government of Canada (DND), McDonnell Douglas, Canadair, Boeing Aircraft, Pratt & Whitney, deHavilland Aircraft, Dowty Equipment, Menasco Canada, Westland, IMP Group, Swiss Federal Air Force, Bell Helicopter, and Fleet Industries.

KEYWORDS: Fasteners (Precision); Industrial Tooling; Wire and Cable; Engineering (Custom).

REVISED: February 88

INTERNATIONAL AIRBORNE SYSTEMS Ltd

ADDRESS: 502 – 4180 Lougheed Hwy
Burnaby, British Columbia, Canada
V5C 6A7

CONTACT: Mr Britt Whitaker, Vice President, Marketing –
(604) 291-7394

HISTORY: International Airborne Systems Corp was incorporated in 1983 as a wholly owned, private Canadian company to provide management information systems to the aviation industry. In November 1985, Airborne became a publicly listed company, trading on the Vancouver Stock Exchange. The company has a branch office in Toronto, Ontario and San Francisco, CA. Expansion to the New York and Los Angeles areas is anticipated in the near future.

CAPABILITY: Airborne is an aviation management information service company specializing in computer software for Aircraft & Crew Scheduling, Aircraft Maintenance, Inventory, Flight Operations, Shop Production Management, Manufacturing Management and Accounting Applications. Airborne's software is a management product intended to improve administrative cost effectiveness, operational efficiency, flight safety and regulatory compliance. Airborne's design approach has resulted in concise, user-friendly, generic software modules for aircraft maintenance, inventory, flight operations and accounting which can be easily modified for specific customer requirements.

Airborne offers a full range of consultation services for the automation of all phases of aviation operations. Their software product is written for a wide variety of hardware from micro to mainframes, including IBM, Unisys, Digital, Honeywell, NCR, etc. An overview of Airborne's software follows:

- Maintenance – the maintenance module tracks aircraft components by ATA Code, aircraft zone, part number and serial number, under a variety of maintenance plans – hard time, on condition and condition monitored – for either periodic or components continuous inspection regimes. The maintenance system features include:
 - The ability to handle any fleet size and aircraft type mix.
 - Component tracking by any combination of flight hours, flight cycles, landings or dates.
 - Component history and reliability tracking.
 - Equipment discrepancies tracking.
 - Future maintenance requirements forecast.
 - Inventory system interface.
- Single entry data capture which eliminates redundant data entry.
- Aviation industry standard terminology.
- Menu organization by employee job classification or task function.
- Inventory – the inventory module manages inventory in four categories: rotables, consumables, tools and supplies. The inventory module features include:
 - Controls for availability, suspense, quarantine, shelf life, calibration, repair, expiry, lead time, on order and minimum stock.
 - Full performance and cost history on rotatable components.
 - Warranty claim situations identified.

- Report generator facilities.
- Single entry data capture which eliminates redundant data entry.
- Aviation industry standard terminology.
- Menu organization by employee job classification and task function.

• Flight Operations – the flight operation module provides for the control of all pilot and aircraft log information including crew and aircraft scheduling for use by air carriers conducting passenger and/or freight operations. Cost and statistical data are monitored by aircraft and pilot, and a variety of user-defined reports are available for management and operational purposes.

- Accounting – the accounting module consists of an integrated system for:
 - Passenger and freight revenue accounting.
 - Accounts Receivable.
 - Accounts Payable.
 - General Ledger.

AVERAGE WORK FORCE: System Analysts – 4
Programmer/Analysts – 4
Marketing & Customer Support – 5
Aircraft Maintenance Planners – 3

GROSS SALES: No Data

PLANT SIZE: 3,000 Sq Ft

EQUIPMENT: Airborne develops software for a wide range of Intel 808X, 80286, 80386 and Motorola 68000 based hardware. In-house computer facilities include the IBM XT/AT, IBM RT, Compaq, Pertec and CIE, with peripheral devices (plotters, printers and CRT's) including NCR, WYSE and Hewlett Packard.

EXPERIENCE: Airborne Data Systems Ltd has developed an excellent reputation with its customers with respect to scheduling budget, product performance and customer support. Airborne's diversified Canadian customer base includes major international jet charters, regional, and commuter carriers as well as multi-national oil and gas and forestry based corporate customers. American customers include a major air frame manufacturer.

KEYWORDS: Accounting; Aircraft Inventory; Aircraft Maintenance; Aircraft Scheduling; Application Software; Aviation Consultants; Aviation Management; Aviation Software; Computers; Crew Scheduling; Data Acquisition; Data Processing; Flight Operations; Flight Planning; ILS; Programming; Software Development; Software Services; Software Systems; Ticketing.

REVISED: April 88

INTERNATIONAL DATACASTING CORPORATION

ADDRESS: 2650 Queensview Drive
Ottawa, Ontario, Canada
K2B 8H6

CONTACT: Mr Bill Currie, Vice President, Marketing & Sales –
(613) 596-4120

HISTORY: IDC is a Canadian-owned and based high technology company founded in 1984. The company recently amalgamated with Central Dynamics Ltd of Montreal, Quebec, a twenty-five year old manufacturer of equipment in the video equipment field. IDC is a publicly traded company operating out of Ottawa, Ontario and Montreal, Quebec.

CAPABILITY: IDC is primarily involved in the design, manufacture and selling of value added, high speed digital data, voice and image communications networks employing satellite and cable transmission technology.

Through the use of technology owned by IDC in radio frequency (RF), modulation schemes, custom integrated circuits and data networking software, IDC has developed a leading edge and cost-effective architecture for integrating voice, data and video applications. The proprietary communication products of IDC include - very small aperture terminals (VSATs); solid-state satellite uplink products; sophisticated, non-stop data networking computers; and a number of special products designed for various application areas, such as digital imaging software, electronic mapping and navigation software, high-speed local area network systems (LAN) and hardware components such as low-power solid-state power amplifiers (SSPAs) and high stability oscillators. Networks based on IDC's products and technology have been established in Japan, Canada and the US. A new network is currently in the planning process for Australia.

IDC has developed specialized hardware and software products for such areas as electronic charting and mapping, electronic high resolution catalogues, freeze-frame digital video, and full motion digital video with stereo audio.

To both protect and enhance its technology, IDC had developed a number of integrated circuit chip sets. These chip sets perform such functions as forward error correction to ensure improved data communication integrity, compression, standard communication interface handling and ensuring security by, encryption, incorporating addressing codes and packed decoding.

AVERAGE WORK FORCE: In excess of two-thirds of the employee population are professional staff.

EXPERIENCE: IDC's customers include - various departments in the Canadian Government, including the Canadian Hydrographic Service for the development of a high-speed mapping and charting transmission system. IDC recently won a major contract for the installation of a satellite based aircraft parts maintenance system.

KEYWORDS: Microwave; FM; Satellite Receivers; Very Small Aperture Terminals (VSAT's); Digital Video Imaging; High Speed Digital Modems; Data Networking Computers; Electronic Mapping Software; Navigation Software; Data Broadcasting Systems; Band-Edge Technology & Utilization.

REVISED: February 88

INVAR MANUFACTURING Ltd

ADDRESS: 1 Parry Drive
Batawa, Ontario, Canada
K0K 1E0

CONTACT: Mr M Mainville, General Sales Manager, Precision Machined Products and Systems - (613) 398-6106

HISTORY: Effective 5 Jan 87, the assets of Bata Engineering Division have been purchased by Invar Manufacturing Ltd. Invar Manufacturing Ltd is a newly formed company owned by Haspear Holding Inc which is a subsidiary of Linamar Machine Ltd, Guelph, Ontario, Canada.

Please be advised that it is management's intention to carry on the existing business of the former Bata Engineering Division in all respects. Accordingly, we are requesting that your present records be amended to reflect the name of Invar Manufacturing Ltd. Invar Manufacturing Ltd will operate with the same experienced management team that was instrumental in achieving the high standards for which Bata Engineering Division was well known. Based on our ongoing capital equipment acquisition program which includes our heavy concentration of NC/CNC machines, we intend to broaden our base of activities to include - aircraft/aerospace, military/defense, nuclear/candu industries, commercial/off-road equipment, and transportation/light rapid transit systems.

CAPABILITY: Invar Manufacturing Ltd is primarily involved in the manufacture of precision machined products and systems using the latest state-of-the-art in manufacturing technology. Complimenting this capability is a high quality sophisticated plate and sheet metal fabrication facility.

- Aircraft - Invar Manufacturing continues to supply flap fittings, splice fittings, carriers, kick fittings and jack fittings for the DC-9, MD-80, DC-10 and MD-11 aircraft.

- Military - Over and above major sub-assemblies, Invar's military production for US ground support vehicles includes a complete range of military hydraulic cylinders, power assist assemblies, gear boxes and individual components. In addition, we fabricate ammo racks, ammo conveyors and ammo stackers for the M109/FAASV Support Vehicle.

- Nuclear - Working in cooperation with AECL, major equipment is machined, assembled and tested at their Batawa facility for the Canadian Candu Reactors.

- Commercial - Commercial production meets the rigid demands required in the construction, forestry and mining industries and off-road equipment. This production includes - ride struts, steer and hoist cylinders ranging in size from 2" to 14" ID with lengths from 12" to 20". Other commercial products include machining of V-4, V-6 and V-8 engine blocks and fly wheel covers.

- Transportation - This area of production is dedicated to the manufacture, assembly, test and supply of trucks (undercarriage) to railway specifications for the Light Rapid Transit System serving Toronto, Vancouver, and Detroit, MI.

AVERAGE WORK FORCE: Engineering - 6
Marketing - 5
Accounting - 5
Production (direct & indirect) - 269
QA/QC - 20

GROSS SALES: 1986 - \$26.1M
1987 - \$24.3M

PLANT SIZE: 208,000 Sq Ft (Manufacturing)
47,000 Sq Ft (Raw Material Storage)
5,000 Sq Ft (Inspection)
24,000 Sq Ft (Administration)

EXPERIENCE: Invar Manufacturing Ltd does business with an extensive list of contractors associated with the Defense, Aerospace, Nuclear Energy, Commercial, and Transportation community.

KEYWORDS: Machining; Precision Machining; Plate & Sheet Metal Fabrication; CAD/CAM; NC/CNC Equipment.

REVISED: January 88

I. P. SHARP ASSOCIATES Ltd (Trusted Systems Group)

ADDRESS: 265 Carling Ave, Suite #600
Ottawa, Ontario, Canada
K1S 2E1

CONTACT: Mr David A Bonyun, Project Manager - (613) 236-9942

HISTORY: I P Sharp Associates Ltd is a Reuters' company with corporate headquarters located in Toronto. Incorporated in 1964, I P Sharp Associates was purchased by Reuters in 1987. The Sharp Special Systems Division began operation in 1973. Minicomputer-related and non-APL activities were amalgamated in this division. The EVES project was performed with Special Systems until recent corporate restructuring created the Trusted Systems Group. This profile focuses on the Trusted Systems Group.

I P Sharp Associates has offices in Australia, Austria, Belgium, Denmark, France, the Far East, the Federal Republic of Germany,

Italy, The Netherlands, Norway, South Africa, Sweden, Switzerland, the UK. The company has six Canadian locations in four provinces, and eight US locations in six states and Washington, DC.

CAPABILITY: I. P. Sharp is a computer software company specializing in the provision of timesharing service called SHARP APL; the development of software to handle projects ranging from large database applications to small real-time monitor and control systems; research and development of software tools to aid in the production of trusted systems.

SHARP APL is offered in both interactive and batch modes and can be used at the users premises, on a variety of terminals, or via a telephone connection. Each user has 256 kilobyte work-space that may contain both functions and data. Any number of work-spaces may be stored on disk for later retrieval. The file system is based on the principles of shared direct access and total security.

AVERAGE WORK FORCE: Total - 9 (Trusted Systems Group)

GROSS SALES: 1986 - \$765K
1987 - \$980K
(Trusted Systems Group)

PLANT SIZE: 3,100 Sq Ft (Trusted Systems Group - including machine room)

EQUIPMENT: The hardware resources available for the Trusted Systems Group projects include an IBM PC/XT, an AT&T 3B1, A VT103, two VAX 750s, and four Symbolics Lisp Machines. The software resources include SAX (Sharp APL for Unix), STSC APL*PLUS, VAX/VMS, Berkeley Unix, and the Genera system. The two VAXen and the four Symbolics reside on an ethernet. One VAX is also connected to the ARPANET.

EXPERIENCE: The Trusted Systems Group of I P Sharp Associates Ltd is currently involved in projects related to Artificial Intelligence - EVES, a program verification system; and - MAPLESS, a tool for developing APL-based expert systems.

EVES (Environment for Verifying and Evaluating Software) is a program verification system being developed for the Canadian Department of National Defence and the United States Navy. The development of EVES has two major streams - the design of a specification and implementation language (with supporting mathematics), called Verdi; and the implementation of a theorem prover, called NEVER.

The first phase of research and development has been completed. This has resulted in the m-EVES system, which consists of the language m-Verdi, an m-Verdi compiler, and the m-NEVER theorem prover.

m-Verdi is a language which allows for the writing of formal specifications and the implementation of imperative programs. The formal semantics for m-Verdi is described using a form of Denotational Semantics. The logic is non-standard in that it extends the many sorted Predicate Calculus so that new symbols can be added to a theory (using m-Verdi declarations), and includes proof obligations requiring the "conservative extension" of theories. The logic requires that programs be proved to terminate and that the specification of program functionality be of the well-understood Floyd-Hoare style.

A compiler for m-Verdi has been written and runs on VAX computers under the VMS or UNIX operating systems. The compiler optimizes the generated code and is easily retargetable to other machines and operating systems.

The m-NEVER (Not the EVEs Rewriter) theorem prover supports the interactive development of proofs and also has powerful automatic capabilities. These capabilities include the detection of propositional tautologies; the handling of equality and integer relations; the application of conditional rewrite rules; the application of forward chaining rules; the heuristic expansion of defined functions; the automatic instantiation of quantified variables; and the Boyer-Moore style of automatic induction.

The theorem prover development has liberally borrowed ideas from work by Bledsoe, Boyer and Moore, Nelson and Oppen, and the work embodied in Affirm. A detailed presentation of m-NEVER is available.

Future work on the theorem prover will focus on the development of a proven "proof checker" for m-EVES proofs. Such a checker will take m-EVES proofs and ensure that each inference is sound.

The m-EVES system, except for the m-Verdi compiler, currently resides on a Symbolics Lisp Machine. Interaction with m-EVES may occur through either an editor interface or a command processor.

The development of m-EVES was completed in mid-November 1987. Future work (resulting in the development of EVES) will be directed at increasing the expressibility of the logic and m-Verdi (resulting in Verdi); the writing of a compiler for Verdi; the continuing evolution of the interface; the porting of the system to other hardware bases; and the continued application of the system to various examples.

MAPLESS (Mixed paradigm APL-based Expert System Shell) is a set of software tools, which can be used by knowledge engineers to develop APL-based expert systems. It is intended to achieve the following goals: increase the availability of expert systems technology to APL users; determine the strengths and weaknesses of APL as a language in which to implement expert systems; and provide the Communications Security Establishment (CSE) with a software tool for building risk analysis expert systems.

A first set of requirements of the software tools has been jointly established by I P Sharp Associates Ltd and CSE. The work plan is to develop product versions of MAPLESS for two APL systems: SAX (Sharp APL for UNIX) running on an AT&T 3B1 computer; and STSC APL*PLUS running on an IBM PC/XT. A MAPLESS prototype for the SAX environment will be demonstrated by I P Sharp Associates Ltd at a SigAPL workshop (Syracuse, NY) in August 1988.

MAPLESS consists of a knowledge-base management facility, STAPLE (Structured TURING and APL Environment), a set of expert system utilities. The knowledge-base management facility will enable knowledge engineers to construct and maintain databases using the following paradigms for representing knowledge - frames, production rules, predicate calculus, and the STAPLE programming language. The latter will be used to define value types of frame slots. Either STAPLE or APL may be used to specify the routines (inference methods, procedural attachments, and end-user interfaces) of MAPLESS expert systems.

STAPLE is an environment for developing programs in the STAPLE Programming Language, which combines TURING (from the University of Toronto) with the expression language of APL. The environment will include a compiler for translating STAPLE programs into either Sharp APL or STSC APL*PLUS, depending on the APL system being used. The set of expert system utilities will include rule chaining inference methods and standard abstract data types. The STAPLE compiler will be written in UNIX C (using lex and YACC) for the SAX environment and translated into Turbo C for the PC.

The following work on the project has been completed: the formal software requirements of MAPLESS; a formal methodology for representing and acquiring knowledge (to be implemented in MAPLESS); and the design of the STAPLE language.

KEYWORDS: APL Programs; Artificial Intelligence; Automated Deduction; Automatic Induction; Computer Security; Software Specification; Software Verification; Higher Order Language; Computer Software; Software Services.

REVISED: February 88

ITRES RESEARCH Ltd

ADDRESS: 141, 6815 - 8 Street N E
Calgary, Alberta, Canada
T2E 7H7

CONTACT: Mr George D Neely, Marketing Manager - (403) 274-7440

HISTORY: Founded in 1979, the company has been specializing in applications of electro-optics technology since that time. ITRES is a Canadian-owned company with its principals as the major share-

holders. Two senior people have had long careers in developing instrumentation for space research through work at the University of Calgary space research department.

CAPABILITY: ITRES Research Ltd is at the forefront of electro-optics technology. It conducts research and development into applications of charge coupled devices for cameras and imaging systems which operate in white light, ultraviolet or infrared ranges.

The company has special expertise in digital electronic camera systems and charge coupled device (CCD) technology and applications. These applications include remote sensing, x-ray detection ultraviolet, infrared, low light level imaging and machine vision.

AVERAGE WORK FORCE: Senior R&D Personnel – 5
Additional Technical Staff – 7
Support Staff – 3

We have the capability to quickly add personnel for larger projects.

PLANT SIZE: 2,500 Sq Ft

EQUIPMENT: All electronics design test equipment needed to turn out our products including CAD design system and electronics design and test equipment. Examples are Tektronix DAS 9100 Series Digital Logic Analyzer System, and Logical Devices PAC Programmer.

EXPERIENCE: ITRES had designed systems for the following uses – a high speed, high resolution digital CCD camera, an airborne imaging spectrograph for use on small aircraft or drones which produces both images and spectral information, a spaceborne imaging spectrograph for use on the space shuttle, a ground-based, all sky auroral imager, a camera and data storage system for astronomy applications. In developing these systems ITRES has acquired considerable expertise in data storage and retrieval systems. The company designs both hardware and software for the above applications.

Major customers include USAF, indirectly with ITRES a subcontractor to the Lunar and Planetary Laboratory of the University of Arizona, University of Calgary, Leigh Instruments, Government of Canada – Energy, Mines and Resources, Atmospheric Environment Service, Bristol Aerospace, and Scitech Ltd.

KEYWORDS: Electro-Optics; Charge Coupled Devices; CCD's; Cameras (Digital); Imaging; Remote Sensing; Spectroscopy; Spectrographic Imager; Space instrumentation; Sensing (UV); Sensing (IR).

REVISED: February 88

ITT CANNON ELECTRIC CANADA (A Division of ITT Industries of Canada Ltd)

ADDRESS: 4 Cannon Court
Whitby, Ontario, Canada
L1N 5V8

CONTACT: Mr A S Gibbins, Manager of Marketing and Sales
(416) 668-8881

HISTORY: The company commenced operation in Canada in 1942 as Cannon Electric Company Ltd. The parent company, Cannon Electric Company (Los Angeles), was eventually purchased by ITT Corporation and the Canadian company became a wholly owned ITT subsidiary. In 1956, the company name was changed to its present name, and in 1967 the company began operation as a division of ITT Canada Ltd. The company maintains sales offices in Montreal and Vancouver.

CAPABILITY: ITT Cannon Electric Canada is engaged in R&D, manufacture, and sales of electrical & electric connectors, cable harnesses, and interconnect devices for the hostile environment market. Cannon connectors are in virtually every passenger jet aircraft in the free world, deep in the earth & ocean, in space, in nuclear reactors, and in oil & gas drilling rigs – in other words, in the hostile environment.

Their manufacturing capability features both manufacturing & industrial engineering, tool design (plastic & metallic components), machining fabrication & assembly operations, machine & model shops, molding facilities, and electroplating. They have world-wide market responsibility and engineering design cognance over: a) battery power connectors, b) firewall connectors, c) waterproof connectors, d) high-temperature connectors, e) buffet series, f) aircraft firewall connectors, g) circular nuclear series, h) weatherproof series, i) Canadian design specials, j) environmental rack & panel DRA series, k) geophysical-seismic, l) cryogenic connector series, and m) sonar-underwater tow connectors.

Product development has led to a variety of new and/or improved connectors. These include: a) a new series with proven results at elevated temperatures for nuclear applications; b) a connector to meet MIL-C28840 for seaboard applications (QPL); c) a connector (MS5015/3400D series) being used by the US Navy on new equipment as well as for retrofit, replacement & all power applications; d) the MIL-C-83723 series III connector designed for high performance aero applications; e) the "Downhole" connector designed for high pressure usage (hermetically sealed); f) the MR series connector – rugged, heavy duty & waterproof (designed to withstand severe environmental conditions); g) a geophysical hermaphroditic connector designed for the seismic exploration industry; and h) a connector to meet MIL-C-38999, III K.

AVERAGE WORK FORCE: 180

GROSS SALES: 1986 – \$18M
1987 – \$20M

PLANT SIZE: Production – 55,000 Sq Ft
Office – 15,000 Sq Ft

EXPERIENCE: It suffices to say that Cannon connectors are designed to the specification of the electronic industry, and meet the requirements of the Canadian Department of National Defense, the US DOD, Canadian Ministry of Transport, and the Canadian Standards Association. Cannon plugs are used world-wide.

KEYWORDS: Cables; Connectors; Harnesses; High Pressure (Connectors); High Temperature (Connectors); Materials R&D (Connectors); Testing (High Pressure); Tubing; Wiring.

REVISED: January 88

IVI Inc

ADDRESS: (Marketing Office)
1010 Sherbrooke West, #608
Montreal, Quebec, Canada
H3A 2R7

CONTACT: BGen J Jacques Morneault, Dir, International Marketing
(514) 866-1232

HISTORY: IVI Inc carries on a tradition in the manufacture of small arms ammunition that dates back to 1880 when the Quebec Arsenal was established in Quebec City. It was incorporated as Valcartier Industries Inc in 1966, later changed to IVI Inc, and the plant is located on a 500 acre site at Val Belair, Quebec, 15 miles outside of Quebec City. IVI Inc, a wholly owned subsidiary of the SNC Group, is Canadian owned.

CAPABILITY: IVI Inc is a manufacturer of high quality, small arms ammunition, both military and commercial. It is the sole small arms ammunition manufacturer in Canada. It supplies the Canadian Forces for all their needs in small caliber ammunition. From the early 1950s on, it has from time to time been a major supplier to the US Army. Its military ammunition conforms to NATO specification.

IVI Inc operates its own foundry and produces brass, lead and gilding metals required for the production of ammunition. All dies, punches, tool holders and other tools are produced in-house. The precision tooling is used for both commercial and military ammunition.

IVI maintains very high quality control standards through rigid and numerous destructive and non-destructive inspection checks follow-

ing the various stages in the manufacturing process. They have a functioning Proof House and ranges for proof firing of all products.

IVI Inc's R&D capability is considerable. In the late 1960s, it cooperated with the Canadian Army Research and Development establishment in the development of heavy core Tungsten Carbide Anti-Armour ammunition and in the middle 1970s, it developed in cooperation with US industry, aluminum cast technology for 30mm canon ammunition. More recently, the R&D department was involved in the development of bullets for caseless ammunition, of plastic blanks and of a 9mm sub-sonic cartridge. The R&D department is equipped with a manufacturing capability, testing facilities, most modern measuring devices, and indoor and outdoor ranges.

IVI Inc's military products include 5.56mm, 7.62mm, .50 cal., 9mm, and 20mm ammunition. Commercial ammunition includes a large assortment of shotshells, .22 caliber rimfire, as well as popular calibers of centerfire cartridges.

AVERAGE WORK FORCE: 600

GROSS SALES: 1986 - \$41.0M
1987 - \$48.0M

PLANT SIZE: Manufacturing - 500,000 Sq Ft
Warehouse - 84,000 Sq Ft
Total Acreage - 500 Acres

EXPERIENCE: IVI is the sole supplier of small arms ammunition to the Canadian Forces. They export small arms ammunition to more than 20 countries.

KEYWORDS: Ammunition; Ordnance; Small Arm Caliber Ammunition.

REVISED: February 88

J.J. CHARLTON COMPANY Ltd

ADDRESS: 115 Milvan Drive
Weston, Ontario, Canada
M9L 1Z8

CONTACT: Mr. John A Charlton, President - (416) 741-9030

HISTORY: J.J. Charlton Company Ltd is a wholly owned Canadian company founded in 1947 with a sole affiliate - C.F.N. Precision Machining Inc. J.J. Charlton initially did work for A.V. Roe (Aircraft Division) during the 1950s. Over the years, J.J. Charlton has concentrated its efforts on supplying precision machined parts to the aerospace, defense, atomic energy, telecommunications and business systems industries.

CAPABILITY: J.J. Charlton specializes in precision machining of all alloys and plastics, using single spindle screw machines, Swiss Type Sliding Head Screw machines, and CNC turning and milling machines. They also have a unique Diamond Centerless Grinding capability for fragile material, i.e., ceramic, glass and ferrite tubes. J.J. Charlton also incorporates a modern QC department using a computerized statistical QC system for process capability along with a digital co-ordinate measuring machine. Our QC manual meets the requirements of DND-1016, AQAP-1, AQAP-9, MIL-I-45208 and CSA Z299-2.

AVERAGE WORK FORCE: Machinists - 37
Quality Control - 4
Production Control - 3
Administrative - 7

GROSS SALES: No Data

PLANT SIZE: 21,000 Sq Ft

EXPERIENCE: J.J. Charlton's customers include Devtek (Diemaco), Murata Erie North America Ltd, Kyocera International, Garrett Manufacturing Ltd, Ernst Leitz Canada Ltd, Varian Canada Inc, Leigh Instruments Ltd, Litton Industries, Hughes Aircraft, Martin Marietta, Bell

Helicopter, Scott Aviation, Canadian Marconi, Donlee Nuclear, T.R.W., I.B.M., Xerox, N.C.R., Vac-Aero International Inc., Amphenol-Bendix, AMP of Canada Ltd, and many more aerospace related customers.

KEYWORDS: Automatic Screw Machining; CNC Machining; Centerless Grinding; Honing; Induction Hardening; Light Assembly; Machining; Precision Machining; Swiss Type Screw Machining.

REVISED: January 88

KAYCOM Inc

ADDRESS: 5800 Thiemens Blvd
Ville St Laurent, Quebec, Canada
H4S 1S5

CONTACT: Mr Brian March, General Manager - (514) 745-5000

HISTORY: Kaycom Inc is primarily involved in the supply, and manufacturing and overhaul of military replacement parts and equipment. Since its inception, Kaycom has specialized in the logistic support of a wide variety of North American designed military transport and fighter aircraft.

CAPABILITIES: Kaycom possesses an extensive product list for which they have developed excellent sources of supply for current and out-of-production aircraft. The company products range from electronic to mechanical, and include airframe and engine spares, to total support all military type equipment.

AVERAGE WORK FORCE: Engineers - 1
Management - 3
QA - 2
Sales - 5
Others - 10

GROSS SALES: 1986 - \$ 6.7M
1987 - \$10.0M

PLANT SIZE: 15,000 Sq Ft (including warehouse)

EXPERIENCE: Present customers include DND; commercial and research agencies (i.e., Canadian Coast Guard and National Research Councils); foreign military based establishments (i.e., Namsa and Ministry of Transport, Britain); and Canadian aerospace manufacturers (i.e., Spar Aerospace, Heroux, IMP Aerospace, and many others).

KEYWORDS: Airframe Spares; Logistic Support; Spare Parts (Aircraft); R&O (Parts); Spare Parts (Engines).

REVISED: January 88

KOM Inc

ADDRESS: 145 Spruce Street
Ottawa, Ontario, Canada
K1R 6P1

CONTACT: Mr George Lambert, Regional Sales Manager - (613) 238-7766

HISTORY: KOM Inc originally known as K O Mair Associates Ltd was established as a proprietorship in 1969 in Ottawa, Canada. The firm provided expertise in service and maintenance of computer and peripheral equipment, particularly for Digital Equipment. To date, service to equipment is provided on a regional level. In 1978, the company diversified into manufacturing its own computer products.

CAPABILITY: KOM specializes in the integration of write once optical disks into the general computing environment. Specific features of this integration are the support of random access to the same disk directory structure and the support of the identical file attributes as the host computer operating system. Current support is for DEC VAX and PDP11 computers, IBM-PC and SUN/UNIX systems. This support will be extended to other significant computer types during 1988.

AVERAGE WORK FORCE: PhDs - 2
Engineers - 4
Others - 24

GROSS SALES: 1987 - \$2.5M
1988 - \$4.0M

PLANT SIZE: 8,500 Sq Ft

EQUIPMENT: DEC VAX 11/780, Micro VAX (3), CAD Workstation (3), Flow Soldering & Board Stuffing, Temperature Cycling and other, Electronic Test facilities, and Optical Disks (6 types).

EXPERIENCE: KOM was recently awarded a contract to integrate optical disks for the storage of mechanical drawings on all US Navy ships. Other significant contracts for optical disk storage from E I Dupont, General Electric Aerospace (Utica, NY), Grumman Aerospace (Long Island), Norwegian Army, European Space Agency, Texas Instruments (Dallas), and Shell Oil (Houston).

KEYWORDS: Optical Disk; Archive; Mass Storage; DEC; VAX; UNIX; RSX11-M Plus.

REVISED: March 88

KOSS MACHINE & TOOL CO

ADDRESS: 1765 Shawson Dr, Units 7 & 8
Mississauga, Ontario, Canada
L4W 1N8

CONTACT: Mr Dragomir Cajic, President - (416) 678-7236

HISTORY: Koss Machine & Tool Co was started in 1975 as a general machine shop and incorporated in 1976. The company ventured into defense and aircraft industry associated work in 1978 which today comprises 80% of their work. The company is a division of 333 111 Ontario Ltd.

CAPABILITY: Koss Machine is involved in milling and lathe operations primarily involved with defense and aerospace related work. The CNC milling operation has a working travel of up to 20x40 inches and a vertical space up to 29.75 inches. Tolerances can be held to 0.0003 inch. A new Makino machine center is operational. It exhibits X, Y, Z axis lengths of 75.5, 27.5, and 23.6 inches, respectively.

Lathe operations are carried out with both CNC and conventional machines with maximum swing of 24 inches, maximum cross travel of 9.75 inches, and a maximum machining length of 21.5 inches. A quality assurance manual (quality level to DND 1016/MIL-I-45208) has been prepared.

AVERAGE WORK FORCE: Machinists - 18
Quality Control - 2
Production Control - 1
Administrative - 4

GROSS SALES: 1986 - \$0.9M
1987 - \$1.1M

PLANT SIZE: 6,600 Sq Ft

EQUIPMENT: Koss' equipment includes CNC machines, vertical milling machines, engine lathes, turret lathes, and other assorted equipment associated with machining operations.

EXPERIENCE: Contractor approvals have been afforded by Canadair Ltd, the deHavilland Aircraft of Canada Ltd, and McDonnell Douglas.

KEYWORDS: CNC Machining; Injection Molding Tools; Machining; Precision Machining; Tooling.

REVISED: February 88

LAVALIN Inc

ADDRESS: 90 Sparks Street, Suite #330
Ottawa, Ontario, Canada
K1P 5B4

CONTACT: Mr Bernard Charbonneau, Vice President, Defence Projects (613) 232-3511

HISTORY: Lavalin Inc is a wholly-owned Canadian Corporation engaged in engineering, manufacturing, procurement and construction management. It was founded in 1936, with a head office in Montreal and offices across Canada and in several countries around the world. It has completed projects including turnkey projects in more than ninety countries worldwide.

CAPABILITY: The Lavalin Group is involved in studies, planning, engineering, procurement, project management, construction, manufacturing, training and technical assistance in military, government and industrial projects. It draws resources from approximately eighty-five group divisions and associate companies offering technology in aerospace and air transportation, both military and civil. Two of these divisions are Aeronautics Canada Inc and UTDC Inc.

Aeronautics Canada offers an integrated line of services regarding operations, technical assistance and expertise related to commercial air transport, passenger and cargo services, at national and international levels; engineering and maintenance of equipment with facilities located at the Montreal International Airport (Dorval) capable of handling stretch aircraft, and include an avionics overhaul and repair shop; technical supervision and project management services, specialized qualifications courses and technical training; civil aviation administration including administration systems, air traffic control services, airports and air navigation aids; the Helicopter division offers complete services in the rotorcraft sector, including operations, technical assistance, training, procurement and sale/purchase services.

UTDC is a leading supplier of ground transportation systems, ground handling equipment and services. In addition to transportation systems research and development, UTDC offers complete services for the development, training, operation and maintenance of efficient revenue services on behalf of the clients. UTDC designs and manufactures light rapid transit, as well as conventional and articulated light rail, heavy rail, and computer rail transit systems. It is currently engaged in the supply of heavy military trucks for the Canadian Armed Forces and is bidding on a large USAF requirement for aircraft cargo loaders.

AVERAGE WORK FORCE: Engineers & Other
Professionals - 2,500
Technicians - 1,500
Others - 2,000

GROSS SALES: 1986 - \$500M +
1987 - \$600M (Est'd)

PLANT SIZE: 170,000 Sq Ft (UTDC)
65,000 Sq Ft (Aeronautics Canada)

EQUIPMENT: UTDC can provide complete developing, testing, research and development programs, engineering and design and manufacturing capabilities. Facilities are located in Thunder Bay and Kingston, Ontario. In-house computer systems include mainframe VAX and DEC system, CAD facilities, IBM, Aries II computer system and PDP central processing units.

EXPERIENCE: Present customers include various departments within the Canadian Government and industries in both Canada and the US:

- Department of National Defence - Heavy Logistics Vehicle Wheeled System (\$250M Cdn); Life Skills Education Program; Design, development and presentation of an Advanced Avionics course.

- Oerlikon Aerospace - Construction Radar Manufacturing Plant, St-Jean, Quebec.

- UTDC – Heavy Rail Mass Transit (\$58M US), Massachusetts; Articulated Light Rail Vehicles (\$52.2M US), Santa Clara, CA; Bi-Level Locomotive Hauled Commuter Coaches (\$24M US), State of Florida; Downtown People Mover Turnkey Contract (\$167M US), Detroit, MI.

KEYWORDS: Process Control; Network Management; Computer-Aided Design; Microcomputers; Digital Graphics; Computer-Aided Teaching; Office Automation; Remote Sensing; Military Trucks; All Terrain Crash Recovery Vehicles; System Integration; Quality Assurance.

REVISED: February 88

LEAVENS AVIATION Inc

ADDRESS: 2555 Derry Road East
Mississauga, Ontario, Canada
L4T 1A1

CONTACT: Mr E Baumgartner, Production Manager – (416) 678-1234

HISTORY: Leavens Aviation Inc is a Canadian-owned company founded in 1927. In its early days, it was primarily engaged in air transportation and flight training. During the second World War, in addition to operating a flight training school for Commonwealth pilots, it enlarged its engine, propeller and accessories overhaul capabilities, and engaged in manufacturing parts and assemblies for aircraft.

In 1972, the operation was relocated to its present facility, concentrating on manufacturing of aircraft parts and assemblies, distribution of aircraft supplies, as well as the overhaul of engines, propellers and accessories for small-to-medium sized aircraft.

CAPABILITY: Leavens Aviation Inc specializes in the manufacturing of parts, sub-assemblies and assemblies for military and civilian aircraft, and the overhaul of piston engines, propellers and accessories.

AVERAGE WORK FORCE: 60

GROSS SALES: 1986 – \$5.3M
1987 – \$5.5M

PLANT SIZE: 30,000 Sq Ft

EQUIPMENT: Equipment includes CNC milling and turning, full machining capabilities, and assembly and test facilities.

EXPERIENCE: Leavens Aviation Inc has manufactured parts and assemblies for Canadian and US manufacturers. They provide their customers with hydraulic hose and aircraft control cable assembly and test facilities, and overhaul of aircraft engines, propellers and accessories. They are interested in doing business for the USAF.

KEYWORDS: Aircraft Parts; CNC Machining; Control Cables (Aircraft); Hydraulic Hose; Machining; R&O (Accessories); R&O (Engines); R&O (Propellers).

REVISED: January 88

LEIGH INSTRUMENTS Ltd

ADDRESS: 260 Hearst Way
Kanata, Ontario, Canada
K2L 3H1

CONTACT: Mr Michael A Rowlands, Vice President – (613) 591-3220

HISTORY: Leigh Instruments is a high technology electronics company engaged in the systems engineering, development and manufacture of equipment, products and systems principally for the aerospace, government and military markets. Leigh was founded in 1961 and is a publicly held, Canadian owned company. Approximately

50% of sales are for the export market. Leigh's engineering and aerospace operations, described further under capabilities, has engineering facilities in Ottawa, marketing and executive offices in Kanata, and has a production facility in Carleton Place thirty miles west of Ottawa. Other facilities include the Frequency Control Division in Toronto, which manufactures crystals, crystal filters, and high environment glass-to-metal seals; and a plant in the UK near Heathrow Airport which supplies some products as well as support and repair and overhaul services to Leigh's European customers. In addition, Leigh has just acquired Micronav Limited of Sydney, Nova Scotia, a manufacturer of microwave landing systems.

CAPABILITY: Leigh's aerospace and engineering systems operations supplies a range of products, systems and services to the aerospace, military and government sector. The company is organized into three product groups: Aerospace, Navigation Aids and Naval Communications.

The company developed initially as a flight recorder/crash locator systems company, building on a patent for a unique deployable crash position indicator. New generation systems of both these products are now offered – a solid-state crash survivable memory unit for flight data recording, and advanced helicopter beacon for crash location.

The aerospace product group has developed its business base to include products and expertise in other areas such as helicopter CPLs, mechanical strain recorder systems and helicopter icing detection systems. In the latter instance, for example, Leigh won a US Army AISLIS (Advanced Icing Severity Level Indicating System) R&D contract on a competitive basis, as a result of its experience.

The company has, over 28 years, developed its capability also in the areas of data processing and display systems applications, communication switching systems, and radar-based surveillance and display systems as both a prime contractor and system integrator.

AVERAGE WORK FORCE: Total – 800

GROSS SALES: 1986 – \$34.5M
1987 – \$52.7M

PLANT SIZE: 122,000 Sq Ft (Ottawa & Carleton Place, Ontario)

EQUIPMENT: Leigh's production facility is qualified to DND 1015, which incorporates MIL-Q-9858B, and has a resident DND inspection detachment. The plant has a fully integrated production facility including machine shop with both NC and CNC equipment; mechanical and electrical inspection facilities; electrical and electromechanical assembly; and specialized foam/fiberglass production facilities. Electrical assembly facilities include component preparation, semiautomatic insertion, PCB flow soldering, conformal coating, semiautomatic wirewrap and harness shop. Test facilities include production ATE, cable and harness test facilities, various production test stations, test equipment calibration facilities, and a large RF anechoic chamber.

The plant also has a well equipped environmental test lab and a number of different types of AGREE production environmental test chambers. Engineering facilities include well equipped laboratories including a number of microprocessor development stations and a VAX 11-750 engineering computer facility.

EXPERIENCE: Leigh Instruments Ltd's major customers include the US Navy, US Army, US Air Force, US Coast Guard, Canadian Forces, Canadian Coast Guard, Transport Canada, McDonnell Douglas, Lockheed, Boeing, RAF, RNOAF, FRG DOD, and Panavia. Leigh is source qualified by all of the foregoing.

Leigh's major projects in the aerospace government and defense areas have included:

- System Prime Contractor – Vessel Traffic Management Systems (radar surveillance, display, data processing, microwave backhaul) for Transport Canada for Vancouver, Tofino and Les Escoumins (1976-1982).
- System Integrator – TRACS, Terminal Radar and Control System, for Department of National Defense. System engi-

neering, integration, installation and test of seven modern ATC radar, processing, display and communication control facilities across Canada (1979-1982).

- Systems Engineer – System definition contractor for VTM System for Port of Hong Kong (1982-present). Interior Communication System integrator for Canadian Patrol Frigate CD phase finalist (1981-1982).

More current programs are:

- Ships Interior Communications – Supply STM SHINCOM (integrated system) to DND (1982-present). Contracted to supply system for new frigate program (1983) and SRP-II follow-on ships.
- TACAN Navigation Equipment – Contracted by DND to supply 30 TACAN ground beacons across Canada as well as naval versions for Canadian Patrol Frigate (1984-present), and SRP-II. 12 TACAN ground beacons for Royal Norwegian Air Force.
- Voice Recorders – Cockpit Voice Recorder to Panavia Tornado (1975-present).
- Flight Recorder/Locator Systems USN, Canadian, USAF and European programs (1970 to date). Aircraft include P3, C130, 707, F104G, Tornado (Joint program with Dornier), others. Contained Crash Survivable PDR/Maintenance Recorder: RAF Hawk.
- Mechanical Strain Recorder – (present) – USAF F-16, others.
- Helicopter Icing Detection Units – Various commercial North Sea, others. AISLIS R&D contractor for US Army.
- Helicopter CPI – Various military, North Sea commercial.
- Other CPI – Military and civil applications; Canada, the US and Europe.
- Avionics Production – Subcontract manufacture of advanced avionics subsystems for CF18 (SMS and CSCS for LSI: 1982-present). Established second source to US Navy.

KEYWORDS: Aircraft Nav aids; Avionics; Build-To-Print; Crash Position Indicator (Deployable); Emergency Locator Beacons; Flight Data Recorders; Ice Detector; Integrated Naval Communications; ILS; R&O (Avionics); Subcontract Manufacturing.

REVISED: February 88

LITTON SYSTEMS CANADA Ltd

ADDRESS: 25 Cityview Drive
Rexdale, Ontario, Canada
M9W 5A7

CONTACT: Mr D Hughes, Director of Marketing, RADAR/FIS/INS
– (416) 249-1231

HISTORY: Litton Systems Canada Ltd (LSL), a major operating division of Litton Industries, has a long and successful history of designing and manufacturing highly sophisticated electronics equipment for military and commercial use in a world-wide market. LSL was launched nearly 30 years ago with a contract to assemble and test the guidance and control systems in the LN3 Inertial Navigation System (INS) for the Canadian Forces CF-104 Starfighter. LSL's facilities were rapidly expanded and improved, and test facilities were established to support the manufacture of gyroscopes, accelerometers and inertial platforms. The original INS has subsequently been modified and improved, and at LSL, a whole family of guidance systems has evolved to support the European Starfighter program and for use in aircraft manufactured by Grumman, Lockheed, Canadair, deHavilland, McDonnell and General Dynamics. A Litton guidance system, the LN35, was the one chosen for the US Cruise Missile.

CAPABILITY: LSL has become a dominant force in the INS marketplace, providing both spinning wheel and ring laser gyros for the military and commercial marketplace. The LTN-72 system has achieved phenomenal success and is the most widely used INS throughout the world. The LTN-72 is a reliable, self-contained, all-weather, world-wide navigation system that is totally independent of ground-based navigation aids. In 1982, LSL underwent a major expansion and upgrading of its INS capabilities to allow the manufacture of ring laser gyro based inertial systems. Litton Canada has a world product mandate to build commercial RLGs for Litton Industries. These systems, the LTN-90, LTN-90-100 and the LTN-92 are now on board aircraft such as the A310, A300-600, E-6A, Dash 7 & 8, and The Challenger 601.

Research and Development money is now being spent on the next generation of INS – the Fibre Optic Gyro (FOG). Litton hopes to have its FOG system out of the engineering lab and onto the production floor within five years.

Utilizing the wealth of experience acquired in LN3 INS design and production testing, in 1962 LSL developed a punched-tape programmer controlled Mobile Automated Test Set for first level maintenance support of the INS used on board to F-104 and P-3 aircraft. LSL developed its first computer-controlled Automatic Test Equipment (ATE) in the late 1960s. This system, the Litton Automated Test Set (LATS), is utilized by LSL as factory test equipment, as well as by a number of commercial and military customers as depot test stations. The LATS has been expanded to accommodate the testing requirements of the F-18 and other modern aircraft and helicopters. The expanded Litton Automated Test Set (ELATS) is used as a depot test station in support of new aircraft programs. ELATS and RF ELATS (for testing RF systems) has been purchased by the Canadian Air Force, the Royal Australian Air Force, the Royal Australian Navy, and one European NATO Air Force. LSL offers an Hydraulic ELATS as well.

In June 1967, the company began broadening the scope of the projects it pursued and competed for and won the contract for the supply of CCS-280 Command and Control System for the Canadian DDH-280 class destroyers.

Now twenty one years later, LSL has headed up a team of Canadian Industrial firms to reconstruct Canada's four Tribal Class Destroyers. The Tribal Update and Modernization Project (TRUMP) has seen LSL chosen as the prime contractor in the refurbishment of the four ships the company help build. The first destroyer entered dry dock in the fall of 1987 on schedule. Litton Canada is now one of the largest marine systems houses in Canada.

LSL's expertise in the Marine environment includes the Automatic Data Link Plotting System (ADLIPS). ADLIPS is a complex, low-cost, shipborne computer-assisted, real-time command, control and tactical data communications system which can be fully integrated with existing ships' systems.

Previous indepth experience in the development of software in both the inertial and systems engineering fields made LSL the logical choice for the contract to develop the Data Interpretation and Analysis Center for the Maritime Command of the Canadian Forces. The DIAC correlates current and historical data enhancing mission planning and control.

The expertise acquired in Systems Engineering was also responsible for the design and development of Litton Integrated Security Systems. These computer-based systems combine complete perimeter detection, surveillance, access control and radio communication to provide the necessary level of protection. The company has obtained contracts for the system for implementation at a Middle East Air Force Base. Canada systems have been installed in Maximum Security Penitentiaries and Nuclear Power Generating Stations.

In order to ensure that its products and areas of expertise stay abreast of the current technology, LSL is committed to a high investment in research and development. Recently, this effort, combined with assistance from a joint Canadian/US development contract, resulted in the next-generation aircraft cockpit displays. LSL has developed a solid-state, multi-colored modular, flat panel display system using light emitting diode technology for use in the military and commercial

environments. This system has been selected by General Dynamics for implementation in the F-16 aircraft, by Boeing for use on the EC-135 and by a number of simulator manufacturing companies.

The company also produces programmable display modules (PDMs), cathode ray tube cockpit displays, and liquid crystal displays (LCDs). A Pittsburgh subsidiary, Panelvision, designs and manufactures programmable liquid crystal displays.

Another successful R&D program that has also progressed to production is the Inertial Referenced Flight Inspection System (IRFIS). IRFIS is a self-contained enroute and terminal navaid calibration system. It performs calibration of Category I, II and III Instrument Landing Systems with higher accuracy and lower operating costs than other systems currently in use.

Another example of the successful implementation of R&D and systems engineering is the Litton family of Airborne Search Radar Systems. LSL entered the field in 1972 when, in conjunction with the AIL Division of Cutler-Hammer, it designed and developed radar systems for fleet fitment in the Canadian Forces CH-124 Sea King Helicopters. Since that time, a number of different systems have emerged with varying capabilities. The Litton radar is currently flying in 16 different types of aircraft in 18 countries around the world. The company is building X Band Radar for the Canadian LLADs and the US FAD-LOS programs. In the summer of 1988, the company will open a radar manufacturing facility in Halifax, Nova Scotia to produce these radars and to support the CP-140 aircraft.

LSL has recognized that an electronic system management capability is a national priority, and has taken the necessary steps to equip the company with the organizational structure, skilled management, technical personnel and specialized computer facilities to undertake the management of large, complex electronic and avionic programs.

AVERAGE WORK FORCE: Engineers - 800
Mfg/Admin/Techs - 2,700

GROSS SALES: 1986 - \$306M
1987 - \$451M

PLANT SIZE: 818,673 Sq Ft

EQUIPMENT: No Data

KEYWORDS: ATC; ATC Simulators; Avionics; Build-To-Print; Cathode Ray Tube Displays; Cockpit Displays; Data Acquisition; Data Analysis; Displays; Fiber Optic Gyros; Flat Panel Displays; Inertial Navigation; Instruments; Intrusion Detection; LED Displays; Liquid Crystal Displays; Navigation; R&O (Avionics); Radar; Search Radar; Ring Laser Gyros; Simulators; Solid State Devices; Subcontract Manufacturing; Training.

REVISED: February 88

LNS SYSTEMS Inc

ADDRESS: 7 Bovis Avenue
Pointe-Claire, Quebec, Canada
H9R 4W3

CONTACT: Mr Neil R Bronson, RSM Product Manager -
(514) 695-8130

HISTORY: LNS Systems Inc was incorporated in 1971 as a wholly owned subsidiary of International Technical Products Corporation Inc (ITPC) of Washington, DC. LNS' ownership changed to Leigh Instruments Ltd (LIL) of Ottawa in 1979. In 1982, LNS was purchased by the current management team under the leadership of Richard Prytula.

CAPABILITY: LNS Systems Inc designs, manufactures and markets mobile, fixed and transportable air traffic control and monitoring systems, and mobile runway lighting systems for government customers. LNS' products consist of both LNS standard manufactured products and specialized systems to meet customers' specific operational requirements. LNS capabilities include custom integration of

hardware systems and design of specialized software applications. From LNS' subsidiary Metcan Fabricators of Ottawa, LNS can provide specialized shelters, test workshops and mobile trailers.

AVERAGE WORK FORCE: Engineering - 6
Marketing/Contracts - 7
Manufacturing - 21
Admin/Management - 12

GROSS SALES: 1986 - \$ 3.0M
1987 - \$13.0M (Est'd)

PLANT SIZE: 30,000 Sq Ft (Manufacturing)
10,000 Sq Ft (Office)

EQUIPMENT: LNS' manufacturing departments include electrical and electronic assembly, mechanical fabrication, testing and quality control.

EXPERIENCE: LNS' sales are primarily to military, civil aviation, government, communications agencies (i.e., Post, Telephones and Telegraph 'PTT'), internal security and other government customers. LNS' diverse products have been sold in Kuwait, Saudi Arabia, United Arab Emirates, Venezuela, Philippines, Yugoslavia, Algeria, Barbados, Bahamas, Guatemala, Canada and the US.

KEYWORDS: ATC; Mobile ATC; Runway Supervision; Communications Switching; Runway Lighting; Spectrum Monitoring.

REVISED: January 88

LUCAS INDUSTRIES CANADA Ltd

ADDRESS: 5595 Royalmount Avenue
Montreal, Quebec, Canada
H4P 1J9

CONTACT: Mr S R (Russ) Woodland, VP and General Manager -
(514) 735-1536

HISTORY: Operating since 1949, Lucas Aerospace Canada is a division of Lucas Aerospace Inc., located in Reston, VA, and provides a fully integrated facility for design, engineering, manufacturing, assembly, testing, and service support for a wide range of aerospace products supplied primarily to the North American market.

CAPABILITY: The Canadian company has designed and developed a range of ancillary fuel controls - start flow control, flow dividers and dump valves for gas turbine engines. Production of main fuel pumps for PW 100 series engines under license commenced in 1985. An extensive capability exists for repair and overhaul of a wide range of equipment including fuel pumps and controls, generators and regulators, air valves and starters, actuators, relays, ignition, contactors, and industrial accessories.

AVERAGE WORK FORCE: Manufacturing - 73
Engineering - 7
Sales & Marketing - 10
Others - 15

GROSS SALES: 1987 - \$10.0M +

PLANT SIZE: 54,000 Sq Ft

EQUIPMENT: Equipment includes:

- Test facilities for the repair and overhaul of both fuel and hydraulic systems, including Rolls Royce Spey and Tay engines and CF-18 F 404 engine. Products in the range up to 400 hp with drive speeds of 40,000 rpm fluid pressures of 5,000 psi dynamic and flow rates to 60,000 pph can be accommodated.
- For pneumatic products, air test pressures up to 1,000 psi and flow rates up to 2.2 lbs per second are available.
- Electrical AC and DC stands for solid state rotating equipment are similarly comprehensive.

- Manufacturing (example) – Monarch VMC45 CNC with GE 2000 control with contouring travel 18" x 30" x 10". Nakamura Tome Model TMC-3B CNC Lathe with Fanuc 6T control. Nakamura Super 2A CNC Lathe with Fanuc 10T-F control.

- Inspection (example) – Mitutoyo coordinate measuring machine type FN 905.

EXPERIENCE: Present customers include – The Department of National Defence, Boeing, Pratt & Whitney Canada, Canadair, Avco-Lycoming, General Electric, Rolls Royce and deHavilland.

KEYWORDS: AOG Service; R&O (Accessories); Mechanical Fuel System; Hydraulic Systems; Specialized Controls.

REVISED: February 88

LUMONICS Inc

ADDRESS: 105 Schneider Road
Kanata, Ontario, Canada
K2K 1Y3

CONTACT: Dr Jim Higgins, Vice President Sales & Marketing – (613) 592-1460

HISTORY: Lumonics Inc is a Canadian-owned high-technology company incorporated in 1970 with three subsidiary companies in the US, providing equipment and services for laser marking and laser materials processing. The company also has a subsidiary in the UK, Lumonics Ltd, that specializes in a range of Nd:YAG lasers for industrial machining tasks and one in West Germany, Photon Sources GmbH, that specializes in industrial CO2 lasers for materials processing. The company was originally formed to manufacture and sell the pulsed CO2 lasers developed at the Defense Research Establishment Valcartier.

CAPABILITY: Lumonics specializes in pulsed gas lasers including excimer, tunable dye, CO2 and HF/DF types. It is the third largest North American laser manufacturer serving both the scientific and industrial markets. They have twelve series of lasers available with various models within each series. A significant portion of their business is contract R&D, but it is carried out only when Lumonics anticipates and retains rights for commercial exploitation. Their scientific market includes university, government and corporate researchers. The primary fields in which their customers are active are spectroscopy, photo-chemistry, isotope separation, material processing and plasma research. Lumonics has been manufacturing their excimer lasers for scientific application since 1978, and introduced the first of an extensive range of industrial applications in 1986. Lumonics' key functions of material procurement and control, electrical and mechanical assembly, and final performance testing are carried out in-house. Machined and sheet metal components are sub-contracted.

AVERAGE WORK FORCE: Scientists & Engineers – 40 (In Canada)
Others – 120 (In Canada)
Others – 240 (In the US)
Others – 180 (In the UK)
Others – 30 (In West Germany)

GROSS SALES: 1986 – \$65M
1987 – \$72M

PLANT SIZE: 75,000 Sq Ft (In Canada)
150,000 Sq Ft (In the US)
75,000 Sq Ft (In the UK)
10,000 Sq Ft (In West Germany)

EXPERIENCE: Lumonics is interested in working with the USAF and has done so in the past in the form of providing standard lasers. They have not undertaken any USAF-sponsored R&D. They carry out extensive in-house R&D for the Canadian Government.

KEYWORDS: CO2 Lasers; Cutting (Laser); Drilling (Laser); Dye Lasers; Excimer Lasers; Gas Lasers; Heat Treating; Laser Marking Systems; Laser Materials Processing; Lasers; Pulsed Gas Lasers; TEA Lasers; Welding (Laser).

REVISED: May 88

MA ELECTRONICS CANADA Ltd

ADDRESS: 3135 Universal Drive
Mississauga, Ontario, Canada
L4X 2E7

CONTACT: Mr Peter Balodis, Sales & Marketing Mgr – (416) 625-4605

HISTORY: MA Electronics Ltd was established in January 1977 to support the Canadian communications industry's expanding needs for advanced technology components and subsystems. Over the last years, a hybrid microwave integrated circuit (HMIC) production facility has been established. The company is part of the M/A Com Inc operating companies.

CAPABILITY: MA Electronics is a major supplier of GaAs FET amplifiers and related microwave components for commercial, military, and telecom markets. Their Mississauga facility houses microwave design and test laboratories, an extensive machine shop, and plating and finishing facilities, complemented by engineering, administrative and sales offices. They have the capability to provide standard components from a diversified product line, design active and passive devices to customer specifications, and interface requirements and combine technologies into subsystems, thus maximizing overall performance and cost effectiveness. In general, they offer a comprehensive in-house product capability spanning 0.5 to 28 GHz.

MA Electronics has three product groups:

- Passive Microwave Components – coaxial and waveguide devices including ferrites, evanescent mode filters, multiplexers, and precision electroformed components.
- Commercial Satellite Electronics – low noise communication band amplifiers, power amplifiers, and integrated subsystems containing up and down conversion, filters, multipliers, and sources.
- Hybrid Microwave Integrated Circuit (HMIC) Components – multioctave wideband amplifiers over .5 to 28 GHz. Small signal to 1 watt. Built in-facility under MIL-Q-9858A Quality Program.

AVERAGE WORK FORCE: 105 (Total)

GROSS SALES: 1986 – \$4.5M
1987 – \$4.5M

PLANT SIZE: 22,000 Sq Ft

EQUIPMENT: Equipment includes Class 10,000 clean room manufacturing area for HMIC products, laser welder for hermetic packages, and electroforming capability.

EXPERIENCE: MA Electronics' product market is world-wide.

KEYWORDS: Microwave Components; Waveguides; Switches; Pin Diode Switches; Waveguide Attenuators; Couplers; Attenuators; Waveguide Transducers; Amplifiers; Microwave Amplifiers; Low Noise Amplifiers; Medium Power Amplifiers; High Power Amplifiers; Multiplexers; Electroforming; GaAs FET Amplifiers; Filters; Microwave Filters; Ferrite Devices; Isolators; Circulators; Coaxial Ferrite Devices; Microwave Subassemblies.

REVISED: February 88

MACDONALD DETTWILER

ADDRESS: 3751 Shell Road
Richmond, British Columbia, Canada
V6X 2Z9

CONTACT: Ms Ann Poelvoorde, Information Officer – (604) 278-3411

HISTORY: MacDonald Dettwiler is a private, Canadian-controlled corporation with two plants in Vancouver, Canada, and sales, service and engineering offices worldwide.

CAPABILITY: MacDonald Dettwiler is a world leader in computer-based systems for aerospace, resource management and electronics manufacturing applications. Founded in 1969, the company was launched to success as a major supplier of ground processing systems for the remote-sending Landsat satellites. Today, MacDonald Dettwiler is the world's largest supplier of turnkey remote-sensing satellite ground stations, and has branched out into:

- Space-Qualified Systems.
- Image Mapping systems for generating accurate maps from digital images.
- Meteorological Data Analysis and Distribution Systems.
- Systems for acquiring, correcting, analyzing and displaying optical and radar images from both spaceborne and airborne sensors.
- Flight operations management and air traffic control systems.
- High-resolution, high speed laser imaging systems for the electronics, manufacturing, graphics reproduction, and remote sensing industries.

The company offers design and development to MIL-SPEC or European Space Agency standards, advanced software engineering techniques, high-reliability and distributed systems, large-scale systems integration, and full integrated logistics support.

Since incorporation, MacDonald Dettwiler has grown to over 600 employees, of whom about 60% have university degrees, mainly in electrical engineering, computer science and physics. The company counts NASA, the European Space Agency, General Electric's Space Division, the US Jet Propulsion Laboratory, the USAF, and the Canadian Government among its clients. It exports 80% of its products and maintains a network of sales, service and engineering offices throughout the world.

As a result of its experience and track record, MacDonald Dettwiler is recognized worldwide as the leading supplier of ground receiving and processing systems for remote-sensing satellites. The company has been prime contractor for eight turnkey remote sensing satellite ground stations worldwide and major subcontractor for another 11. These constitute 19 out of the world's 23 Landsat and SPOT ground stations. Full turnkey services, including training and support, were provided for most of these installations. MacDonald Dettwiler is the prime contractor for both the ground segment of the ERS-1 radar satellite and Canada's Radarsat satellite ground station system.

The company is also a leading developer of space-qualified systems and associated artificial intelligence technology. As a major partner in Canada's Mobile Servicing System for the international Space Station Program, the company is contributing towards development of complex software, data processing subsystems and artificial intelligence applications.

MacDonald Dettwiler's MERIDIAN Image Analysis and Correction Systems combine both geometric and radiometric image correction with an advanced image analysis and processing capability. The MERIDIAN Image Mapping Systems produce topographic and thematic maps from digital imagery sources such as the SPOT and Landsat satellites and airborne Synthetic Aperture Radar (SAR). Their capabilities include geocoded image correction, height extraction, feature detection and extraction, and sophisticated interfaces to digital mapping systems.

The company has also played a leading role supplying meteorological satellite ground systems and components for all commercial weather satellites. MacDonald Dettwiler has been the prime contractor for 14 turnkey weather satellite ground stations. In the broader field of weather data processing and distribution, MacDonald Dettwiler has developed an Automated Weather Distribution System (AWDS) for

the USAF. AWDS will eventually provide a global weather information network connecting several thousand mini/micro-computers distributed over 166 sites worldwide.

MacDonald Dettwiler has always been at the forefront of digital Synthetic Aperture Radar (SAR) processing. The company was first to digitally process data from the Seasat A satellite, and first to develop a commercial digital SAR processor. It now manufactures a complete airborne SAR system - IRIS - in both remote-sensing and defense versions. The defense IRIS produces three meter resolution imagery and performs both moving and static target imaging in real time, on-board the aircraft. Images are downlinked, also in real time, to tactical mobile ground stations and to central processing and analysis facilities.

MacDonald Dettwiler's Aviation Systems Group specializes in developing high-reliability, advanced computer systems for flight operations and air traffic control. Systems and services are provided in airspace management, flight plan filing and validation, flight progress tracking, conflict detection and resolution, aeronautical data communications, simulation and training, radar data processing, flight data processing and weather data processing.

MacDonald Dettwiler FIRE 240 film image recorders plot high quality monochrome and color satellite images onto film for resource management and other remote-sensing applications.

AVERAGE WORK FORCE: Elect Eng - 80
Software Eng - 190
Systems Engs - 40
Scientists - 20
Admin - 265
TOTAL - 600

GROSS SALES: 1986 - \$55M
1987 - \$65M

PLANT SIZE: 150,000 Sq Ft (5 Buildings on 2 Sites)

EQUIPMENT: MacDonald Dettwiler's systems engineering facilities include an extensive VAX-based development environment. The hardware manufacturing plant includes full assembly, integration and test facilities for both custom and production units. Electronic assembly techniques include computer-guided stitch wiring. High precision electro-optical test equipment is used to ensure machined surfaces and electro-optical assemblies adhere to exacting tolerances.

EXPERIENCE: MacDonald Dettwiler has served as prime contractor on large scale systems for the US Air Force, Swedish Space Corp, Australia Center for Remote Sensing, National Research Council of Thailand, Indonesian Space Agency, German Space Agency, European Space Agency, Swissair Transport Co Ltd, Canada Center for Remote Sensing, and Atmospheric Environment Service Canada. The company has also served as subcontractor to Bendix, TRW Systems, General Electric Co, Jet Propulsion Laboratories, NASA, Messerschmitt-Bolkow-Blohm (W Germany), National Space Development Agency of Japan, and Hitachi.

KEYWORDS: Data Handling; Ground Stations; Image Processing; Image Recorder; Interactive Analysis; Landsat; Laser Film Image Recorder; Meteorological Satellite Processing; Remote Sensing; SAR; Software Systems; Space Qualified Systems; Spot; Synthetic Aperture Radar; Weather Forecasting Systems; Weather Image Processor.

REVISED: February 88

MAGNUM DISTRIBUTION Ltd

ADDRESS: #102 - 11400 Bridgeport Road
Richmond, British Columbia, Canada
V6X 1T2

CONTACT: Mr Terry Ibbetson, President - (604) 270-1389

HISTORY: Magnum Distribution is a Canadian-based manufacturing and distribution company founded in 1983. Originally the distributor

of the EAR-MIKE for North America, the company was so successful they were approached by the manufacturer to enter into a joint venture agreement. The joint venture has been completed and Magnum is now responsible for the manufacture and distribution of the EAR-MIKE on an international basis.

CAPABILITY: Magnum Distribution is primarily involved in the design, manufacture and distribution of EAR-MIKES and HEADSETS, which are the key accessories for two-way portable radio equipment. Magnum has also designed a vehicular intercom system for use in emergency rescue vehicles, fire trucks or any vehicle which operates in environments where there is a high ambient noise level where maintenance of two-way communication is critical. Magnum capabilities include engineering (encompassing R&D), production, quality control and training. There is a dealer network established throughout North America for product support and service. The dealer network in the US is operated by our associate company Magnum Distribution Inc which is located in Blaine, Washington. Additional, Magnum sells EAR-MIKES internationally and can provide product support and service in the following countries - West Germany, Norway, Sweden, Belgium, Denmark, France, the UK, Australia, Singapore, Japan, Hong Kong, Taiwan, Brunei, Indonesia, Malaysia, the Philippines, Thailand, Saudi Arabia, Bahrain, Yemen, Kuwait, United Arab Emirates, Oman, and Qatar.

AVERAGE WORK FORCE: Engineers - 2
Production Mgr - 1
Technicians - 5

GROSS SALES: 1986 - \$.0M
1987 - \$.08M

PLANT SIZE: 1,800 Sq Ft

EQUIPMENT: EM-200 Ear-Microphone, EM-200A Ear-Microphone Airline Version, EM-200W Hardwired Intercom System, HS-600 Light Noise Attenuation Headset, HS-700 Medium Noise Attenuation Headset, HS-800 High Noise Attenuation Headset, and Vehicular Intercom System.

EXPERIENCE: Magnum's present Government customers include - the Department of Supply & Services, the RCMP, the Coast Guard, and the Department of Fisheries, and Parks and Recreation. Additionally, other customers include many municipal fire and policing agencies as well as general industry.

KEYWORDS: Ear-Microphone; Handsfree Radio Communications; Headsets; Vehicular Intercom Systems; Communications Design.

REVISED: January 88

MAGNUS AEROSPACE CORPORATION

ADDRESS: 237 Metcalfe Street
P. O. Box 599, Sta B
Ottawa, Ontario, Canada
K1P 5P7

CONTACT: Mr Frederick D Ferguson, President - (613) 236-4798

HISTORY: Founded in 1981 by Mr Ferguson, Mr F Y McCutcheon (Toronto), Mr C Bosch (Bermuda), to develop a Heavy-Lift, Lighter-than-Air Craft industry based upon Mr Ferguson's invention of the Rotating Sphere (Magnus effect) airship. The company built scaled prototypes and has extensively analyzed the "LTA 20-1". In 1987, Magnus was awarded a prime contract with the Strategic Defense Initiative Office (SDIO), US Military. US Contact is Mr P Stockton at (617) 523-5630.

CAPABILITY: Magnus is primarily involved in the start-up and manufacturing of low level, VTOL, heavy-lift, lighter-than-air-craft. Payloads up to 400 tons can be lifted with helicopter-like precision hover and placement. The LTA 20-1 design is a twin tilt rotor design encompassing a helium filled sphere which provides neutral buoyancy without payload. The sphere provides additional lift by rotating (magnus effect) as the craft translates to forward velocity. The craft is analogous to a large weightless tilt-rotor aircraft. Magnus is explor-

ing the possibility of operating the LTA 20-1 at high altitudes for station-keeping missions. The SDIO contract resulted in aircraft definition for three high altitude roles and one heavy lift specification. Magnus envisages co-production with existing manufacturers.

AVERAGE WORK FORCE: (Est'd 1988)
Technical - 40
Others - 10

GROSS SALES: 1988 - \$5.0M (Est'd)
1981/1987 - \$17.0M (Gross Investment Income)

PLANT SIZE: 10,000 Sq Ft

EXPERIENCE: SDIO US Military, definitions contract, extensive R&D analysis including computer analysis and wind tunnel (Institute for Aerospace Studies, University of Toronto).

KEYWORDS: Lighter-Than-Air; LTA Systems; Airships; Heavy-Lift Systems; Vertical Take-Off and Landing; Spherical Airships; Magnus Effect; Aerodynamic Research; High Altitude Airships; Aerial Crane; Blimp Systems.

REVISED: February 88

MBB HELICOPTER CANADA Ltd

ADDRESS: 130 Albert St, Suite #910
Ottawa, Ontario, Canada
K1P 5G4

CONTACT: Mr D P Chambers, Manager, Government Programs - (613) 232-5454

HISTORY: MBB Helicopter Canada Ltd began operation as Canada's first helicopter manufacturer in April 1984. The company was established as a result of a contract with the Federal and Ontario Governments, and is 95% owned by Messerschmitt-Boelkow-Blohm GmbH of West Germany and 5% owned by Fleet Aerospace of St Catharines, Ontario.

In 1986, MBB Helicopter Canada Ltd opened an 85,000 sq ft manufacturing plant in Fort Erie, Ontario. MBB Helicopter Canada Ltd has the world product mandate for the manufacture of the BO 105 LS helicopter, the latest in MBB's series of light twin engine helicopters. The BO 105 LS is especially designed for operations in areas of hot temperatures and high altitudes.

CAPABILITY: The capabilities at the Fort Erie, Ontario facility range from research and development, systems integration and flight testing, to full scale product support. The production facility will provide for up to 38 helicopters at various stages of completion at any one time and a Quality Assurance section monitors this production at each assembly stage through to final approval of the flight-tested helicopter.

The Product Development Group's capabilities include preliminary design and development schemes, detailed electrical and mechanical design, specifications for materials and processes, final preparation of drawings, and load and stress analysis. There is a writing services department that produces technical publications including maintenance, overhaul and repair manuals, and flight manuals.

The company's Marketing Department is located in Ottawa, Ontario, and is responsible for the promotion and sale of all MBB helicopters, including the BO 105 CBS and the larger BK 117.

AVERAGE WORK FORCE: Corporate - 5
Marketing - 7
Finance - 16
Engineering - 42
Operations - 68
Quality Assurance - 8

GROSS SALES: 1987 - \$20.0M

PLANT SIZE: 85,000 Sq Ft

EQUIPMENT: No Data

EXPERIENCE: MBB Helicopter Canada Ltd as a subsidiary of Messerschmitt-Boelkow-Blohm GmbH (MBB) has access to a broad range of knowledge and expertise. MBB is a trusted partner around the world in various programs, including the TORNADO fighter aircraft, FANTRAINER primary training aircraft, AIRBUS transport aircraft, Space Labs, Satellites and Energy and Environmental programs.

The companies Canadian customers include the Canadian Coast Guard, ALC Airlift Corporation of British Columbia, Ontario Ministry of Natural Resources, Sealand Helicopters, Toronto Helicopters, and the Department of National Defence.

MBB Helicopter Canada Ltd is a rapidly expanding organization with a highly professional team who are eager to broaden present day programs.

KEYWORDS: BK 117 Helicopter; BO 105 Helicopter; Environmental Control; Flight Testing (Helicopters); Helicopters; R&O (Helicopters).

REVISED: February 88

McDONNELL DOUGLAS CANADA Ltd

ADDRESS: Box 6013
Toronto AMF, Ontario, Canada
L5P 1B7

CONTACT: Mr Garret G Ackerson, President & CEO - (416) 677-4341

HISTORY: McDonnell Douglas Canada Ltd (MDCAN), a wholly owned subsidiary of McDonnell Douglas Corp, St Louis, MO, was federally chartered in Jul 64 to manufacture aircraft and other aerospace products. The plant and head offices are located adjoining the Lester B Pearson International Airport, Toronto, Canada.

CAPABILITY: MDCAN is a fully-integrated high technology manufacturer of major airframe structural components for both commercial and military jet aircraft. Capabilities include design assist for major components and full management and implementation of tooling concepts, and design and manufacture for McDonnell Douglas DC-8, DC-9/MD-80 and DC-10/KC-10 aircraft. On these programs, MDCAN has total project management responsibility, including material and subcontract management. MDCAN has been a pioneer in manufacturing methods and equipment development, including substantial application of numerically controlled machines. Extensive work also has been done in the area of bonded metal components, automated machine controlled drilling and riveting and milling of spars of extended length components.

MDCAN is a leader in the design and implementation of integrated computer-assisted Management Systems in the ongoing development of Information Resource Management.

AVERAGE WORK FORCE: Engineers - 79
Machinists - 106
Tool Makers - 110
Others - 4071

GROSS SALES: 1986 - \$308.9M
1987 - \$293.0M

PLANT SIZE: 1,780,000 Sq Ft

EQUIPMENT: MDCAN's equipment is progressively updated to state-of-the-art with the result that MDCAN is a leader in computer aided manufacturing in the Canadian aircraft industry. The equipment used at MDCAN is that of a well-equipped airframe manufacturing facility producing large sophisticated airframe components such as MD-80 and KC-10 wings. Special equipment includes:

- Automated Hydraulic Powered Riveters - five 100' long machines; five 50' long machines.

- Numerical Control Equipment - 72 machining centers; 2 drill rivet/routers; 4 lathes; 1 coordinate measuring machine; 8 CNC presses; 1 digitizer plotter; and 2 tube benders.

- Computing Equipment - 1 IBM 4341; 2 IBM 3380; 2 DEC PDP11/70; 2 DEC VAX; and 2 Perkin Elmer 3250.

- Hydraulic Presses - 6 vertical and stretch form, up to 300 tons.

Other facilities include the Engineering Laboratory, heat treat, paint and process, and mechanized penetrant inspection units up to 100 feet in length.

EXPERIENCE: Since 1965, MDCAN has produced major fuselage structures for the DC-8 and major wing and fuselage structures for all commercial and military versions of the DC-9/MD-80 family. MDCAN was also active in the design and development of the DC-10, leading to design and manufacture beginning in 1968 of detail and assembly tooling for the DC-10 wing. Production deliveries of DC-10/KC-10 components have continued uninterrupted since 1970, including several versions, both commercial and military. Tooling and production of F/A-18 structural components was begun in 1982, and production continues for aircraft destined to the US Navy, the Canadian Armed Forces, and other allied defense forces.

KEYWORDS: Airframe Components; Bonded Components; Bonded Honeycomb Components; Coatings; Components (Airframe); Composite/Fiberglass Components; Extended Length Machining; Forgings; Fuel Systems; Heat Treating; Hydraulics; Machining; Metalworking; Structures; Tooling; Tubing; Wiring.

REVISED: January 88

MDS AERO SUPPORT CORPORATION

ADDRESS: 1351 Newton Street
Boucherville, Quebec, Canada
J4B 5H2

CONTACT: Mr T E Miller, Vice President, Business Development - (613) 744-7257

HISTORY: MDS Aero Support Corporation is a Canadian-owned company providing systems engineering support for gas turbine engine test facilities. The company has offices in Montreal, Quebec; Ottawa, Ontario; and Toronto, Ontario.

CAPABILITY: MDS Aero Support Corporation is primarily involved in the design, engineering, construction, maintenance and operational support requirements for engine test facilities. Their capabilities cover specialized engineering services for complete test facility design and construction as well as individual systems design, fabrication and installation including data acquisition systems, fluid control measurement systems, test stands and prototype systems. They provide operational configuration management support for engine test facilities through the provision of Field Service Representatives, documentation control, technical publications, training, engineering support, acoustical and vibration analysis, gas turbine engine related performance studies, Repair & Overhaul services and spare parts.

AVERAGE WORK FORCE: PhD - 1
Engineers - 15
Others - 25

GROSS SALES: 1987 - \$4.0M
1988 - \$6.5M (Est'd)

PLANT SIZE: 10,000 Sq Ft

EXPERIENCE: MDS Aero Support Corporation's present customers include various departments in the Canadian Government and industries in both Canada and the US for both military and commercial applications. The company is interested in doing business with the US Military and commercial operators.

KEYWORDS: Engine Test; Fuel Control; Systems Engineering; R&O (Engine Test Facilities); Ground Support Equipment; Field Service; Spare Parts; Facilities Design; Facilities Construction.

REVISED: January 88

M.E.L. DEFENCE SYSTEMS Ltd

ADDRESS: 1 Iber Road, P. O. Box 90
Stittsville, Ontario, Canada
K0A 3G0

CONTACT: Mr Brian Metcalfe, Deputy Director, Corporate Business Development (613) 836-6860

HISTORY: M.E.L. Defense Systems Ltd is a wholly-owned subsidiary of Philips Canada Ltd, established in 1982 as a Canadian electronic warfare systems company.

CAPABILITY: M.E.L. Defense Systems specializes in the design, development, manufacture and integration of naval electronic warfare (EW) systems for Canadian and export markets. The company also provides contracted engineering consulting and program management services. In-house and contracted studies have been performed for the Department of National Defence on advanced land and air EW systems as well as naval EW systems. Capabilities include research and development, software design and development, and program generation and simulation activities. The M.E.L. Defence Systems' plant and CAD/CAM laboratory facilities are security cleared to SECRET level, as are all personnel associated with our military EW products. Manufacturing is to AQAP-1. As a member of the Philips Defence Control Systems Main Industry Group, M.E.L. Defence Systems has full access to the substantial research, engineering, production and marketing resources of the Philips Group of companies worldwide.

AVERAGE WORK FORCE: PhD - 6
Engineers - 50
Others - 84

GROSS SALES: 1986 - \$33.0M
1987 - \$34.0M

PLANT SIZE: 45,000 Sq Ft

EQUIPMENT: Secure electronics assembly, integration and testing facility, 600 sq ft of TEMPEST shielded environment for support of EW research and development, software development and program generation and simulation activities, and CAD/CAM microwave and digital laboratories supported by a central in-house DEC computer system tied to various VAX and micros.

EXPERIENCE: M.E.L. Defence Systems' principal customer is Canadian Department of National Defence.

KEYWORDS: ECM; Electronic Support Measures; Electronic Warfare; Program Management; Software Development; Systems Integration; TEMPEST.

REVISED: April 88

MENASCO AEROSPACE Ltd

ADDRESS: 1400 South Service Road West
Oakville, Ontario, Canada
L6L 5Y7

CONTACT: Mr Eric Eriksmoen, VP, Marketing - (416) 827-7777

HISTORY: Menasco is a wholly owned subsidiary of Colt Inc (US) and was organized in 1971.

CAPABILITY: Menasco designs, develops, test, and manufactures fixed-wing aircraft and helicopter landing gear systems. Also included in this capability are electro-hydraulic and hydro-mechanical systems related to primary and secondary flight controls; fly-by-wire electro-

hydraulic flight controls; ground steering, including steer-by-wire; aircraft hydraulic systems; variable wing and wing sweep actuation and machining of aircraft and helicopter components. They meet contractor and quality control standards as specified by FAA, DOT, MIL-Q-9858A, and AQAP-1. Physical and environmental testing is accomplished with, among other facilities, two drop test towers which can also measure landing gear shimmy and steering characteristics. Brochures available upon request.

AVERAGE WORK FORCE: Engineers - 45
Manufacturing - 262
Others - 193

GROSS SALES: 1986 - \$80M
1987 - \$84M

PLANT SIZE: 220,000 Sq Ft

EQUIPMENT: Complete physical and environmental testing laboratory for landing gear, flight controls and actuating devices, including facilities for vibration, structural, stress survey, fatigue testing, and full complement of NC equipment and a computerized production control system.

EXPERIENCE: Menasco Canada has produced equipment for the following manufacturers and aircraft - Boeing (727, 737, 757, CH-47, CH-46, V-22); Bell (YAH-63, XV-15); Canadair (CL-41, CL-84); deHavilland (DHC-4, DHC-5, DHC-7); Fairchild Republic (A-10); Fokker (F-28, Fokker 100); General Dynamics (F-111); Lockheed (C-141, C-5A,B); McDonnell Douglas (DC-10, KC-10, MD-80); Short Bros (SD3-30); and Sikorsky (CH-53). Program and facilities have been approved by major military prime contractors and government agencies in the US and Canada.

KEYWORDS: Airframe Components; Control Systems; Flight Control Actuation Systems; Ground Steering Systems; Hydraulics; Landing Gear Components; Landing Gears; Wing Actuation Systems.

REVISED: January 88

METRO MACHINING CORPORATION

ADDRESS: 7926 - 15e Avenue
Ville St-Michel, Quebec, Canada
H1Z 3N6

CONTACT: Mr Bernard Coursimault, President - (514) 374-0791

HISTORY: Metro Machining Corporation is a high technology CNC machining center founded in October 1973. The company is Canadian-owned.

CAPABILITY: Metro Machining Corporation is primarily involved in producing aluminum and titanium air frame components from small to medium size, using 3 to 5 axis equipment. The company also produces landing gear components, heat treated up to 300 PSI.

AVERAGE WORK FORCE: Management - 6
Others - 45

GROSS SALES: 1986 - \$1.5M
1987 - \$2.3M

PLANT SIZE: 17,000 Sq Ft

EQUIPMENT: Various CNC equipment, single and multi spindle up to 5 axis including programming system NCL No. 501 APT.

EXPERIENCE: Present customers include - McDonnell Douglas Canada Ltd, Heroux Inc., Canadair Ltd, and Bell Helicopter.

KEYWORDS: Machining; Airframe Components; Components (Airframe); Components (Landing Gear); Components (Aluminum); Components (Titanium).

REVISED: February 88

MICRONAV Ltd

ADDRESS: P. O. Box 1523
Sydport Industrial Park
Sydney, Nova Scotia, Canada
B1P 6R7

CONTACT: Mr Nick Coyle, President - (902) 564-8833

HISTORY: Micronav is a Canadian owned manufacturer of airport microwave landing systems (MLS) ground transmitting equipment. The company was founded in 1981, and in 1988 was acquired by Leigh Instruments Ltd, Ottawa, Ontario, for which it operates as a wholly-owned subsidiary.

CAPABILITY: Micronav has designed and is now manufacturing MLS equipment meeting International Civil Aviation Organization standards. The company's MLS has been installed at airports in Eastern and Western Canada. MLS design and manufacturing disciplines include microwave technology, hardware and software design and development, systems management, product assurance (including reliability and failure mode and criticality analysis), production, quality assurance, documentation and training. Airport installation disciplines include site and soils surveys, foundation design, power and mechanical installation, general construction, on-site equipment test and checkout, and field service support. These disciplines can be applied to other products or projects on a contract basis.

AVERAGE WORK FORCE: Engineering - 20
Others - 20

GROSS SALES: 1986 - \$1.5M
1987 - \$2.1M

PLANT SIZE: 14,000 Sq Ft

EQUIPMENT: Complete digital electronics production facility. Micro-processor software development systems. Temperature test chamber, Microstrip circuit fabrication shop.

EXPERIENCE: Present customers include regional airports. Micronav maintains close technical liaison with Transport Canada. Specific installations include - MLS-400 plus associated DME/N, Port Hawkesbury, NS; and MLS-400 plus associated DME/N and 2 non-directional beacons, Pemberton, BC.

KEYWORDS: MLS; Precision Approach System; Airport Equipment; ATC; DME; Non-Directional Beacon.

REVISED: January 88

MICROTEL Ltd (Manutronics Division)

ADDRESS: 100 Strowger Blvd
Brockville, Ontario, Canada
K6V 5W8

CONTACT: Mr B W Tekamp, Marketing & Sales Manager -
(613) 342-6621

HISTORY: Microtel is Canada's second largest manufacturer of telecommunications equipment and is a wholly-owned subsidiary of British Columbia Telephone Company. In 1980, the Manutronics Division was established to market custom electronic manufacturing services. Over the past seven years, the Manutronics Division has evolved to become a total military subcontracting division.

CAPABILITY: Manutronics procures, manufactures and tests a wide variety of build-to-print products in electronics sub-assembly. Current contracts include backplane wiring, PWC, fab, assembly and test, cable forming and build-to-print assemblies. They meet MIL-Q-9858, MIL-I-45208 and P55110 requirements. They have instructors and operators qualified to WS 6536 weapon spec soldering.

AVERAGE WORK FORCE: Total - 1700

GROSS SALES: 1987 - \$140.0M (Microtel)
1987 - \$ 9.1M (Manutronics)

PLANT SIZE: 453,000 Sq Ft (Brockville, Ontario)
154,000 Sq Ft (Vancouver - 3 facilities)

EQUIPMENT: Includes Gardner Denver vertical (4), horizontal (7) machines, Hughes high voltage Fact test machines (2), surface mount equipment, weapon spec solder room and state-of-the-art PWC test equipment (Gen Rad 2276, Wayne Kerr 8315, Zentel).

KEYWORDS: Automated Backplane Wiring; Custom Chips; Fabrication/Assembly/Test; Hybrid Circuits; Machining; PC Board Design & Fabrication; Plastic Molding; Relays; Sheet Metal Fabrication; Wiring Harness Fabrication.

REVISED: January 88

MILLER COMMUNICATIONS SYSTEMS Ltd

ADDRESS: 300 Legget Drive
Kanata, Ontario, Canada
K2K 1Y5

CONTACT: Mr Allan Miller, President - (613) 592-3020

HISTORY: Miller Communications is a wholly Canadian-owned company founded in 1974 with no US subsidiaries. It is primarily a systems engineering company specializing in the planning, design, and implementation of a wide range of communication systems.

CAPABILITY: MCS designs and manufactures advanced communications systems and equipment for both military and commercial applications. The company is structured into three complementary divisions as follows:

- The Advanced Systems Division performs design studies, analyses and simulations, principally in the fields of communications and electronic warfare. Custom software and hardware is also developed to the level of full-scale prototype to prove concepts and demonstrate performance. Particular expertise exists in digital modulation and coding, spread spectrum techniques, channel modelling and propagation analysis, emitter location and identification, spectrum analyzing receivers, fixed/mobile satellite system design, satellite navigation and positioning, and interference effects analysis.
- The Monitoring Systems Division produces computer-controlled instrumentation for communications monitoring, research, and simulation. Defense-related products include a Communications ECM Simulator, which allows the evaluation of communications systems performance under jamming conditions, and an Adaptive Antenna Array Processor, which automatically synthesizes appropriate antenna patterns to reject interference and jamming. Products with both commercial and military applications include systems for spectrum surveillance, satellite monitoring, and satellite-mobile propagation simulation.
- The Telemetry Systems Division produces data downlink systems designed to transmit high-speed information such as digitized SLAR radar video in real time from an aircraft to a ship or ground station. Radar images from the aircraft can be received, stored and reproduced in hardcopy form on board the ship. Applications for the system include coastal surveillance and ice reconnaissance. Related data downlink system products include a high resolution airborne data acquisition system which permits video information such as SLAR and SAR to be stored on a 9 track tape recorder for off-line processing and an aircraft motion compensation system which corrects aircraft imagery for yaw and drift angle motion.

AVERAGE WORK FORCE: Engineers/Computer Scientists - 15
Total - 20

GROSS SALES: 1986 - \$1.9M
1987 - \$2.1M

PLANT SIZE: MCS is housed in a modern 15,000 sq ft plant (expandable to 40,000 sq ft on current site). The plant is well equipped with a variety of computers, test equipment and production equipment.

KEYWORDS: Adaptive Receivers; Automated Monitoring & Control; Build-To-Print; Communications; Communications Simulators; Data Acquisition; Data Processing; Digital Communications; Digital Modems; Electronic Warfare; Ground Stations; HF Adaptive Antenna Arrays; HF Communications; HF Modems; Jamming; Modems; R&O (Electronics); Radar; Radio Communications; Satellite Communications; Signal Identification Systems; Signal Processing; Spectrum Analysis; Spread Spectrum Modems; Synthesizers; Systems Design; Telecommunications; Terminals; Test Instrumentation; Testing/Test Equipment; UHF & S-Band Telemetry Trans; Voice Privacy Communications.

REVISED: January 88

MOLI ENERGY Ltd

ADDRESS: 3958 Myrtle Street
Burnaby, British Columbia, Canada
V5C 4G2

CONTACT: Mr S Newton Hockey, Business Development Manager
- (604) 437-6927

HISTORY: Moli Energy was formed in 1977 and initially was a privately owned research and development company. In 1986, it became a public corporation with shares trading on the Toronto Stock Exchange. The company operates out of two locations - an R&D and Marketing office in Burnaby, and a manufacturing plant in Maple Ridge, British Columbia.

CAPABILITY: Moli Energy Ltd is the world's leader in rechargeable lithium battery technology. The MOLICEL* battery, like other rechargeable batteries, is capable of being recharged hundreds of times. It is competing with Ni-Cd and lead acid rechargeable batteries and also with alkaline and lithium primary cells in those applications where cost effective operation is important.

The MOLICEL product offers distinct advantages over these other types of batteries:

- The higher energy density and high voltage of the MOLICEL rechargeable lithium battery make it the ideal power source for electronic devices.
- The batteries exhibit excellent charge retention and reliability and do not exhibit any memory effect problems.
- The sloping voltage profile during discharge allows measurement of the state-of-charge of the battery.
- The MOLICEL battery has set new standards of safety and is designed to operate over a wide range of environmental conditions.

AVERAGE WORK FORCE: Engineers & Scientists - 40
Others - 140

GROSS SALES: 1988 - \$5.0M (Est'd)

PLANT SIZE: 80,000 Sq Ft (Manufacturing)
30,000 Sq Ft (R&D and Admin)

EQUIPMENT: The most up-to-date lithium battery plant in the world consisting of electrolyte preparation plant with computerized process control, molybdenum sulfide cathode line, fully equipped dry room with automatic winders and assembly equipment.

EXPERIENCE: Moli Energy Ltd has been supplying the US Military and other customers from a pilot plant since 1985. Cells have been provided for test and evaluation as well as for small scale production devices. Research and development contracts have been received

from the US Army (Ft Monmouth), Department of National Defence (Ottawa), Transport Canada, and Boeing Aerospace. The new manufacturing plant was officially opened on 18 Sep 1987 and is gearing up for an ultimate capability of producing 33 million "AA" size cells per year.

KEYWORDS: Batteries; Rechargeable Batteries; Lithium Batteries.

REVISED: January 88

MONTREAL PRECISION CRAFTING Ltd

ADDRESS: 797 Lajoie
Dorval, Quebec, Canada
H9P 1G7

CONTACT: Mr Gerry Mancini, President - (514) 636-0823

HISTORY: Montreal Precision Crafting Ltd is a Canadian-owned machine shop that performs both industrial and aircraft machine work. It has been in existence since 1969.

CAPABILITY: Montreal Precision Crafting Ltd performs highly technical work and designing for all types of commercial and aircraft work. MPC is engaged in all types of manufacturing and designing.

AVERAGE WORK FORCE: Management - 3
Others - 15

GROSS SALES: 1986 - \$400K
1987 - \$425K

PLANT SIZE: 5,000 sq ft

EQUIPMENT: \$100K and more of standard machine shop equipment including lathes, milling machines, and drill presses.

EXPERIENCE: Montreal Precision Crafting Ltd's customers include Pratt & Whitney (United Aircraft), Noranda Research, Bell Canada, Canadian Explosives, Department of National Defence, Leigh Navigations Systems, MPB Technologies, Man Ashton, Peacock Ltd, Canadian industries, Proctor & Gamble, Noram Quality Controls, Avon Products, Beloit Canada, McGill University and Northern Telecom.

KEYWORDS: CNC Machining; Machining; Precision Machining.

REVISED: January 88

MPB TECHNOLOGIES Inc

ADDRESS: 1725 N Service Road, Trans Canada Highway
Dorval, Quebec, Canada
H9P 1J1

CONTACT: Dr M P Bachynski, President - (514) 683-1490

HISTORY: MPB is a Canadian-owned high-technology company that was incorporated in 1976. It is a spin-off from RCA Ltd. Other locations include Ottawa, Ont, and Varennes, Que (in the Canada Center for Magnetic Fusion at Hydro Quebec).

CAPABILITY: MPB headquarters occupies a modern 30,000 sq ft facility which includes a library, central computer room, machine shop, laboratories and production area. They are fully facilitated to conduct experimental, theoretical, and developmental work in a variety of fields. These include lasers, electromagnetics and radars, digital electronics, communications and instrumentation. A further 18,000 sq ft facility in Montreal augments the above. In late 1987, MPB took over the electromagnetic Engineering activity of the National Research Council of Canada including extensive antenna and scattering ranges, EMC and radar facilities and 5,000 sq ft of fully facilitated laboratory and office space in Ottawa.

Laser work includes the design and development of CO₂ continuous wave lasers (1-20 watt range, > 10,000 hours lifetime, sealed off) and CO₂ waveguide lasers with wide bandwidth and good tunability (sealed off, 10,000 hours lifetime). They have a capability with iodine lasers in conjunction with mode locking experiments, and have conducted laser spectroscopic studies. They have also been involved with heterodyne detection techniques in conjunction with optical fiber hydrophones that can measure 1/500 of a fringe (phase shift: 360/500°). A program is in place for the development of far infrared lasers, a FIR heterodyne receiver breadboard, and the construction of advanced FIR detector packages including reflector mounts. They are involved in a program on the application of lasers to satellite communications (MILSATCOM) and have developed a laser communications test bed and propagation measurement facility for a Canadian Government laboratory. Current work involves development of a 1 GHz bandwidth communications system based on solid state lasers, and waveguide lasers with ceramic envelopes. A spin-off from this work has been a land based laser communications system.

In the area of electromagnetics and radar technology, MPB has carried out research with synthetic pulse radar for airborne measurement of sea-ice thickness at VHF and UHF, and in the area of radar/chaff interaction from 8 to 80 GHz, target RCS enhancement and reduction at 6 to 18 GHz. They have been involved with communications analysis (cross polarization effects, earth and satellite communications), and mine detection using electromagnetic techniques and antenna research (wide-band VHF antennas). The company recently delivered an airborne C-band scatterometer for measurements of ice surface roughness and a 6 channel millimeter wave radiometer (from 20 to 60 GHz) for remote sensing of the atmosphere. Further developments include a 60/90 GHz airborne radiometer, a 35 GHz doppler fragmentation measuring radar, and a 90 GHz coherent radar. The company is involved in projects related to target augmentation and to deployment of chaff including the NATO MACE Trials. In the digital electronics area, MPB has expertise in electronic graphics, displays, training systems, and graphic composition. They have also been involved with special purpose communication terminals (transcontinental telex operator communications) and special purpose data recorders (based on microprocessor technology).

In the area of instrumentation, MPB is involved with a Space Shuttle experiment (wave injection facility), where their main responsibility is the software for the control electronics and the system test equipment. Their contribution to the Tokanak de Varenne experiment include the plasma pre-ionization, diagnostic instrumentation – probes, lasers, microwave interferometry, and software development (controls and on-line data analysis), and the complete control and data acquisition system.

MPB products include the VISTA 80 Graphics System, a versatile character generating system which utilizes a standard keyboard for message composition, and a magnetic diskette system for bulk storage of messages. The system is based on microprocessor technology. Primary use is for presenting alphanumeric information in news, weather, sports & election programs, and for titling & credits. The company recently introduced their VISTA 90 electronic graphics and composition system for applications to business and science. The system permits the composition of picture quality graphics by various input devices and hard copy through a choice of 35mm slides, printer, or video tape. Their laser communications system is capable of video, multiple voicechannel, or high bit rate digital transmission. The system has a video signal to voice ratio greater than 60 db and is immune to RF interference. They have made major sales to the US of their sealed-off CO₂ lasers that are long lived (greater than 38,000 hours) and have power ranges from 3 to 12 watts TEMs and 1 to 18 watts multimode. Suggested uses are optical communications, atmospheric research, spectroscopy, far infrared laser excitation, materials processing, surgery, etc. MPB has recently introduced a number of new laser products which include a 100 watt cw CO₂ laser, a low voltage mirror translator with control electronics and a low-cost closed-looped cooler for use with the family of CO₂ lasers. Their final product is a High Intensity Light Source. It is a long (450mm) self-starting vortex stabilized arc discharge. It has a continuous radiation spectrum, can be started instantaneously and can deliver a hundred times more light output than a high power mercury arc lamp light-head of comparable dimensions.

AVERAGE WORK FORCE: PhDs – 30
Engineers – 55
Others – 45

GROSS SALES: 1986 – \$ 5.4M
1987 – \$10.0M

PLANT SIZE: 30,000 Sq Ft (Dorval)
18,000 Sq Ft (Pointe Claire)
5,000 Sq Ft (Ottawa)

EQUIPMENT: Equipment includes hydrogen oven for high temperature ceramic band seals; Tempest secure computer room; millimeter wave instrumentation to ASIC design center based in Mentu Graphics CAE systems; prototype center from 140 GHz; circuit board and MIC fabrication; reliability test laboratory for IC's and electronic devices; laser materials processing and test facilities; scientific glass center; extensive electromagnetics measurement facilities for antenna test (20 MHz to 18 GHz) to include EMC test cell, anechoic chamber, and high power microwave sources.

EXPERIENCE: MPB's typical clients include the Canadian Government (Dept of National Defense, Communications Research Center, National Research Council), AFOSR, CBC, SPAR Aerospace Ltd, Telesat Corp, Teleglobe Canada, plus others. Recent US customers have included the Department of Energy (Nevada Div), Hughes Aircraft, RCA Astroelectronics, AT&T, USAF (Hanscom Field), USA (Ft Belvoir) and National Oceans & Atmospheric Administration. More than 50% of MPB's business originates from outside of Canada.

KEYWORDS: Antennas; CO₂ Lasers; Communications Analysis; Displays; Electromagnetics; Fiber Optics Communications; Graphics; Instrumentation; Laser Communications; Lasers; Laser Instruments; Microwave Instruments; Optical Instruments; Radar; Satellite Communications; Sealed-Off Lasers; Synthetic Pulsed Radar; Training.

REVISED: February 88

MURATA ERIE NORTH AMERICA Ltd

ADDRESS: 5 Fraser Avenue
Trenton, Ontario, Canada
K8V 5S1

CONTACT: Mr Arie Verhagen, VP Marketing – (613) 392-2581

HISTORY: Originally known as Erie Technological Products, the company merged with the US Murata/Manufacturing Co Inc to form the present Murata Erie North America Ltd, with headquarters in Smyrna, GA. The Trenton & Mississauga, Ontario, Canada, operations are committed to the manufacture of EMI low-pass filters and high-voltage power supplies, respectively. Both operations have the exclusive mandate to manufacture and export these products for world markets.

CAPABILITY: The Trenton operation is totally involved in the design, manufacture and testing of EMI filter products. Many of its products are manufactured to QPL specifications which include MIL-F-15733 and MIL-C-39014. Its main strength is the employment of its product and ceramic engineering capabilities to meet unique customer specifications, mostly on US and NATO military programs. EMI filters are custom design to fit in military circular connectors such as MIL-C-38999 and MIL-C-26482 connectors. Recently, the company introduced a new line of commercial filtered connectors with envelope dimensions the same as the military version. Murata Erie has complete process control of each manufacturing operation – mixing the slurry, drawing the tape, punching and stacking, firing, and the final termination. The Quality Control department audits in process manufacturing, as well as final assembly testing while the Quality Assurance department performs all environmental testing done within the facility.

AVERAGE WORK FORCE: Technicians - 24
Engineers - 25
Others - 600

GROSS SALES: 1986 - \$40.0M
1987 - \$45.0M

PLANT SIZE: 196,000 Sq Ft
(including 8,000 Sq Ft class, 100,000 clean room)

EQUIPMENT: Equipment includes: in-house computer systems IBM 36, 2 IBM PCs, 2 Zenith and 1 IBM PS2 model 30; HP 9845B computer, PH 85 computer, CAD system, HP computer 200, HP computer 300, AB size plotter 7475A, CD size plotter 7920, and photo plotter GSI 3244.

EXPERIENCE: Customers include: Autonetics Strategic Systems Division, Honeywell Inc., Hughes Aircraft Co, Martin Marietta Aerospace, Motorola Inc., McDonnell Douglas, Loral Date System, Avco System Division, Boeing, General Dynamics, Lockheed Missiles & Space Company Inc., Litton Systems, Northrop, TRW, Amphenol, and Canadian Marconi.

KEYWORDS: Filter Manufacturer; Ceramics; Filter Design; Environmental Testing; Qualified Test Facility; EMI Filter; Connector Filters; High Voltage Power Supplies; Low-Pass Filters.

REVISED: February 88

MYRIAS RESEARCH Corp

ADDRESS: #900, 10611 - 98th Avenue
Edmonton, Alberta, Canada
T5K 2P7

CONTACT: Dr Martin Walker, Director of Planning - (403) 428-1616

HISTORY: Myrias Research Corp is a Canadian-owned corporation established in 1982 to design, manufacture sell and service computer hardware and software for high-speed parallel computing.

CAPABILITY: Myrias Research Corp is developing a very high-speed parallel computing system. The minimal configuration has 64 microprocessors (Motorola 68020 (16.7Mhz) and 256 MBytes of memory. Many defense applications such as transonic shock and multidimensional flows, and scalar problems such as ray tracing (for sonar analysis), are well suited to the system. The Myrias Parallel Computing System has the first truly expandable computer architecture. Up to 8 times the minimal configuration can be configured to meet much higher speed and larger memory requirements.

Myrias parallel Fortran provides a single extension ("pardo") to Fortran 77, which makes the Myrias Parallel Computing System very easy to program. Scheduling and load-leveling are automatic and transparent. The Myrias Parallel Computing System is physically small and consumes little power, so no elaborate cooling system or other expensive support is required. The architecture of the Myrias Parallel Computing System enables system performance to be improved as the microprocessors and memory on which it is based become faster and more capable, while the system presents a constant unchanging interface to user programs.

AVERAGE WORK FORCE: PhD - 5
MSc - 9
Engineers - 3
BSc - 23
(Non Technical)
BComm - 1
BA - 1
MA - 1

GROSS SALES: No Data

PLANT SIZE: 24,000 Sq Ft

EQUIPMENT: Complete digital electronics laboratory and facility. In-house tandem VAX 11/750s, Pyramid 98X, Sun 3/160, Sun 3/180 file servers, and networked Sun 3/50s; 512 PE prototype Myrias System.

KEYWORDS: Cartography Processing & Database; Computers; Computers (Parallel); Cryptography; Distributed Processing; Meteorology; Parallel Processing; Quantum Chemical Modelling; Reservoir Modelling; VLSI Simulation.

REVISED: January 88

NATIONAL ENGINEERING & SCIENCE ASSOCIATES Inc

ADDRESS: 367 Water Street
P. O. Box 1
Stratford, Ontario, Canada
N5A 6S8

CONTACT: Ms Kathleen Engberg, Director of Marketing - (519) 271-6710

HISTORY: National Engineering & Science was founded in 1978. In 1983, it purchased its manufacturing division (Jones 83 Mfg Co) in Stratford and proceeded to develop its abilities in production of electronic cabinetry including shielded enclosures. In 1987, shielded rooms were developed.

CAPABILITY: National Engineering & Science designs and manufactures shielded enclosures including modular rooms through use of CAD/CAM, CNC/DNC turret punch press and brake bending, and welding to Canadian standards.

AVERAGE WORK FORCE: Engineers & Science Degrees - 3
Drafting & Programming - 2
Others - 15

GROSS SALES: 1986 - \$1.2M
1987 - \$1.9M

PLANT SIZE: 27,000 Sq Ft

EQUIPMENT: CAD/CAM, PC based MIS, CNC 56 station turret punch press, CNC brake (braking to 300 tons), stamping presses to 225 tons, MIG and TIG welding in steel and aluminum, spot welding to 90KVA in steel, and batch painting system.

EXPERIENCE: Present customers include: the Canadian Government as well as other NATO requirements. We are interested in accessing the US Military market as well as the State Department (Embassies) and other departments interested in maintaining communications security.

KEYWORDS: TEMPEST Enclosures; EMI-NEMP-EMP Shielding; Red-Black Enclosures; Shielded Rooms; Modular Design; Portable Shielded Rooms; Sheet Metal Fabrication.

REVISED: March 88

NAVAIR Ltd

ADDRESS: 2450 Derry Rd East, Hangar #2
Mississauga, Ontario, Canada
L4T 3B6

CONTACT: Mr Terry Malone, Marketing Manager - (416) 676-4150

HISTORY: Navair Limited is a Canadian manufacturer and distributor of avionics oriented electronics equipment. Formally incorporated as NAVAIR LIMITED in 1971, the company was originally established as the Field Aviation Avionics Division in 1959, and has a long history of service to both the North American and overseas aircraft industry from its base at the Lester B Pearson International Airport in Canada.

CAPABILITY: Navair Limited has three distinct spheres of operation:

- Avionics sales, installations, repairs and overhaul. Avionics installations are performed in all types of aircraft, including survey and reconnaissance aircraft; piston-engined, turbine and jet aircraft; military and government aircraft such as the Lockheed C-130 and Electra L-188; deHavilland DHC-5D Buffalo and DHC-6 Twin Otter; Convair 540; and Grumman GI (Commercial). The repair and overhaul section has a full range of facilities and fully qualified personnel for servicing the most sophisticated avionics systems.
- Test equipment sales, repair, overhaul and re-calibration for the avionics and telecommunications industry are performed at the Navair facility.
- Preparation and instructing of training programs in avionics and aircraft systems to all levels. This includes the design and supply of "turnkey" workshop facilities for customers in various parts of the world.

Navair Limited operates under strict quality control procedures and is a designated approved company by the Canadian Ministry of Transport (MOT Approval No. 13-74). It is authorized to certify avionics installations and modifications (including structural modification) up to an including BOEING 727 and 737. Navair maintains a Canadian Military AQAP-1 Quality Assurance approval standard.

AVERAGE WORK FORCE: 42 (with additional contract personnel as required)

GROSS SALES: 1986 - \$7.0M
1987 - \$8.0M

PLANT SIZE: 7,500 Sq Ft (Office and service facilities)
6,000 Sq Ft (Hangar space)

EQUIPMENT: Full complement of test equipment for full-range avionics repair and overhaul; hangaring and aircraft storage facilities for most aircraft; engineering and drafting departments; and class rooms and equipment (including audio-visual) for training programs.

EXPERIENCE: Present customers include various departments in the Canadian Government such as Transport Canada, National Defense, Coast Guard, and The deHavilland Aircraft Company Ltd. Navair Limited is interested in doing business with the USAF.

KEYWORDS: Custom Software (ATE); Installations (Avionics); Modification (Aircraft/Avionics); R&O (Avionics); Telecommunications Test Equipment; Training; Training (Audio-Visual).

REVISED: February 88

NORSTAR INSTRUMENTS Ltd

ADDRESS: 319 - 2nd Avenue S W
Calgary, Alberta, Canada
T2P 0C5

CONTACT: Mr R A Collie, President & Chief Executive Officer -
(403) 262-0800

HISTORY: Norstar is a wholly owned subsidiary of Nortech Surveys (Canada) Inc which was originally an operating unit of Shell Canada Ltd. Nortech and its predecessor company (Sheltech), pioneered precise positioning and navigation requirements.

CAPABILITY: Norstar is a Canadian manufacturer of Global Position System (GPS) satellite receivers. The Norstar 1000 currently available, is a five channel high-precision instrument used for precise positioning and navigating in dynamic and static modes. Dynamic capabilities permit use for air, land and sea applications. With a single instrument, accuracies of a few meters are achieved and in a differential mode, sub-meter accuracies are standard.

Other models under development include a dual frequency multi-channel unit and a two channel sequencing unit.

Norstar's parent company, Nortech, is a high technology positioning and navigating company. Nortech has undertaken many research projects in the fields of Inertial, GPS and Doppler navigation and has unique capabilities in systems integration.

AVERAGE WORK FORCE: PhD - 1
Masters - 3
Engineers & Other Professionals - 29
Others - 50

GROSS SALES: 1986 - \$6.0M
1987 - \$6.2M

PLANT SIZE: 14,000 Sq Ft

EQUIPMENT: Large number of field and office computers, ten GPS receivers, twelve JMR Doppler receivers, seven Ferranti FILS Inertial systems, and large quantity of VHF & UHF navigation equipment.

KEYWORDS: Navigation; Guidance; Global Positioning; System Receivers.

REVISED: March 88

NORTHERN TELECOM CANADA Ltd

ADDRESS: 304 The East Mall
Islington, Ontario, Canada
M9B 6E4

CONTACT: Mr Alan F Lytle - Vice President, Business Development
(416) 232-2000

HISTORY: Northern Telecom Canada Ltd, based in Toronto, Canada, is a subsidiary of Northern Telecom Ltd. Northern Telecom Ltd is the telecommunications manufacturing subsidiary of Bell Canada Enterprises Inc. The manufacturing company has a US subsidiary, Northern Telecom Incorporated which is headquartered in Nashville, TN; a European subsidiary, Northern Telecom PLC, based in London, England; and an Asian subsidiary Northern Telecom Pacific, based in Tokyo, Japan.

CAPABILITY: Northern Telecom designs and manufactures a complete range of telecommunications equipment covering central office switching, private branch exchanges, packet switching, transmission systems, terminal and distribution systems, and electronic integrated office systems. Research and development is conducted by Bell Northern Research Ltd, the largest research and development organization in Canada. Northern Telecom Electronics, based in Mississauga, Ontario, manufactures printed circuit boards, hybrid components, and custom semi-conductor chips for Northern Telecom products.

As a developer and supplier of a complete range of products, Northern Telecom markets products in more than 90 countries. Services based on Northern Telecom products include government, military, private, commercial and public networks worldwide.

AVERAGE WORK FORCE: Canada - 21,000
USA - 20,000
Off Shore - 5,000

GROSS SALES: Canada - \$1.31B
USA - \$2.86B
Off Shore - \$0.21B

PLANT SIZE: Canada - 24 Manufacturing Locations
USA - 14 Manufacturing Locations
8 R&D Labs in Canada, the US and the UK

EXPERIENCE: As global suppliers, customers include: Canadian and US government departments, including military product applications. Northern Telecom is the primary supplier to the USAF for the SCOPE DIAL and SCOPE EXCHANGE programs. Northern Telecom Canada is also the supplier to the Department of National Defence in Canada for the Integrated Data Network (Secure). Capabilities in communications extends from design, development and manufacturing through system integration and implementation to maintenance and support.

KEYWORDS: Carrier Systems; Communications Components; Computers; Data Communications; Digital Communications; Digital Communications Terminals; Facsimile; Fiber Optics; Management Services; Message Systems; Microelectronics; Microwave Products and Systems; Repair Equipment Services; Secure Communications; Switching Systems; Telephone Equipment; Telephone Systems; Tempest Modifications; Test Equipment.

REVISED: January 88

NORTHWEST INDUSTRIES Ltd

ADDRESS: P. O. Box 9864
Edmonton International Airport
Edmonton, Alberta, Canada
T5J 2T2

CONTACT: Mr F A (Floyd) Maybee, Vice President and General Manager (403) 955-6300

HISTORY: Northwest Industries Ltd, incorporated in 1943, is a subsidiary of CAE Industries Ltd, Toronto, Ontario, Canada.

CAPABILITY: Northwest Industries Ltd (NWI), a recognized DND Quality Assurance and NATO AQAP-1 company, is one of Canada's principal aircraft maintenance contractors experienced in the overhaul and modification of military and commercial aircraft, including CF-18 Hornet and CF-104 Starfighter, T-33 and CL-41 jet trainers, and C-130 Hercules transports. The company provides a comprehensive aircraft maintenance service from minor inspection to major overhaul including non-destructive testing, airframe life extension and corrosion control, airframe parts and components manufacture, hydraulic, mechanical and electrical systems overhaul, lines and cable manufacture, electrical wiring fabrication, instrumentation repair and calibration, and avionics systems installation and integration.

NWI's Technical Publications group produces military and commercial manuals, technical orders and modification leaflets in direct support of the Company's aircraft modification programs, or as separate publication contracts. Utilizing photography, typesetting, word processing and computerized electronic publishing system techniques, the group undertakes the technical writing and illustration of documents from raw data through to final text, artwork and printing.

NWI's manufacturing shops are utilized primarily in direct support of in-house programs with limited participation with outside activities. The company does, however, manufacture lines, cables and various fluid tanks for DND, and produces the sophisticated mechanical cable assemblies incorporated in the Spar Aerospace remote manipulator arm of the NASA Space Shuttle.

AVERAGE WORK FORCE: Engineering - 15
P Eng (2)
Quality Control - 30
Production - 150
Admin & Others - 90
Tech Publications - 25

GROSS SALES: 1986 - \$14.7M
1987 - \$17.0M

PLANT SIZE: 200,000 Sq Ft (Edmonton International Airport)
(Modern hangars at the Edmonton International Airport accommodate aircraft to the size of the Boeing 747).

EQUIPMENT: Test and Inspection Equipment - avionics electronics; electrical hydraulics and mechanical test equipment; NDT; and Mitutoyo No. 241 Series co-ordinate measuring machine, Eddy-Current, dye penetrant, ultrasonic and radiographic equipment.

Production Equipment - precision tube bender up to 3 1/2" OD capacity; cable swaging, splicing and proof loading; and heat treatment, cadmium plating, and anodizing, sheet metal fabrication, welding and painting.

EXPERIENCE: Northwest Industries Ltd customers include, Government of Canada Department of National Defense, United States Air Force, Spar Aerospace, and other major aircraft manufacturers and operators. The company holds Canadian Department of National Defense AQAP-1 (MIL-Q-9858A) Approval, Canadian Ministry of Transport Approval No. 3/57 and US Federal Manufacturers Code No. 35598.

KEYWORDS: Airframe Components; Airframe Structures; Components (Airframe); Control Cables (Aircraft); Die Fabrication; Fiberglass/Composite Components; Flight Surface Manufacture; Hydraulics; Installations & Servicing; Instrument Repair; Non-Destructive Testing; R&O (Aircraft); R&O (Avionics); Sheet Metal Fabrication; Structural Components Manufacture; Structural Modification; Technical Illustration; Technical Publications Production; Technical Writing; Tooling; Tubing Assembly Fabrication; Wiring Harness Fabrication; X-Ray Inspection.

REVISED: February 88

NOVA SCOTIA RESEARCH FOUNDATION Corp

ADDRESS: 100 Fenwick St
P. O. Box 790
Dartmouth, Nova Scotia, Canada
B2Y 3Z7

CONTACT: Mr John A Gillis, Marketing Director - (902) 424-8670

HISTORY: Nova Scotia Research was established in 1946 by the Province of Nova Scotia to use science and technology to assist in the economic development of Nova Scotia.

The three operating divisions, Product Development, Applied Science and Industry Services, carry out technical assignments for 600 companies and government departments each year.

The corporation pursues two main goals - assistance to industry in the solution of today's technical problems, and product/process innovation in anticipation of tomorrow's opportunities. While the corporation serves all sectors of Nova Scotia's industrial economy, it emphasizes technological support for secondary manufacturing industry and takes a special interest in developing Nova Scotia's ocean industry potential.

CAPABILITY: Nova Scotia Research's capabilities are in the areas of applied science, industry services, and product development. Analytical and environmental chemistry, biology, coal technology, and geophysics comprise areas of expertise in applied science. Technical assistance for small and medium sized manufacturers is provided to improve productivity and technological capabilities. Engineering, manufacturing and marketing services are available for product development and export sales. A specialty product is a fiber-optic rotary joint primarily for marine applications.

AVERAGE WORK FORCE: PhD's - 9
Engineers - 28
Others - 60

GROSS SALES: 1986 - \$4.1M
1987 - \$4.2M

PLANT SIZE: 3 Buildings

EQUIPMENT: CNC precision machining equipment and various computers for CAD/CAM and office management.

EXPERIENCE: Customers include: several small and medium sized manufacturing companies in Canada and worldwide, as well as the Canadian Forces Defense Research Establishments.

KEYWORDS: Analytical Chemistry; Environmental Chemistry; Chemistry; Biology; Coal Technology; Engineering Services; Product Development; Magnetic Couplings; Fiber Optic Rotary Joints.

REVISED: February 88

NOVATRONICS OF CANADA Ltd

ADDRESS: P. O. Box 610
677 Erie St
Stratford, Ontario, Canada
N5A 6V6

CONTACT: Ms Loraine Murray, Director of Sales - (519) 271-3880

HISTORY: Novatronics of Canada Ltd is a privately-owned Canadian company focusing on the marketing, development and manufacture of custom precision electromechanical systems and devices and related electronics for sensing, indication, actuation, and control of mechanical motion/positioning.

The company was established in 1955 as Muirhead Instruments Ltd, a subsidiary of Muirhead and Company, United Kingdom. It was acquired in 1969 by Novatronics Inc of Pompano, FL, and was sold in 1983 to the present owner, Donald J McDougall of London, Ontario.

CAPABILITY: Novatronics of Canada Ltd is primarily a developer and manufacturer of custom precision electromechanical devices and related electronics for the aircraft/aerospace/defence industries. Products include the following:

- Sensors - Synchros, resolvers, tachometers, rotary linear transducers (RLTs, RVDTs), and linear inductive transducers (LITs, LVDTs).
- Indicators - Cockpit indicators, digital indicators (electromechanical types).
- Motors/Actuators - Stepping motors, servo motors, brushless and brush type DC motors, rotary and linear actuators, and solenoid/valves.
- Electronics - Signal conditioning and processing, logic and control circuitry, A/D conversion, etc.
- Systems - Systems incorporating the above elements.

Novatronics has capabilities in the following areas:

- Design and Development - Full engineering design and development capabilities exist in the company, including qualified engineering staff supported by CAE/CAD systems, prototype shops and environmental test facilities.
- Manufacturing Facilities - High precision manufacturing is achieved through modern CN and NC machining equipment, along with specialized winding and assembly equipment staffed by an experienced and stable work force. The company occupied owned premises of some 27,000 sq ft located on 16 acres of industrial land in Stratford, Ontario.
- Quality Assurance - Consistent conformance to specifications is assured by the company's quality systems which conform presently to the requirements of AQAP-4 and are progressing towards AQAP-1.

• Project Management - Effective management of Development and Production Start-Up Programs is achieved through formal project planning and control methods, facilitated by computer-based Critical Path techniques.

AVERAGE WORK FORCE: Technical - 11
Managerial/Supervisory - 11
Skilled - 13
Others - 58

GROSS SALES: 1987 - \$3.8M
1988 - \$5.1M (Est'd)

PLANT SIZE: 27,000 Sq Ft

EXPERIENCE: Novatronics' primary markets are the aircraft, aerospace and defence industries in North America. Secondary markets are the aircraft, aerospace and defence industries in Europe. Tertiary markets are the business machines and industrial control sectors, again predominantly in North America with small offshore sales. Major customers include: Boeing, Bendix, Canadair, deHavilland, Fairchild, Gull, IBM, and Sperry.

KEYWORDS: Precision Electromechanical Devices; Sensors; Actuators; Indicators; Instruments; Flight Control Systems; Cockpit Indicators (Electromechanical); Synchros; Resolvers; RVDTs; Brushless DC Motors; Servo Motors.

REVISED: February 88

THE ONTARIO AEROSPACE CONSORTIUM Inc

ADDRESS: c/o Reil Industrial Enterprises Ltd
730 Gana Court
Mississauga, Ontario, Canada
L5S 1N1

CONTACT: Mr W H Reil - (416) 672-1070

HISTORY: The Ontario Aerospace Consortium is a group of Ontario aerospace companies whose primary purpose is to enhance the marketing of the aerospace products and services of its members to high-technology customers. The Consortium, which was founded in 1984 with the support of the Ontario Ministry of Industry, Trade & Technology, is an independent company owned by the member shareholders.

CAPABILITY: Consortium members collectively possess some of the most extensive engineering design and manufacturing capabilities in the aerospace industry in Canada. The Consortium is able to combine the flexibility and low overhead costs of a small company with the strength and capabilities of a much larger corporation. The Consortium's members are:

- ATG AEROSPACE INC - A wholly owned subsidiary of Israel Aircraft Industries, ATG Aerospace Inc was established to provide for the transfer of high-technology products to Canada through license arrangements and joint venture agreements which will eventually result in the establishment of a manufacturing facility.
- INDAL TECHNOLOGIES INC - Indal Technologies is a diversified Canadian company which manufactures and engineers a variety of mechanical, electro-mechanical, hydraulic and structural systems. The company is the world's leading supplier of shipborne helicopter recovery and support systems, telescopic helicopter hangars and hangar door systems.
- NYAB VICOM - NYAB VICOM is a producer of high quality machined components and assemblies for helicopters and a manufacturer of air and hydraulic equipment for railroads, and transit systems, as well as customized machine parts, synthetic fibers, nuclear components and special machinery.
- REIL INDUSTRIAL ENTERPRISES LTD - Reil Industrial Enterprises is involved in the custom precision machining of small

to medium sized components and assemblies for the aerospace and related industries.

• VALCOM LTD – Valcom designs and manufactures commercial and military communications and electronic equipment and is recognized as the world's leading manufacturing of whip antennas. The company is also a specialist in built-to-print MF, VF and UHF radio communications equipment.

AVERAGE WORK FORCE: PhD – 1
Engineers – 35
Others – 592

GROSS SALES: 1987 – \$83.5M

PLANT SIZE: 175,000 Sq Ft

EQUIPMENT: Wide variety of numerical controlled (NC) and computer numerical controlled (CNC) machining centers and lathes, drill presses, milling machines, material handling equipment, computer aided design (CAD) and computer aided manufacturing (CAM) facilities, thermal and vibration electronic components test facility.

EXPERIENCE: Present customers of the member companies include various departments in the Canadian and US Governments, and industries in Canada, the US and the international marketplace.

KEYWORDS: Program Management; Specialized Fabrication; R&O (Components); Shipborne Helicopter Support Systems; Coupler Systems; Whip Antennas; Electronics Assembly; Machining; Precision Machining; CNC Machining.

REVISED: February 88

ONTARIO HYDRO (Research Division)

ADDRESS: 800 Kipling Avenue
Toronto, Ontario, Canada
M8Z 5S4

CONTACT: Dr G R Floyd, Supervisor, Research Business Relations
(416) 231-4111, X6322

HISTORY: Ontario Hydro was established by Provincial Legislation in 1906 and has the authority to generate, buy and distribute electricity throughout Ontario. The Research Division, which occupies the Dobson Research Laboratory was founded in 1912, and is one of the oldest and largest utility research laboratories on this Continent. Ontario Hydro is a financially self-sustaining Crown Corporation that derives no revenue from taxes.

CAPABILITY: The Research Division of Ontario Hydro is a fully integrated facility with a broad range of capabilities in research, development and testing. Extensive experience with solving utility-related problems has produced a staff with expertise in such areas as materials science, high voltage science and engineering, concrete technology, organic and inorganic chemistry, biology and geotechnical engineering to name a few. The keyword list gives a more detailed account of the Division's areas of expertise. Many of the techniques and skills developed at the Research Division, while developed in support of the utility, are applicable in other areas.

AVERAGE WORK FORCE: Research Division:
Engineers, Physicists, Chemists &
Biologists – 298
Technicians & Technologists – 256
Support Staff – 74

GROSS SALES: 1986 – \$57.0M
1987 – \$58.0M

PLANT SIZE: 43,000 Sq Meters Kipling Complex (plus other test sites).

EQUIPMENT: The following is a list of the major physical facilities. The Research Division also has various sophisticated test and measurement instruments in general use in its laboratories.

• Electrical/Electronic – High Voltage Laboratory (including winter weather chamber), High Current Laboratory, Industrial Processes Laboratory (high frequency power, impulse power, high temperature plasma), Electronics Development Laboratory, Mobile Cable Fault Location Laboratory, Mobile High Potential Test Facility, SF6 Substation (full scale), and Battery Laboratory.

• Mechanical/Metallurgical/Structural – Nuclear Process Components Test Facility (full-scale primary Heat Transport Pump Test Set up to 12,600 hp), Seismic laboratory, Anechoic Chamber, Conductor Stress-Strain Laboratory, Heavy Mechanical Test laboratory, Conductor Dynamics Full Scale Test Facility, Non-destructive Evaluation Center, Welding Laboratory, Metallographic Analysis Laboratory, Corrosion Testing Autoclaves and Loops, Scanning and Transmission Electron Microscopes, Tritium Laboratory, and Burst Test Facility (full-scale pressure test on pipes, pressure vessels, etc.).

• Chemical – Analytical Chemistry Laboratory, Radioactive Materials Laboratory, Surface Analysis Facility, Oil Laboratory, Combustion Test Facility, Corrosion Research Facility, and Radiography and Thermography Facility.

• Environmental – Mobile Environmental Monitoring Facility; Environmental Chamber; LIDAR, other Laser Systems; and Micrometeorological Instrumentation.

• Civil – Soil, rock and concrete research and testing laboratories – various strength testing equipment; freeze-thaw testing of concrete, petrographic analysis of geological materials, pore size distribution and surface area determination of porous media.

EXPERIENCE: In the past, the Research Division has won many research and development contracts from the Canadian Electrical Association, the Electric Power Research Institute, the Canadian Federal Government, and other public and private organizations, both domestic and foreign.

KEYWORDS: Alternate Fuels Research; Atmospheric Research; Biological Research; Biomass; Combustion Research; Concrete Technology; Corrosion Science; Electronics Research; Energy Conversion; Engineering Services; Environmental Assessment; Failure Analysis; Fracture Mechanics; Geotechnical Engineering; High Voltage Engineering; High Voltage Science; Instrumentation; Materials Sciences; Non-Destructive Testing; Nuclear Engineering; Nuclear Waste Management; Organic Materials Research; Pollution Control; Power Systems; Rock Sciences; Soil Sciences; Tritium Technology; Welding Technology.

REVISED: January 88

OPTECH Inc

ADDRESS: 701 Petrolia Road
Downsview, Ontario, Canada
M3J 2N6

CONTACT: Mr Allan Carswell, President – (416) 661-5904

HISTORY: Incorporated in 1974, Optech Inc is Canadian owned. There is only one location at the above address.

CAPABILITY: Optech Inc has a broad capability in electro-optical systems with specialization in laser ranging systems. They have designed, developed and manufactured laser systems for atmospheric diagnostics (i.e., atmospheric lidars), water depth measurement, wave height analysis, terrain profiling and high resolution (0.1m) distance measurements. Optech Inc has custom fabrication and R&D capabilities. Primary capabilities are in research, development and systems engineering. Production to date has been limited to custom systems and small volume runs.

AVERAGE WORK FORCE: PhDs - 7
Engineers & Scientists - 12
Technicians - 11
Others - 6

GROSS SALES: 1986 - \$1.5M
1987 - \$3.0M

PLANT SIZE: 14,000 Sq Ft

EQUIPMENT: Laser fabrication, and test facilities; optical, electronic, and mechanical assembly areas. Laser propagation laboratories. DEC & SUN computer systems for data acquisition and analysis and CAD systems for PC layouts.

EXPERIENCE: Optech Inc experience includes:

- Mobile atmospheric lidars for Ontario Hydro and the Canadian Atmospheric Environment Service.
- Development and operation of Coastal Mapping Airborne Laser Bathymeter for Canada Center for Remote Sensing and the Canadian Hydrographic Service.
- Development of Laser Bathymeter systems for US Defense Advanced Research Projects Agency (DARPA) and the US Army Corp of Engineers.
- Precision airborne Laser Terrain Profilometer for the Canadian Department of the Environment, Ice Reconnaissance Branch.
- Laser Cloud Mapper for the Canadian Department of National Defense.
- Two channel Raman lidar for water content measurements in a maritime atmosphere developed for Memorial University, St John's, Newfoundland.
- Airborne laser wave height analysis system for the Defense Research Establishment Pacific.
- Raman lidar for hydrocarbon gas detection for British Gas Corporation.
- Gallium arsenide laser rangefinders for high resolution distance measurements delivered to a number of commercial and defense projects.
- Precision Aerial Reconnaissance laser altimeter/profilometer for airborne surveys, developed for customers in Canada and the US.
- Military electro-optic studies and laboratory measurement programs for Defense Research Establishment Valcartier.
- Water depth studies using Airborne Laser Bathymeter for Swedish Department of Defense.
- Military Electro-Optics Systems manufactured.
- Lidar systems complete with mobile vans and data handling computers for boundary layer meteorological and pollution dispersion measurements.
- Software consulting.
- Manufactured products - Laser Rangefinders (Model 60 & 501), Terrain Profiling Systems (Model 501 & Profilometer 5000), Coastal Mapping Systems.

KEYWORDS: Altimeter; Atmospheric Optics; Bathymeter; Electro-Optics; Laser Altimeter; Laser Radar; Laser Rangefinders; Lidar Systems; Radar (Laser); Range Finder; Remote Sensing; Terrain Profiler.

REVISED: April 88

OPTO-ELECTRONICS Inc

ADDRESS: 2538 Speers Road, Units 8, 9, & 10
Oakville, Ontario, Canada
L6L 5K9

CONTACT: Dr B K Garside, President - (416) 827-6214

HISTORY: Opto-Electronics is a high technology company incorporated in late 1976 with a subsidiary in the US (775 Main St, Unit #202, Buffalo, NY 14202, Telephone 216-856-1322). The company was formed with the primary goal of carrying out research, development, manufacturing, and marketing of high technology electro-optical components, devices, and instruments.

CAPABILITY: Opto-Electronics fields of expertise lie in the areas of industrial control instrumentation, fiber optic systems, optical communications, electro-optics & instrumentation, fast optical sources & detectors, solid state electronics, laser devices, and sensors & transducers. Past year activities include new product development and manufacturing as well as research on special ultra-high speed photodetectors, ultra-high speed diode laser light sources, millimeter resolution optical time domain reflectors, and a line of industrial fiber-optical test and measurement instruments, controllers and sensors. Current research projects include ultra-fast photodetectors, ultra-fast laser diode sources, photon counting for fiber test instrumentation, passive waveguide splitters and combiners, high-speed optical switches, and fiber-based liquid sensors.

AVERAGE WORK FORCE: Scientists, Engs, & Techs - 16
Others - 8

GROSS SALES: 1986 - \$1.45M
1987 - \$1.60M

PLANT SIZE: 12,000 Sq Ft

EQUIPMENT: OEI's facilities include a machine shop, assembly room, dark room, & circuit etching, electronics test & optics test areas, stock room, and shipping & receiving rooms. Eight people are currently assigned to manufacturing and sales. Their R&D facility consists of lasers, optics, electronics & optics design, electronic assembly areas, materials processing rooms, areas of microscope & spectral analysis, vacuum work & measurement, and a high voltage shielded room. Also included are special rooms for furnace work, machining and modeling, and a library.

Major equipment includes high vacuum evaporator, electron microscope, cryogenic, electrical and optical facilities, spectrophotometer, ellipsometer, diffusion furnace, vacuum furnace, optical microscopes, multiple beam interferometer, electrometers, oscilloscopes, and other associated instruments.

EXPERIENCE: OEI's R&D contract experience has for the most part been with the Canadian Government, although they have recently carried out contractual work on liquid leak fiber optic sensors for NASA. Most products are exported. They have expressed interest in doing R&D contract business with the USAF - a significant amount of OEI's commercial business is with USAF prime contractors.

KEYWORDS: Detectors; Electro-Optics; Fast Optical Detection; Fast Optical Sources; Fiber Dispersion Measurement; Fiber Optic Instruments; IR Detectors; IR Sources; Industrial Control Instrumentation; Infrared Diode Lasers; Infrared Instrumentation; Instrumentation; Laser Diodes; Measurement Systems; Optical Communications; Optical Switches; Photodetectors; Sensors; Reflectometry (High Resolution).

REVISED: February 88

OPTOTEK Ltd

ADDRESS: 62 Steacie Drive
Kanata, Ontario, Canada
K2K 2A9

CONTACT: Dr David I Kennedy, President - (613) 591-0336

HISTORY: Optotek Ltd is a high technology company with no other divisions in Canada or the US. Optotek was incorporated in Oct 77 as a spin-off from Bowmar Canada Ltd, a Canadian subsidiary of Bowmar Instrument Corp.

CAPABILITY: Active - (1) Development and manufacture of LED materials and devices based on Group III-V and II-VI compounds, (2) design and manufacture of custom LED arrays for military and industrial applications, (3) design and manufacture of display-related electronic subsystems and test equipment, (4) design and manufacture of Gallium Arsenide monolithic microwave integrated circuits and (5) design and manufacture of infrared photodetector arrays (Cadmium Mercury Telluride).

Development - Current LED displays, both monochromatic and multi-color, range in resolution from 25 to 1000 lines-per-inch. Diversification activities will encompass gallium arsenide MMIC's and high-speed integrated circuit technology, as well as infrared photodetector technology based on cadmium mercury telluride.

AVERAGE WORK FORCE: PhDs - 2
Engineers - 10

GROSS SALES: No Data

PLANT SIZE: 37,000 Sq Ft

EQUIPMENT: Optotek has a full complement of semiconductor processing and test equipment.

EXPERIENCE: Optotek has experience with the USAF, USN and NASA. They are interested in continuing their business with the DOD and NASA. Past contracts have been in the LED materials, devices, and displays areas. Principal programs with the USAF have been the Multimode Matrix LED Display, the Video Flat-Panel LED Display, and the development of Multicolor LED Displays. The USN programs include manufacturing technology for advanced solid-state data annotation displays and a production program involving the RF-4 and P3 reconnaissance systems.

KEYWORDS: Cockpit Displays; Data Annotation Displays; Displays; Electronic Test Equipment; Flat Panel Displays; IR Detectors; Infrared Instrumentation; Integrated High Density LED Displays; LED Arrays; LED Materials; MMICs; Multicolor LED Displays; Printheads (LED); Semiconductors; Solid State Devices; Solid State Recording Heads.

REVISED: January 88

PAI-PUBLIC AFFAIRS INTERNATIONAL

ADDRESS: 55 Metcalfe St, Suite #1300
Ottawa, Ontario, Canada
K1P 6L5

CONTACT: Lt Gen Donald C Mackenzie, CF (Ret), Senior Consultant (613) 238-4371

HISTORY: PAI was founded in 1973. The company is part of the Public Affairs Resource Group (PARG) and has three affiliates: Government Research Corp (GRC) in Washington, DC; Decima Research in Toronto, Ontario; and Public Affairs Communications Management (PACM) in Toronto, Ontario.

CAPABILITY: PAI is Canada's largest public policy and government relations consulting company with headquarters in Ottawa and affiliated offices across Canada in Toronto, Winnipeg, Calgary, Victoria, and Halifax. PAI's range of services includes: monitoring, analyzing and interpreting the entire range of government policies that affect companies operating in Canada and the US; strategic advice and issue management; establishing effective and ongoing government relations strategies for clients; and occasionally, direct representation.

PAI is also Canada's leading procurement consulting firm. In this regard PAI's staff provides clients with an unsurpassed expertise

while offering a full range of services to assist clients interested in accessing the multi-billion dollar government procurement market.

AVERAGE WORK FORCE: Professional Staff - 25
Research & Support - 10

GROSS SALES: 1986 - \$5.0M
1987 - \$6.0M

EQUIPMENT: PAI's equipment includes: complete in-house computer system including publishing capability, a large conference room, and office space available for clients.

EXPERIENCE: PAI's client list includes major corporations from virtually every industry sector - defense, financial, high tech, energy, transportation, agriculture, and manufacturing.

KEYWORDS: Consulting; Government Relations; Procurement Advice; Sales Representation.

REVISED: January 88

PARAMAX ELECTRONICS Inc

ADDRESS: 6111 Royalmount Avenue
Montreal, Quebec, Canada
H4P 1K6

CONTACT: Mr Jack Henry, Director, Marketing - (514) 340-8310

HISTORY: Paramax Electronics Inc is a wholly-owned subsidiary of Unisys Corporation in Canada. The company was created following the granting by the Canadian Government of a \$2.6 billion contract to the St John Shipbuilding/Paramax team for the construction of six Canadian Patrol Frigates. Paramax's contract for design, integration, testing and installation of the combat systems and other electronics on the first six frigates is valued at \$1.25 billion. The company has also recently been awarded an additional contract for electronic systems work on a second group of six frigates. This contract, running to 1997, represents a further \$1.25 billion to Paramax. Paramax is also presently involved in contract proposals for systems integration work on up to 50 new shipboard helicopters for the Canadian Forces and for as many as 12 nuclear submarines.

CAPABILITY: Paramax is the business of electronic systems management. It is a disciplined systematic process which begins with the analysis of a complex requirement, examines alternatives, selects candidate approaches, synthesizes the best answer, and then implements the proper solution.

Paramax engineers have developed independent expertise in systems integration and management and are now pursuing new large-scale program management business involving work on other naval vessels or systems integration work for commercial ships, oil and gas platforms, and other civilian projects in Canada and abroad.

Training Canadian Navy crews is also one of Paramax's immediate responsibilities. The realistic physical environment created in the 16,000 sq ft Radio Frequency (RF) shielded room within the Combat System Test and Support Facility allows naval personnel to test and familiarize themselves in the use of the system over an extended period of time in life-size detailed mock-ups of the frigate's bridge, operations room and other ship's space.

The significant advantage of the land-based test concept is that the entire combat system, including the computer software, can be tested to its operational limits through simulation of realistic and repeatable combat scenarios prior to installation aboard ship. Similar testing is not feasible at sea, except in wartime, because of costs.

AVERAGE WORK FORCE: 700 specialists in electrical, electronic and mechanical engineering and computer sciences.

GROSS SALES: No Data

PLANT SIZE: 160,000 Sq Ft

KEYWORDS: Electronic Systems Design; Naval Combat Systems; Program Management; Systems Integration; Training.

REVISED: February 88

PATLON AIRCRAFT & INDUSTRIES Ltd

ADDRESS: 5502 Timberlea Blvd
Mississauga, Ontario, Canada
L4W 2T7

CONTACT: Mr P B Mann, President - (416) 624-5572

HISTORY: Patlon Aircraft & Industries Ltd has been in business for 35 years and is 100% Canadian owned. It was originally located at 74 Six Point Road, but moved to a much larger facility at its present address. It has a wholly owned subsidiary located in Miami, FL, and a branch office in Ottawa.

CAPABILITY: Patlon is an engineering sales, servicing and warehousing distributor servicing the total aircraft industry which includes the Canadian Government, Canadian Forces, airlines, private aircraft users and electronic and communication companies. Over its 35-year history, it has built up and currently maintains excellent business and personal relationships at all levels of the aforementioned areas.

Patlon maintains one of the largest master reference libraries in Canada which includes most of the military vehicles and equipment purchased in the free world. This capability enables us to cross reference products replacing specified materials and equipment with qualified products from multiple sources, usually at a lower cost. Patlon has been particularly successful in this area with the Canadian military, airframe and engine repair and overhaul depots.

Its selling procedure includes meeting with management, procurement, engineering, sales, service and manufacturing personnel, depending upon the product and customer requirements. With its knowledge of the industry and personnel involved, it has the opportunity of discussing projects at the drawing board stage, and in many cases, has been successful in having its equipment specified.

To summarize, Patlon provides both spare support service as well as product support at the original equipment manufacturer level.

AVERAGE WORK FORCE: Management - 5
Support Staff - 9
Sales - 14

GROSS SALES: No Data

PLANT SIZE: 6,000 Sq Ft (Toronto, Canada)
2,500 Sq Ft (Miami, FL)
1,000 Sq Ft (Ottawa, Canada)

EQUIPMENT: Patlon is equipped with all the required communications equipment to conduct business around the world.

EXPERIENCE: Patlon provides the services mentioned above to several other countries. The list of foreign countries which it has sold to includes Germany, Turkey, Australia, Denmark, Indonesia, the US, and many South and Central American countries. The Miami office of Patlon, which was opened in January 1980, has vastly improved Patlon's ability to service both the South and Central American countries.

KEYWORDS: Aircraft Parts; Library (Aircraft Parts); Parts (Aircraft); Reference Library (Aircraft Parts).

REVISED: February 88

PELORUS NAVIGATION SYSTEMS Inc

ADDRESS: #202 - 575 Palmer Road N E
Calgary, Alberta, Canada
T2E 7G4

CONTACT: Mr Don Sinclair, Vice President, Marketing - (403) 250-9377

HISTORY: Pelorus Navigation Systems Inc is a Canadian-owned company started in 1982 as a navigation system specialist in the aviation industry. The company headquarters are in Calgary with sales offices in Toronto, Ontario, and Tucson, AZ.

CAPABILITY: Pelorus supplies, installs, monitors and maintains ground-based aids to aircraft navigation. These systems include - MLS (Microwave Landing systems), DME (Distance Measuring Equipment), AWOS (Automatic Weather Reporting Systems), SCAN (Runway/Roadway Surface Weather Analyzing and Ice Detection Equipment), NDB (Non-Directional Beacons), and VHF-DF (Direction Finding Equipment). Pelorus systems are installed at over 40 regional airports, as well as Vancouver, Calgary, Winnipeg and Halifax International Airports.

The company is a manufacture of radio navigational and meteorological equipment, and as well, supplies products through long-term exclusive distributor agreements with leading manufacturers. Engineering surveys and consulting are also capabilities.

Pelorus has an active R&D program. Currently under development is a low-cost microwave landing system avionics receiver, designed for general aviation operators. The receiver is a state-of-the-art design based on Very Large Scale Integration (VLSI) technology.

AVERAGE WORK FORCE: MBA/B Communications - 2
Engineers/Technicians - 7
Others - 7

GROSS SALES: \$3M (Annually)

PLANT SIZE: 6,000 Sq Ft

EQUIPMENT: Pelorus' electronic test equipment includes: oscilloscopes, spectrum analyzers, watt meters, power meters, and meteorological devices.

EXPERIENCE: Pelorus' present customers include: Transport Canada, Province of Alberta, Canadian Coast Guard, Petro Canada, Shell Canada Resources, Home Oil Co., Canterra Energy Co., City of Calgary, City of Edmonton, Towns of Golden and Salmon Arm, BC, Town of Fairmont Hot Springs, BC, City of Nanaimo, Village of Pemberton, and Port Hawkesbury, NS.

KEYWORDS: Distance Measuring; MLS; Automated Weather Observation; Avionics; Meteorological Stations; Navigation Systems; Ice Detection; Weather Forecasting; Direction Finder.

REVISED: January 88

PLASTAL Inc

ADDRESS: 840 Vadnais Street
Granby, Quebec, Canada
J2J 1A7

CONTACT: Mr Michael Artus, President - (514) 378-8439

HISTORY: Plastal Inc is a wholly owned subsidiary of Avcorp Industries Inc, Montreal, Quebec. The company was formed in 1952 to produce acrylic cockpit canopies for the North American F-86 Sabrejet fighter.

CAPABILITY: Plastal Inc is a prime producer of specialized plastic and composite components using materials and fabrication techniques that reflect the latest advances in technology.

The company's products include: flight simulator bodies, surveillance aircraft nose and tail cones, fighter aircraft canopies, passenger cabin windows, cockpit glare shields, fairing, moldings, doors, wheel well bins, aircraft ducting, satellite earth station and ship antennae, wingtip lenses, window surrounds, interior paneling and more.

AVERAGE WORK FORCE: Engineers - 1
QC - 2
Staff - 5
Others - 30

GROSS SALES: 1986 - \$2.6M
1987 - \$2.6M

PLANT SIZE: 22,000 Sq Ft

EQUIPMENT: Plastal Inc's equipment includes composite curing ovens, an autoclave, and an environmentally-controlled composite lay-up facility.

EXPERIENCE: Plastal Inc's customers include McDonnell Douglas Canada Ltd, The Boeing Co, British Aerospace PLC, Canadair Ltd, Innotec Aviation Enterprises Ltd, CAE Industries Ltd, and Pratt & Whitney Canada Ltd.

KEYWORDS: Composite Components; Composite/Fiberglass Components; Plastic Fabrication; Plastic Molding; Antennas (Ground Station); Canopies; Transparencies; Aircraft Transparencies.

REVISED: March 88

PRA LASER Inc

ADDRESS: 45 Meg Drive
London, Ontario, Canada
N6E 2V2

CONTACT: Dr R C Miller, General Manager - (519) 686-2950

HISTORY: In early 1987, assets of PRA International Inc were acquired by Laser Photonics Inc of Orlando, FL. PRA Laser Inc is now a subsidiary of LPI and a member of the Laser Photonics family of companies.

CAPABILITY: PRA Laser Inc is involved in the design, development and manufacture of gas/dye laser systems specifically UV nitrogen lasers and associated dye lasers. Through our association with Laser Photonics, PRA is also actively involved in the development of waveguide CO2 lasers and pulsed YAG lasers.

In addition to manufacturing standard products, PRA and the Laser Photonics family of companies operate research and laboratory facilities for custom manufacturing, contract research, and consulting. PRA Laser Inc operates on an international basis through offices in Canada and the US, as well as through distributor networks in Europe and the Far East.

AVERAGE WORK FORCE: Scientists/Engineers - 5
Others - 15

GROSS SALES: 1986 - \$3.0M
1987 - \$2.0M

PLANT SIZE: 10,000 Sq Ft

EQUIPMENT: No Data

EXPERIENCE: PRA has sold their off-the-shelf products to a variety of academic, industrial, and government research facilities including Lawrence Livermore Laboratories, Oak Ridge National Laboratories, Los Alamos Scientific Laboratories, Solar Energy Research Institute, Exxon Research, Bell Laboratories, Western Electric, Eastman Kodak, and Wright-Patterson AFB, OH.

KEYWORDS: Electro-Optical Instrumentation; Dye Lasers; Lasers; Nitrogen Lasers.

REVISED: January 88

PRATT & WHITNEY CANADA Ltd

ADDRESS: 1000 Marie Victorin
Longueuil, Quebec, Canada
J4G 1A1

CONTACT: Mr S Monaghan, Chief R&D Support - (514) 647-7557

HISTORY: Established in 1928 as a Canadian center for the overhaul of Pratt & Whitney Aircraft radial piston engines, Pratt & Whitney Canada Ltd (P&WC) took over full responsibility for this function prior to moving into small gas turbine development and production. They are a wholly owned subsidiary of the Pratt & Whitney Aircraft Group, a division of United Technologies Corporation.

CAPABILITY: P&WC has the mandate to develop and produce all small gas turbine engines typically for general aviation, commuter, paramilitary and for aircraft auxiliary power units. Their primary business areas are:

- Small gas turbine engine development
- Small gas turbine engine production
- Small gas turbine engine oriented research

The development of gas turbine engines at P&WC started in the late 1950s with the early PT6. This turboprop engine was introduced to the commercial market in 1963. The military designation for this engine is the T74-CP-701. In 1979, the development started on the PW100 turboprop engine. This fuel efficient engine is used primarily in commuter and short-haul aircraft.

The JT15D turbofan engine was introduced in 1967. It is the power plant of the Cessna Citation series of corporate jets, and the Beech Diamond aircraft. P&WC has also developed a twin turboshaft engine for helicopter use. These are designated the PT6T-3 and -6 series (military designation is T400-CP-400,-WV-402). Other engine families are also under development which include a series of small turbo shaft engines, a new fan engine and auxiliary power units.

By 1987, the company had delivered 31,053 engines for the world market.

AVERAGE WORK FORCE: Company Total - 7,625
R&D Center - 2,232

GROSS SALES: 1986 - \$816M
1987 - \$981M

EQUIPMENT: Equipment includes extensive manufacturing and R&D equipment and facilities for all aspects of small aviation gas turbines - test cells, spin pits, fatigue test facilities, metallurgical test facilities, gear test facilities, strain gauging/thermocouple applications, photoelasticity, acoustics, etc.

EXPERIENCE: P&WC has had experience with the following organizations:

- United States Air Force - (1) Research on High DN Value Roller Bearings - a program to determine the influence of geometric variable etc., on small high-speed roller bearings (carried out as a shared development program); and (2) Alternate Fuels Combustion Research - an experimental study of the effects of alternate jet fuels on small gas turbine combustion systems (also carried out as a shared development program).
- United States Army - (1) Subcontractor in Cooled Radial Turbine Program to Pratt & Whitney, Government Products Division (GPD) (1969-1971). Pratt & Whitney Canada Ltd was responsible for the Aerodynamic design and participated in the structural analysis and mechanical design of the turbine; (2) Consultant to P&W (GPD), on ST9 1500 horsepower demonstrator program for new US Army helicopter engine - first stage was scaled P&WC research rotor and second stage was centrifugal compressor (1966-1969); (3) Consultant to P&W (GPD), for the demonstration of a 10:1 Pressure Ratio single centrifugal compressor - P&WC provided data from previous in-house demonstrations of 10:1 Pressure Ratio Compressors

carried in 1967 & 1970 (1970-1972); and (4) P&WC is currently contracted with the US Army at Ft Eustis for a advanced 15:1 Pressure Ratio Single Centrifugal Compressor and to date has met or exceeded all the original program goals.

- United States Navy – (1) P&WC was a subcontractor to P&W, Commercial Products Division (CPD), on a demonstration of a regenerative, small turboprop engine based on the PT6 – P&W designed the regenerator, while P&WC designed the ducting, organized hardware fabrication, and demonstrated the concept (1964-1966); (2) P&WC won a contract to provide a twinned helicopter engine (T400/402 Twin Pac R) to the US Navy for Bell Aerospace helicopters where 1032 units have been supplied – also 2218 units in a civil version (PT6T3/6) have been produced to date and (3) P&WC has also performed as a subcontractor to P&W, CPD, on a demonstration of single crystal turbine blades for gas turbine operation.

- Environmental Protection Agency – (1) P&WC carried out a combustion research program for small, single can, highly loaded combustors for automotive application with good performance and low emissions (1973-1974); (2) P&WC was subcontractor to United Technologies Research Center (UTRC) on a study of the automotive application of gas turbines – carried out a series of cycle studies and supported experimental work on combustion (early 1970s); and (3) P&WC also supported the Environmental Protection Agency (EPA) (Triangle Park) on studies of the carcinogenic effect of small gas turbine emissions (1977-1978).

- National Aeronautical Space Administration (NASA) – (1) P&WC was subcontractor to P&W (CPD), on a turbofan core noise program at NASA Ames carried out on a NASA owned P&WC JT15D engine – P&WC designed and fabricated an alternate fan core stator to increase the axial spacing between rotor and stator, and the number of stator vanes (1977); (2) P&WC was subcontractor to P&W (CPD), on a program of nose cone telemetry for NASA Lewis Research Center as applied to a NASA JT15D turbofan – P&WC designed a transmitter to operate within the nose of a JT15D to study the difference between ground and flight noise measurements (1978-1980); (3) P&WC was also subcontractor to P&W (CPD), on a program to supply NASA Langley with copies of the telemetry units from item #2 for flight use with stringent manufacturing requirements (1979-1980); and (4) P&WC was also subcontractor to United Technologies Research Center on a Combustor soot program – all combustor hardware was designed and fabricated by P&WC, while United Technologies Research Center assembled the rig and carried out all testing (1980-1981).

KEYWORDS: Alternate Fuels Research; Auxiliary Power Units; Combustion Research; Compressors (GT Engines); Engine Components; Engine Emission Research; Engine Research; Engine Systems; Engines; Fuel Research; Fuel Systems Research; Gas Turbine Engines; Helicopter Subsystems; R&O (Engines); Roller Bearings; Small Gas Turbine Engines; Test Instrumentation; Testing/Test Equipment; Turbine Engines.

REVISED: February 88

PRECI SYSTEMS INTERNATIONAL Inc

ADDRESS: 4150 Poirier Blvd.
St Laurent, Quebec, Canada
H4R 2A5

CONTACT: Mr Paul A Rousseau, President & Chairman of the Board (514) 337-9732

HISTORY: Preci Systems International Inc (PSI) was formed in December 1986 to design, develop and manufacture aircraft hydraulic, hydro-mechanical, electro-mechanical, electronic-hydro-mechanical an electronic-hydraulic control systems and components.

Preci Tech Ltee, a wholly owned manufacturing subsidiary, is a producer of highly precision components for the aerospace, electronic

and space industries. It was acquired by PSI in December 1986 as an initial manufacturing facility. In February 1987, PSI commenced the establishment of a flight control system engineering department and engineering test facilities. Engineering and manufacturing facilities will expand to match market projections.

Ownership of PSI is 100% Canadian, with the major shareholder being Lambert Somec Inc, a Quebec City based company, listed on the Montreal Stock Exchange (LAMSO.INC).

CAPABILITY: Preci Systems International Inc is involved in the sub-contract machining of precision machine components to customer specifications. In collaboration with the customer, they also engage in design, engineering, development and manufacture of flight controls, servo valves, shuttle valves and electro & hydro-mechanical systems.

AVERAGE WORK FORCE: Engineers – 6
Quality Control – 7
Production – 47
Supervisory – 10
Others – 18

GROSS SALES: 1986 – \$2.5M
1987 – \$3.0M

PLANT SIZE: 28,000 Sq Ft

EQUIPMENT: Preci Systems International Inc's equipment includes numerous CNC turning centers, CNC machining centers, EDM centers, NC jib boring, grinding & honing, drills & presses and conventional turning, milling & jig boring, hydraulic test stands, temperature test chamber, humidity-temperature chamber, QC/QA gages and measuring machines, IBM-PC based design/analysis/engineering support systems, and IBM-PC data base management systems. A detailed facilities list is available upon request.

EXPERIENCE: Preci Systems International Inc's customer list includes Canadair Inc (Montreal), E-Systems Inc (Florida), Canadian Vickers Ltd (Montreal), Pratt & Whitney Canada Ltd (Montreal), United States Surgical Corp (Connecticut), Rolls Royce Canada (Montreal), Warner Robbins AFB (Georgia), and Spar Aerospace Ltd (Ontario).

KEYWORDS: Machining; Precision Machining; Flight Controls; Solenoid Valves; Shuttle Valves; Electro & Hydro-Mechanical Systems; R&O (Components).

REVISED: March 88

PRICE & KNOTT MANUFACTURING COMPANY Ltd

ADDRESS: 655 Finley Avenue
Ajax, Ontario, Canada
L1S 3V3

CONTACT: Barry Wheeler, Vice-President, Sales & Marketing – (416) 683-7501

HISTORY: Price & Knott was formed in 1954 to supply job shop expertise to local aerospace and defense companies. The company is currently operating as an autonomous division of Werner Dahnz Ltd of Toronto, and is a public company traded on the Toronto stock exchange.

CAPABILITY: Price & Knott is currently involved in made to print mechanical assemblies and components using the facilities of their precision sheet metal and machining departments. The facility is supported by, in house, welders approved to weld per MIL-W-8604 and MIL-W-8611 specifications. In addition, they have a complete assembly area for part markings, of all description, and hardware assembly. Their expertise in finishing to MIL Std's includes chromate conversion to MIL-C-5541, anodize to MIL-A-8625, type 2 class 1 & 2 and passivating to QQP-35 Type 1 to 6. The entire operation has been certified to AQAP 4 and MIL-I-45208A quality standards by numerous prime contractors and the Canadian Department of National Defence.

AVERAGE WORK FORCE: Quality Control – 3
Engineering – 4
Others – 78

GROSS SALES: 1978 – \$5.4M
1979 – \$7.2M (Est'd)

PLANT SIZE: 62,000 Sq Ft

EQUIPMENT: Complete state-of-the-art equipment for machining and fabrication of materials including numerous CNC machines.

EXPERIENCE: Over thirty years experience in supplying prime and sub-contractors including:

- Litton Systems
- Rockwell International
- General Electric
- Honeywell, Sperry
- Pratt & Whitney Canada Inc
- de Havilland Aircraft

Price & Knott are interested in doing business with the USAF.

KEYWORDS: CNC Punching; CNC Forming; CNC Milling; CNC Turning; Welding; Build-To-Print; Machining; Precision Machining; Components (Mechanical).

REVISED: January 88

PRIOR DATA SCIENCES Ltd

ADDRESS: 240 Michael Cowpland Drive
Kanata, Ontario, Canada
K2M 1P6

CONTACT: Mr Kester Hamilton, Vice President, Marketing – (613) 591-7235

HISTORY: PRIOR Data Sciences Ltd was founded in early 1977 and has experienced steady growth to its current level of 150 employees (May 88). The company is Canadian owned and is located in Ottawa (Headquarters), Halifax and Toronto. There are no US subsidiaries.

CAPABILITY: PRIOR has capabilities in:

- "Turnkey" computer systems development for real-time applications
- In Air Traffic Control and Command & Control Systems
- All phases of software project development and life cycle support
- Software engineering consultation and contact support services
- Software product development and sales

Computer systems development may range from microprocessors to mainframes. In the industrial field, PRIOR has considerable experience with the DEC PDP-11 family of computers, the RSX-11M, RT-11 and UNIX operating systems, and the Pascal and C programming languages. In the military field, PRIOR has significant expertise with the UYK-20 and associated computers, and the CMS-2 and ADA programming languages. They have assumed responsibilities as a software subcontractor, and as a turnkey system developer.

PRIOR has participated in all phases of software project development. This experience includes:

- Research and Development
- Feasibility studies and requirements analysis
- Systems analysis, systems specification, and hardware procurement
- Proposal preparation and evaluation
- System design and detailed module design
- Module code and testing
- System integration
- Acceptance test plan preparation
- Software maintenance and enhancements

Software engineering consultation and contract support services can be provided for all of the above phases of software project development, from requirements analysis to software maintenance.

AVERAGE WORK FORCE: Professionals – 100
Others – 50

GROSS SALES: 1986 – \$ 7.0M
1987 – \$10.0M

PLANT SIZE: 30,000 Sq Ft (Ottawa)
2,000 Sq Ft (Toronto)
2,000 Sq Ft (Halifax)

EQUIPMENT: DEC PDP-11/44, Perkin-Elmer 7/32, WICAT 68000, Micro VAX II, and PCs.

EXPERIENCE: PRIOR has participated in the following military application areas: Command and Control; Anti-submarine Warfare (ASW); Communications; Surveillance; Graphics; and Simulation.

PRIOR has worked directly for DND or as a subcontractor on many of DND's recent major projects. These include NFA, CPF, AURORA, ADLIPS, CANEWS SHINCOM, MACs, and MCOIN II. PRIOR has successfully teamed with other members of Canadian industry such as Leigh Instruments, Litton Systems Canada Ltd, Westinghouse, and Rockwell.

In the area of military research and development, PRIOR has had a continuing involvement with projects at the Defense Research Establishment Ottawa and the Communications Research Center. These projects have been concerned with radar, direction finding, electronic warfare, countermeasures, analysis, navigation, graphics and simulation.

PRIOR's three major real-time application areas are the Military, Air Traffic Control, and Supervisory Control and Data Acquisition.

Sixty percent of the company's work is military-related. There has been no direct contact with the US military. All experience to date has been either with the Canadian Department of National Defense or as a subcontractor on a DND sponsored project.

KEYWORDS: ASW; ATC; C3 Systems; Communications; Computer Graphics; Computer Simulation; Computers; Consulting; Data Acquisition; Electronic Warfare; Feasibility Studies; Graphics; Life Cycle Support; Module Design; Program Management; Radar; Requirements Analysis; Simulation; Software Development; Software Services; Surveillance; Systems Analysis; Turnkey Computer Systems.

REVISED: May 88

PYLON ELECTRONIC DEVELOPMENT CO Ltd

ADDRESS: 147 Colonnade Road
Ottawa, Ontario, Canada
K2E 7L9

CONTACT: Mr H Laks, President – (613) 226-7920

HISTORY: The Pylon organization celebrated its first 33 years of business 21 Mar 88. Within two years of incorporation under Federal Charter in 1955, the company was manufacturing 20Hz Ringing Generators and static power conversion equipment. This was the outcome of an R&D program to develop a line of "solid state" products to replace rotary equipment. The term generator is still used to describe these products. The name most commonly used by domestic phone companies was "Pylons" regardless of the type of equipment.

The use of solid state ringing and power conversion in the US came several years later. Telcos were quick to see the advantage of using one central office battery and the conversion method with redundancy for high reliability. In Canada, Pylon is the major supplier of DC-DC Converters and ringing machines.

With the acquisition of Armtrrol Ltd in 1970, Pylon entered into the manufacture of electronic switching equipment. A line of trunk concentrators of CAMA application and ROTS apparatus were introduced.

Manufacture of digital equipment began in 1965 with systems involving photoelectric badge readers. The first system formed the basis of data gathering systems for the Post Office. Pylon has supplied a vast range of specialized data equipment to customers in North America and overseas. Pylon offers a complete engineering support team from system concept through to the end product.

In 1977, the company expanded by opening a division in Ottawa which specialized in the manufacture and development of instrumentation. The Toronto division was opened in the fall of 1979.

Due to the growth of the Pylon market, it was decided to build a new development plant in Ottawa and to relocate the Pylon Head Office on completion of this facility. A year later, this was accomplished.

The company holds 21 Canadian patents, 13 US patents, and 5 trade marks. Approximately 25% of all telecommunication equipment, and over 90% of the nuclear equipment is exported.

CAPABILITY: Both Montreal and Ottawa maintain an R&D and engineering group capable of developing new equipment. These facilities will undertake contract work in the area of their competence.

- Montreal Branch – Telco Products, Ringing Generators, Ringing Talk Signal Supplies, UPS Systems, CO Power Plants, Wide Area Alarm Systems, Electronic Switching Equipment, and Custom Transit Cases.

- Toronto Branch – Cables, Harnesses, and Custom Test Equipment.

- Ottawa Branch – Manufactures a line of Time Code Generators, Distribution Amplifiers, Satellite Ground Station Equipment, specialized equipment for DND, and nuclear monitoring equipment.

AVERAGE WORK FORCE: Scientists/Engineers – 30
Others – 100

GROSS SALES: 1987 – \$5.8M
1988 – \$6.5M (Est'd)

PLANT SIZE: Montreal – 18,000 Sq Ft
Toronto – 5,000 Sq Ft
Ottawa – 16,000 Sq Ft

EXPERIENCE: Canada – Department of National Defense, RCMP, National Research Council, Bell Canada, Telesat, Trans Canada Telephone System, Atomic Energy of Canada, CNCP Telecom, Northern Telecom Ltd; and in the US – Danray Inc, Northern Telecom Inc, Bell South Advanced Systems, Digital Communications Corp, Shell Oil Co Inc, Siecor Optical Cable, Tellabs Inc, ABC, NBC, CBS, and various bodies involved with Health Physics investigations. Other areas include Nuclear Instrumentation worldwide.

KEYWORDS: Battery Chargers; Code Converters & Displays; Converters; EMI Hardened Equipment; Electronic Telephone Switching Equip.; Instruments; Inverters; Loop Back Units; Monitoring (Microprocessors-Based); Nuclear Instrumentation; Radioactive Gas Generators; Ringing (Telephone Circuits); Satellite Ground Station; Alarm Equipment; Talk and Signal Supplies; Telephone Communications; Telephone Rectifiers; Time Code Generators; Uninterruptable Power Supplies; Wide Area Alarm Units.

REVISED: February 88

QUANTUM INSPECTION AND TESTING Ltd

ADDRESS: 916 Gateway
Burlington, Ontario, Canada
L7L 5K7

CONTACT: Mr Wm I Marcovitch, President – (416) 632-5869

HISTORY: Established in 1968 as a firm of consulting engineers, Quantum has evolved into Canada's largest specialist independent professional quality services/surveillance and laboratory testing/inspection organization dedicated to the aerospace, defense and precision manufacturing sectors.

Quantum's Test Center and corporate headquarters are strategically located in a new facility in the hub of Canada's manufacturing/industrial heartland which also provides convenient access to the East and Midwest regions of the US market.

CAPABILITY: Quantum's product is Contract Quality Services and Expertise – people, facilities and related capabilities. The company's broadly-based resources, experience and capabilities are geared to integrate on either a complementary and supplementary basis with the client's organization in an efficient and cost effective manner to fulfill those requirements.

Quantum offers the following services:

- Vendor Surveillance – capability and pre-award surveys; performance monitoring; sampling inspection; test witnessing; expediting; and certification.

- Non-Destructive Testing – radiographic, ultrasonic, liquid penetrant, magnetic particle, eddy current, infrared thermography.

- Quality Management Consulting – quality systems development, training and problem solving/troubleshooting.

- Welding/Fabrication/Consulting – procedures development/evaluation, specialized fab/repair contract management and subcontracting, applications R&D, and failure investigation.

- Product Development and Research – Quantum participates in industry/government schemes for product development/improvement.

- Measurement Services – calibration laboratory; three coordinate measurement; laser theodolite dimensional coordinate analyzing capability (unlimited size and contour); casting layout; dimensional verification; and relapping and calibration of granite surface plates.

Housed in a total environmentally controlled laboratory facility, Quantum is Canada's largest independent contract and subcontract service source for dimensional verification inspection with major Aero/Defense/Precision buyer approval of facilities and capabilities with recognized accuracies to 3 millionths of an inch.

AVERAGE WORK FORCE: Engineers – 5
Scientists – 3
Technicians – 45
Others – 15

GROSS SALES: 1986 – \$2.5M
1987 – \$2.8M

PLANT SIZE: 29,000 Sq Ft

EQUIPMENT: Complete NDE Facility and Mechanical Metrology and Measurement Capability.

EXPERIENCE: All test center facilities are traceable to NRC Canada (equivalent of NBS Washington) and the operational capabilities operate under such validated governmental recognitions as the Department of National Defense, Canadian Standards Association, Department of Transportation and Communications, the Canadian Government Standards Board (US MIL and NATO Standards), and Standards Council of Canada.

Buyer approvals include such organizations as Pratt and Whitney, Boeing, McDonnell Douglas, Rockwell, General Electric, Bell Helicopter, Spar Aerospace and Sikorsky. Our status is typified by Quantum's recognition by NASA as being the sole Canadian source approved for the non-destructive testing of fracture critical components for the Space Program.

They are quality professionals whose permanent staff resources and facilities base allows the aerospace sector optimal flexibility and economies in fulfilling its mandate for quality in confidence and security. They are interested in doing business with the USAF.

KEYWORDS: Calibration; Expediting; Fabrication Procedures; Failure Investigations; Inspection; Metrology; Non-Destructive Testing; Precision Measurement; Product Surveillance; Quality Assurance; Sub-contract Management; Training; Vendor Surveillance; Welding Procedures.

REVISED: February 88

QUESTOR SURVEYS Ltd

ADDRESS: 55A Port Street E
Mississauga, Ontario, Canada
L5G 4P3

CONTACT: Mr S J Kilty, President - (416) 271-0311

HISTORY: Originally a one aircraft operations section of a mining company, the company split in 1961 and formed a Contract Survey Services Division. During this period, the company operated one owned aircraft and three leased aircraft. In 1970, they began expanding operations, and in 1979 acquired the geophysics division of Northway Survey Corporation. During this period, they specialized in the use and development of the Barringer INPUT electromagnetic system. Questor is now associated with World Licensing Corporation of Perth, Australia.

CAPABILITY: Questor specializes in all state-of-the-art airborne sensing for base metal, uranium and oil. In addition to the Barringer INPUT system (Time-Domain electromagnetics), they also are capable of acquiring and analyzing data from airborne standard & high sensitivity magnetics, standard & multi-channel spectrometry, and frequency domain electromagnetics. They also design and build very high sensitivity magnetometers along with their associated data acquisition systems. Their aircraft fleet includes two Skyvans, two Trislanders, and one C206. The INPUT systems generate a pulsed signal from a vertical dipole. The primary field induces eddy currents in conductive targets and these currents produce secondary fields. These secondary fields are then sensed. Through analysis of these secondary field anomalies, sulfide and graphite conducting pockets have been identified to a depth of 300 meters. Standard and high-sensitivity magnetometry provide detailed magnetic contour maps. Corrections for aircraft attitudes & maneuvers, and the use of precision clocks, etc., enable Questor to improve the normal high standard government contour maps by a factor of four in geologic resolution.

Gamma ray spectrometers are used to identify potential uranium deposits as well as for geologic mapping and identification of man-made radio-active wastes. Data reduction for all types of sensors/missions is provided by the company's specially developed algorithms and provides a variety of outputs depending on the users' needs.

Questor has recently organized an internal Research Division. They are presently working to improve the various sensors used by Questor.

AVERAGE WORK FORCE: PhD - 1
Prof Eng - 1
BsE - 4
Technicians - 10
Others - 6

GROSS SALES: No Data

PLANT SIZE: 10,000 Sq Ft

EQUIPMENT: Equipment includes INPUT time domain electromagnetic system and Helium high sensitivity magnetometer and gradiometer.

EXPERIENCE: Questor's clients include 49 different countries around the world for one or more of their surveys. Their surveys have led to the discovery of fourteen base metals, precious metals, or uranium deposits in a variety of geologic environments. In Canada, customers have included Noranda Mines, Falconbridge Mines, Inco,

Imperial Oil, Shell Oil, and Gulf Oil. They are interested in conducting research for the USAF.

KEYWORDS: Data Acquisition; Data Analysis; Data Reduction; Electromagnetic Surveys; Helicopter Magnetic Gradiometer; Magnetic Gradiometer; Magnetometers; Mapping; Pollution; Remote Sensing; Sensors.

REVISED: April 88

RAYLO CHEMICALS (A Division of Terochem Laboratories Ltd)

ADDRESS: 8045 Argyll Road
Edmonton, Alberta, Canada
T6C 4A9

CONTACT: Mr J Matthew Colomb, Commercial Officer - (403) 468-6060

HISTORY: Raylo Chemicals was founded in 1961, became a subsidiary in 1981, and a division in 1985 of Terochem Laboratories Ltd, a private Canadian corporation. Terochem has no US subsidiaries.

CAPABILITY: Raylo Chemicals specializes in contract research, custom synthesis, and sales of manufactured products. Areas of expertise include bench scale pilot plant design & operation; Synthetic chemistry (natural products, pharmaceuticals & hydrocarbon chemistry); high pressure & temperature reactions; polymer chemistry (synthesis of novel monomers and their polymers, characterization and chemical stability testing); and non-routine analysis. A major contract activity is polymer chemistry applied to stable high-strength polymers for composites, elastomers, water soluble polymers, flocculation studies, and electrolyte cell separators. Other principal projects include supercritical gas technology applied to coal liquefaction & analyses of heavy oil, and development of physical & physico-chemical data in support of various commercial industrial processes.

Raylo Chemicals offers custom manufacture of complex chemicals and polymers from a few grams to several thousand kilograms, including process design and development. Raylo routinely handles highly reactive solid, liquid, and gaseous reagents, and can operate under vacuum and inert atmospheres. The following reactions are performed regularly:

- Acylation
- Alkylation
- Condensation
- Dissolved Metal Reduction
- Friedel-Crafts Reactions
- Grignard
- Halogenation (substitution and addition)
- High Vacuum Distillation
- Hydrogenation
- Hydrolysis
- Metal Hydride Reduction
- Optical Resolution
- Phosgenation
- Reductions

Raylo Chemicals products include specialty polymers and other fine chemicals for high technology industries. Over 150 compounds are currently in production and for many of these, Raylo is the sole or principal world manufacturer.

AVERAGE WORK FORCE: PhD Chemists - 10
Chemical Technicians &
Operators - 35
Others - 10

GROSS SALES: 1986 - \$4.5M
1987 - \$5.5M

PLANT SIZE: 16,000 Sq Ft
6,000 Sq Ft (Laboratory + Library)

EQUIPMENT: Raylo Chemicals has well equipped laboratories with the following instruments: 60 MHz proton magnetic resonance spectrometer; infrared and ultraviolet spectrophotometers; high performance liquid chromatograph, equipped with a variable wavelength ultraviolet detector with stop-flow capability; gas chromatograph, both packed column and capillary column, with FID and TC detectors; size exclusion chromatography system with differential refractometer; and other up to date chemical, biochemical and physical equipment.

Under an established arrangement with the University of Alberta, high resolution instruments such as Fourier Transform Infrared Spectrometer; Fourier Transform (100, 200 and 400 MHz) and Carbon-13 magnetic resonance spectrometers, and low and high resolution mass spectrometers are available to Raylo's research staff. Raylo also has access to and experience in using a low angle laser scattering photometer (KMX-6), particularly useful for determination of absolute molecular weight and molecular weight distribution polymers.

Raylo's plant equipment includes multi-purpose glass and stainless steel, jacketed, stirred reactors in the 10-1000 gallon range and a broad selection of separation equipment.

EXPERIENCE: The company has produced 77 patents and 35 publications. Raylo's clients are government, universities, and industry in the US, Canada, Europe and Japan.

KEYWORDS: Chemical Processing; Contract Research; Custom Synthesis; Monomers; Non-Routine Analysis; Physical Chemistry; Polymer Chemistry; Process Development; Product Characterization; Supercritical Gas Technology.

REVISED: January 88

RAYTHEON CANADA Ltd

ADDRESS: 400 Phillip Street
Waterloo, Ontario, Canada
N2J 4K6

CONTACT: Mr Graham R Beaumont, Director of Marketing -
(519) 885-0110

HISTORY: Raytheon Canada Ltd is a high-technology electronics company established as a Canadian corporation in 1956. Raytheon Canada is an independent, wholly owned subsidiary of the Raytheon Company, Lexington, MA.

CAPABILITY: Raytheon Canada Ltd designs, develops and manufactures Air Traffic Control (ATC) and Communications systems for civil and military applications for the world market. As a complete system supplier, Raytheon Canada is equipped to take on assignments of a national scope. In its role as a developer and manufacturer of high technology, state-of-the-art systems, Raytheon Canada's product base includes a broad range of ATC equipment including primary radars for terminal and enroute applications, ground control approach radar systems (mobile and fixed base), and navigational aids. Raytheon Canada also has a distinguished background in the design and manufacture of a wide range of communications equipment for both domestic and export markets. Products in this area span the range from microwave components to complete satellite ground stations and terrestrial microwave systems.

AVERAGE WORK FORCE: PhDs - 2
Engineers - 50
Others - 580

GROSS SALES: 1986 - \$123M
1987 - \$144M

PLANT SIZE: 132,000 Sq Ft

EQUIPMENT: In-house computer systems include VAX and IBM. Manufacturing includes some of the most sophisticated, fully automated machinery available for today's technology, such as Hardinge precision lathes, and a group of vertical and horizontal mills with Direct Read-Out Control. The test area also includes the most up-to-date multi-layer board test equipment.

EXPERIENCE: Raytheon Canada's customers include Transport Canada and the Department of National Defence. Previous customers include - all Canadian telephone companies, Telesat Canada, and Teleglobe, as well as numerous overseas PTT's, etc, and Civil Aviation Authorities.

KEYWORDS: Primary Surveillance Radar; Secondary Surveillance Radar; Ground Control Approach Radar; Precision Approach Radar; Radar; ATC Display Systems; Flight Data Processing; Radar Data Processing; VHF Omirange; Distance Measuring Equipment; Satellite Earth Stations; EHF Synthesizer; ATC.

REVISED: January 88

RDS ENGINEERING

ADDRESS: 253 Duckworth Street
St John's, Newfoundland, Canada
A1C 1G8

CONTACT: Mr James E Nicholas, Vice President, Operations -
(709) 739-5473

HISTORY: RDS Engineering, a privately owned Canadian company, utilizes state-of-the-art CADD (Computer Aided Design and Drafting) technology, providing engineering and drafting services to the Government, Fisheries, Shipbuilding, Industrial/Commercial Building, Defence, and Electric Utility industries. The company was founded in 1986. Branch offices will soon open in New Brunswick and in two locations in Ontario.

CAPABILITY: RDS Engineering is a full service consulting engineering firm. We feel we have revolutionized the engineering design and drafting industry with our CADD technology. The technology, which we have developed, can be found nowhere else in Eastern Canada. Designs are performed directly at CADD workstations, as well as all drafting deliverables. In many cases, drafting deliverables from CADD can be created seven to eight times faster than the conventional drafting board. Our state-of-the-art electrostatic plotter can deliver a full-size engineering drawing in 18 seconds. Changes on drawings can be made in a matter of seconds; bills-of-material are generated automatically. RDS Engineering can electronically check drawings for interferences between systems (i.e., piping and structural steel). The quality of our drawings is unequalled. Our technology helps us produce a product for our clients in the minimum time possible.

AVERAGE WORK FORCE: Engineers - 6
CADD Operators - 10
Others - 4

GROSS SALES: 1987 - \$0.6M
1988 - \$0.9M

PLANT SIZE: 4,200 Sq Ft (Design Center)

EQUIPMENT: Complete 2-D/3-D CADD system including seven CADD workstations, CADDserver, Electrostatic Plotter, Dot Matrix Printer, Color Plotter, Graphics Accelerator, one billion byte memory system, Apple Macintosh PC's, IBM PC's, and LaserWriters.

EXPERIENCE: Clients include Newfoundland Dockyard, St John Shipbuilding Ltd, Canadian Coast Guard, Supply & Services Canada, Universal Multifoods Ltd, Grove Telecommunications Ltd, Seaboard Construction Ltd, McNamara Construction Ltd, MRL Contractors Ltd, Beck Construction Ltd, Nordco Ltd, and Fisheries Products International Ltd.

KEYWORDS: Consulting Engineers; Energy Audits; Quality Assurance; Project Management; CAD & Drafting Systems; Drawing Preparation; Energy Conservation Studies; Interface Checking (Electronically); Project Scheduling; Modelling Mapping (3-D); CNC Input; Site Engineering.

REVISED: May 88

**RE: ACTION MARKETING SERVICES
Ltd
(RE: PRINT COPY & PRINTING Ltd)**

ADDRESS: 517 Parliament Street
Toronto, Ontario, Canada
M4X 1P3

CONTACT: Mr Gerald R Graves, President - (416) 964-8049

HISTORY: Both Re: Action Marketing Services and Re: Print Copy & Printing were founded by Gerald R Graves, who is president and sole director of both firms. Established in 1977, Re: Action initially offered advertising, marketing and promotion services. Recognizing the potential of computer-based word processing and other office automation technology, Graves expanded both companies' facilities to provide many of these new services starting with the establishment of both Re: Print and Re: Action's Document Creation Center in 1978. As a result, Re: Action Marketing Services and Re: Print Copy & Printing now offer not only advertising, marketing, sales promotion and public relations services, but also automated text and data creation, desktop publishing; data conversion; word and information processing; tele-communications; laser printing; graphic design; writing; editing; and system facility management and consulting services.

CAPABILITY: Re: Action and Re: Print are primarily involved in print communications of all types, including text creation, enhancement and print production projects, marketing plans, product sheets, technical, user, and training manuals; sales and support documentation; RFP responses; chemical, medical and engineering specifications and operations guides; biological abstracts; and reference works. Re: Action and Re: Print also offer complete writing, editing, graphic design, and marketing & promotional services. Both facilities and personnel have clearance to NATO secret level.

AVERAGE WORK FORCE: Management - 3
Administration - 6
Marketing & Information
Processing - 5 to 10
Graphic Design & Print
Production - 5 to 10
Others - 5 to 30

GROSS SALES: 1986 - \$1.00M
1987 - \$1.25M

PLANT SIZE: 7,500 Sq Ft

EQUIPMENT: 5+ IBM compatible 80286/80386 PCs; 2+ HP Laserjet + /SeriesII printers; Sigma Laserview Plus 19" high-res monitor; Electronic Publishing; 5 Xerox 860 IPS; 3 Xerox 850 PDS; 2 Xerox 820-II; 1 Xerox 16/8; 1 Xerox 2700-II; 2 Xerox 9400 EPS; 1 Kodak 150; 1 Xerox 6500 Color EPS; 1 Compaq 5161; Visualizing Lucy; Bell 201C synchronous modem; Bell 212A asynchronous modem; SME-4 modem eliminator; and miscellaneous peripheral equipment. Also support wide variety of software and provide data/format conversions.

EXPERIENCE: Customers include General Motors, Thomson-CSF, Ontario Ministry of the Environment, Chemetics (CIL), Chrysler Canada, Warner Lambert, Motorola Information Systems, Institute for Hydrogen Systems, Procter & Gamble, Addiction Research Foundation, Guaranty Trust, Liquid Carbonic Inc, Ontario Economic Council, Ontario Ministry of Education, Marshall Macklin Monaghan, Atomic Energy of Canada, Consumers Gas Company, Environics Research Group Ltd, Municipality of Metropolitan Toronto, Ontario Ministry of Municipal Affairs & Housing, Supply and Services Canada, Toyota Canada, and Xerox Canada.

KEYWORDS: Data Communications; Data Conversion; Desk Top Publishing; Direct Mail; Documentation; Editing; Electronic Publishing; Graphics; Laser Printing; Marketing; Microcomputer Programming; Operations Manuals; Printing; Public Relations; RFP Response; Reference Manuals; Reports; Specifications; Systems Facility Management; Systems Facility Services; Technical Manuals; Telecommunications; Text Management; Training Manuals; User Manuals; Word Processing; Writing.

REVISED: February 88

ROBERT MITCHELL Inc

ADDRESS: 350 Decarie Blvd
P. O. Box 950
St Laurent, Quebec
H4L 3K5

CONTACT: Mr P E Dostie, Vice President, Sales - (514) 757-2471

HISTORY: Robert Mitchell Inc was established in 1851 and at that time specialized in foundry work and railway equipment. Over the years, the company diversified and modified its manufacturing facilities. Consequently, Robert Mitchell Inc acquired other reputable firms that have become divisions of Robert Mitchell Inc, namely Prowse (established since 1929), Douglas Bros (founded in 1875), and the following subsidiary corporations:

- The Garth Company (in business since 1829)
- Canadian Cabinets Company Ltd (founded in 1968)
- 131098 Canada Inc - Aero Pattern Reg'd (1981)
- Robert Mitchell Co Inc (US Division, located in Portland, Maine)

CAPABILITY: Because of its diversification, Robert Mitchell Inc manufactures a great variety of products from airport ground support equipment (95% of all passenger loading bridges in operation at Canadian airports were fabricated and installed by the Robert Mitchell) to precision sheet metal machining, aluminum and magnesium castings, and patterns for the aerospace industry, plus laboratory facilities.

- Prowse - manufactures galley equipment, food service equipment for hospitals, institutions, hotels and cafeterias.

- Canadian Cabinets Company Ltd - specializes in environmental air control, such as laminar flow clean air work stations, biological containment hoods, and other related equipment.

- Douglas Bros - because of its complete line of metal working facilities, enables this division to manufacture pipe and fittings of stainless, carbon and alloy steels, process and pressure piping, pressure vessels, distilling units, desalination equipment, heat exchangers, sheet metal and plate custom products.

- The Garth Company - is a warehousing distributor of pipes, valves, fittings, and power piping specialties.

AVERAGE WORK FORCE: 550 - 600 employees

GROSS SALES: 1986 - \$67.8M
1987 - \$66.0M

PLANT SIZE: 250,000 Sq Ft (Montreal)
14,000 Sq Ft (Cornwall)

EQUIPMENT: No Data

EXPERIENCE: Robert Mitchell Inc, its divisions and subsidiaries serve the following industries: chemical, petro-chemical, pulp and paper, nuclear, water treatment, aerospace, pollution control, sewage treatment, food, beverage, distilleries, hydro-electric, breweries across Canada and the US.

KEYWORDS: Airport Equipment; Castings; Patterns; Railway Fittings; Pulp & Paper Instruments; Galley Equipment; Laminar Flow Work Stations; Biological Containment Hoods; Fume Hoods; Polypropylene Wet Stations; Modular Clean Rooms; Pipe & Fittings; Pressure Vessels; Reboilers; Desalination Equipment; Exhaust Intake; Exhaust Ducts; Reactors; Heat Exchangers; Digesters; Still Columns; Towers; Pressure Piping.

REVISED: January 88

ROBERTSON PHOTOGRAMMETRIC Inc

ADDRESS: Edmonton Research & Development Park
Research Center One
9411-20 Avenue
Edmonton, Alberta, Canada
T6N 1E5

CONTACT: Mr Gary Robertson, President - (403) 461-2974

HISTORY: Robertson Photogrammetrics Inc was incorporated in 1980.

CAPABILITY: RPI is the only company in Canada involved exclusively in the field of close-range photogrammetry. The company offers capabilities in research & development, consulting service, software, training programs, and manufacturing of close-range photogrammetric instrumentation.

Examples of some of the aerospace services provided by RPI are:

- Analysis of flight testing provided for RPV
- Structural testing
- Measurements of prototype models
- Quality control of assembly fixtures
- Sales of specialized close-range photogrammetric software for aerospace use
- Training programs for aerospace companies
- Measurement of radar antenna and reflectors
- Consulting in specialized applications for aerospace use

RPI, working jointly with The Perkin-Elmer Corp, Applied Optics Operation, Garden Grove, CA, have developed an automated close-range photogrammetric instrument. The instrument is called PASS 2000 (Photogrammetric Automatic Scanning System).

The PASS 2000 system has been designed to provide a multi-role instrument for aerospace usage in high precision manufacturing and quality control. The system has the capability of measuring and analyzing any form of imagery.

Entire assembly tools can be photographed and target locations are automatically measured, to accuracies of less than .001 inches. This eliminates the use of manual measurements with a master tool gage. Photogrammetry has shown time savings of up to 400 hours per assembly tool.

The PASS 2000 has the capability to enhance and measure x-rays and ultrasound images. The PASS 2000 offers options which includes an automatic film transport unit that will automatically measure up to 8 rolls of cine theodolite data.

AVERAGE WORK FORCE: Engineers & Photogrammetrist - 3
Perkin-Elmer/A00 Facility - 8
Others - 3

GROSS SALES: No Data

PLANT SIZE: 4,000 Sq Ft (Research Facility in Edmonton)
4,200 Sq Ft (Perkin-Elmer/A00, Garden Grove, CA)

EQUIPMENT: The company operates Digital VAX computers, DEC PDP/11, 4 photogrammetric cameras, PASS 2000 System Image Processing Work Station, flatbed plotter, graphics terminals, and a PDS Microdensitometer.

EXPERIENCE: Currently 100% of aerospace sales have been to the US. The company is interested in working directly with the USAF in particular on joint R&D programs. RPI has undertaken projects for USAF prime contractors such as Northrop, General Dynamics, Martin Marietta and ITT.

KEYWORDS: Analysis (Test Data); Inspection Systems; Measurement Systems; Photogrammetry; Software Training; Structural Testing.

REVISED: February 88

ROCKWELL INTERNATIONAL OF CANADA Ltd (Collins Canada Division)

ADDRESS: 150 Bartley Drive
Toronto, Ontario, Canada
M4A 1C7

CONTACT: Mr R Zanette, Marketing Manager - (416) 757-1101

HISTORY: Collins Radio of Canada Ltd was formed in 1953 as a wholly owned subsidiary of Collins Radio Company of Cedar Rapids, Iowa. With the acquisition of Collins Radio by Rockwell International in 1973, it became a Division of Rockwell International of Canada.

CAPABILITY: The Collins Canada Division is engaged in the manufacture of radio communications products, systems designs and support activities. Principal products are HF Receivers and Transmitters, General Purpose VLF/LF/MF/HF Receiver, Miniature HF Single Channel Synthesized Receiver, HF Manpack Transceiver, 150-watt HF power amplifier/antenna coupler, preselector for an Extended Range Communications System, and Standard and Custom Transportable HF Communication Shelters. Products and systems are sold worldwide.

AVERAGE WORK FORCE: Engineers - 38
Technicians - 65
Others - 282

GROSS SALES: 1986 - \$51.0M
1987 - \$56.0M

PLANT SIZE: 122,000 Sq Ft

EQUIPMENT: Rockwell's facility is equipped for all types of electrical and mechanical assembly employing advanced techniques such as computerized wave soldering, auto insertion for ICs and axial lead components. Product quality is assured by intensive in-process and completed item inspection. Test equipment is maintained and calibrated on regular cycles. Calibration is traceable to the Canadian National and US National Bureau of Standards. Requirements of the Canadian Government DND 1015 and by reciprocal agreement, US MIL-Q-9858A for quality standards are met. A detachment of the Canadian Forces Technical Services Agency is resident at the facility.

EXPERIENCE: Since its inception as a manufacturing facility in 1955, Collins Canada has been providing UHF/HF equipment and systems to the Canadian Forces, the US military and a wide range of other countries. Current products are being supplied to all US Military Services, Canadian Forces and other countries. Products include equipment such as the HF-80 HF Transceivers, the HF-2050 HF Receiver, the S-1 HF Receiver, the AN/PRC-515 HF Packset, Collins 549-1 150-watt HF power amplifier/antenna coupler enhances the AN/PRC-515 capabilities, the F-1535 agile preselector is a rapid tuning bandpass filter designed for use with the AN/ARC-190(V), and communication centrals such as the AN/TSC-60(V)7 a 1-kW system, the AN/TSC-60(V)8 a dual 2.5-kW system and the AN/TSC-60(V)9 a dual 1-kW system.

KEYWORDS: Avionics; Communication Shelters; Communications; HF Airborne Communication Systems; HF Packset; HF Receivers; HF Transmitters; Support Activities; Systems Design.

REVISED: February 88

ROLLS-ROYCE (CANADA) Ltd

ADDRESS: 9500 Cote de Liesse Road
P. O. Box 1000
Montreal AMF, Quebec, Canada
H4Y 1B7

CONTACT: Mr D Bayly, Account Manager, US Military Programs
- (514) 631-3541

HISTORY: Rolls-Royce Canada was founded in 1952 for the production and support of Nene engines powering the Canadian Armed Forces' T-33 trainer aircraft built by Canadair. From that specialized beginning, Rolls-Royce Canada has continually grown and diversified. Still expanding today, Rolls-Royce Canada is a modern broadly based aero and industrial engine facility. The company is a wholly owned subsidiary of Rolls-Royce PLC.

CAPABILITY: Repair and overhaul has always been and will continue to be the backbone of Rolls-Royce Canada's business. The company has the ability to repair and overhaul the following engines:

- Military – Nene; GE T64; R 1820; Adour (F405-RR-400).
- Civil – Spey; Dart; Viper; RB211 535E4, Tay.
- Industrial – Avon; RB211; Spey. These engines cover the medium to high power range, i.e., 3000 to 4000 lbs thrust, 1500 to 3500 SHP (capability to 9000 SHP) and up to 3500 GHP.

A repair engineering group works closely with prime manufacturers and the repair industry to develop and apply new repair techniques and processes. Repairs are carried out in accordance with the original manufacturer's specifications. In addition, Rolls-Royce Canada has developed more than 3000 repair schemes on its own in an effort to increase component lives and to reduce overhaul costs.

Rolls-Royce Canada is the world source for the Industrial Spey and Industrial RB211 gas generators. These aero derivative gas turbines are manufactured to aerospace standards. The company has developed and manufactures the off-engine support systems for both industrial gas turbines.

AVERAGE WORK FORCE: Salaried – 227
Hourly – 458
Management – 43

GROSS SALES: 1986 – \$122.0M
1987 – \$113.0M

PLANT SIZE: 38,000 Sq Ft (Engine Assembly)
120,000 Sq Ft (Engine Overhaul and Common Support Shops)
35,000 Sq Ft (Test Beds)
170,000 Sq Ft (Offices & Warehouses)

EQUIPMENT: The repair shop contains a wide range of general purpose machine tools to enable turning, milling, jig boring, grinding, and electrical discharge machining to be carried out on a wide range of materials. Welding capabilities include Hobart Dabber Automatic Pulse Weld System, TIG weld, metallic arc resistance, needle arc, torch brazing and vacuum, or inert gas high temperature brazing. Heat treatment includes argon or hydrogen controlled atmosphere, low and high temperature vacuum heat and aluminizing. Metal spray capabilities are thermal spray (powder and wire) including 6P gun and plasma spray; erosion or wear resistant hard coatings; abrasable coatings; thermal barrier (ceramic) coatings and anti-corrosion coatings. Processing capabilities include non-metallic coatings-rubber wear away and PL95, nickel, chrome, silver, cadmium, copper, SerMetal processing, tin, lead-tin and Tribomet wear resistant coatings; soft anodizing, alodine dichromate surface treatment and phosphating; vapor blasting, dry blasting and shot peening; electroless nickel plating; and aerofoil surface superfinish. Balance includes static/vertical and dynamic/horizontal.

Rolls-Royce Canada operates five diverse engine test facilities capable of testing a wide range of equipment encompassing piston engines, turboprops and turbofans. A new state-of-the-art test bed was inaugurated in November 1986, which can accommodate engines of up to 100,000 lbs thrust. The company designs and engineers all supporting systems (starting, fuel, lubrication, cooling), equipment (cradles, carts, tooling), safety controls (interlocks, alarms, trips) and instrumentation.

The laboratory presently holds DND approval number 020-2/56 to act as a chemical, metallurgical and mechanical test establishment and offers a wide range of services encompassing tensile testing, hardness testing, metallography, electronic and instrumentation testing and, radiographic and ultrasonic testing.

EXPERIENCE: Rolls-Royce Canada is highly export-oriented – over 70% of the company's business is with non-Canadian customers. Although 80% of the customer base is within the continental Americas, Rolls-Royce Canada customers now originate in the Middle and Far East, Europe and Africa.

Rolls-Royce Canada has over 35 years experience in heavy maintenance support of aero engines for Military and Civil Operators around the world. A specialist repair engineering group develops new repair technology for economic piece part repair.

The sheet metal and welding shop carries out complex repairs on sheet metal fabricated components as well as repairing main casings by weld build-up prior to re-machining. Sheet metal components made from high temperature resistant alloys of nickel and chromium such as combustion liners, turbine entry ducts, seal fins and jet pipes are repaired by direct welding or the fabrication of locally formed patches welded into the structures. Resistance weld certification in accordance with MIL W6858 and MIL STD 1595A and fusion weld approvals can be carried out in accordance with D49-001-24/SF-001.

Quality approval conforms with the following specifications: MIL-Q-9858A, MIL-I-45208, MIL-C-45667, DAR 7-103-S; DOT Approval No. 1/58, DND 1015/16/17/19; and CAA A1/2423/47.

KEYWORDS: Aluminum Components; Calibration; Combustion Research; Components (Engines); Corrosion Control; Engine Components; Engine Systems; Engines; Gas Turbine Engines; Heat Treating; Life Cycle Support; Magnesium; Metal Plating; Non-Destructive Testing; R&O (Engines); Tool Fabrication; Turbine Blade Inspection; Turbine Engines; Welding.

REVISED: January 88

SANDERS CANADA Inc

ADDRESS: 2421 Lancaster Road
Ottawa, Ontario, Canada
K1B 4L5

CONTACT: Mr Fred Bertelmann, Manager, Plans & Programs – (613) 738-4514

HISTORY: Sanders Canada Inc (SCI) is a wholly owned subsidiary of Sanders Associates Inc, a Lockheed Company. SCI was established in 1985 in response to the Industrial Benefits clause of the Canadian Forces AN/ALQ 126B contract to provide Canadian EW depot support, and the capability to design, test and produce EW products.

CAPABILITY: Sanders Canada Inc is primarily involved in the design, manufacture and depot support of electronic warfare (EW) products. Depot support is provided for the Sanders AN/ALQ 126B Defensive ECM System, the AN/ALT 502/503 Noise Jammer, the OL-5002 Acoustic Data Processor, and the Lockheed On-Board Structural Computer (OBSC). SCI has a resident DND QA Inspector in-plant. Manufacturing includes the production of state-of-the-art power supplies, circuit cards, and wire harnesses to MIL-Q-9858A standards. The facility is cleared to SECRET and the company operates a large TEMPEST facility, and has extensive EW simulation and modeling capabilities. On-going engineering work includes systems integration and design of airborne EW Support and Training (EST) platforms, EW Software Support, Test Program Set (TPS) development, EW Technique Studies, and development/production of portable Flight Line EW Reprogramming systems.

AVERAGE WORK FORCE: PhD – 1
Engineers – 14
Others – 110

GROSS SALES: 1987 – \$3.5M
1988 – \$9.0M (Est'd)

PLANT SIZE: 60,000 Sq Ft

EQUIPMENT: Sanders Canada Inc's equipment includes:

- In-house computing equipment including a VAX 11/785 and a Micro-VAX II computer.

- Complete production equipment for power supply, circuit card, and wire harness assembly and test.

- Depot level support equipment including CF-18 EW support equipment (power supply fill group, power supply assembly & sub-assembly test stands, USM 392 Analog/Digital test stand, microwave test station & temperature chambers), and CP-140 acoustic data processor support equipment comprising 11 test stations (e.g., analog, digital, power supply, circuit card assemblies, WRA).

EXPERIENCE: Sanders Canada Inc's present customers include the Canadian Forces, the USN, Sanders Associates, Lockheed, and Litton Canada.

KEYWORDS: R&O (Avionics); Electronic Warfare; Circuit Card Assembly; Power Supplies; Harnesses; TPS Development.

REVISED: January 88

SCI-TEC INSTRUMENTS Inc

ADDRESS: 1526 Fletcher Road
Saskatoon, Saskatchewan, Canada
S7M 5M1

CONTACT: Mr Neil Foulds, President - (306) 934-0101

HISTORY: Sci-Tec Instruments Inc is a Canadian-owned high-technology electronics company incorporated in 1981. There are no other Canadian or US facilities.

CAPABILITY: Sci-Tec Instruments was established to design, manufacture and market high quality scientific and industrial instrumentation and electronic systems. They can offer a broad range of capabilities in data acquisition, microprocessors, communication, remote sensing, remote control systems, as well as electronic system engineering and instrumentation from the conceptual stage through to delivery of a finished product. Along with the capability of machining components for their products, in-house machining experiences have included a range of intricate, close tolerance machining in satellite low noise amplifier housings, rocket payload extend/retract mechanisms, payload booms and payload prototyping.

The management objectives for the company are comprised of continued market penetration for their three main products and diversifying its operations to include US Government solicited contracts in areas of research and development and off-load or subcontract opportunities in the scientific and industrial electronics fields.

AVERAGE WORK FORCE: Scientists and Engineers - 4
Others - 11

GROSS SALES: 1986 - \$1.5M
1987 - \$1.5M

PLANT SIZE: 7,200 Sq Ft

EQUIPMENT: Sci-Tec Instruments employs the following equipment:

- Electronics - Microprocessor development system for development and test of software and hardware. Lab test equipment for the R&D and production testing of products and prototypes. Optical assembly and alignment facility which includes a laminar air flow bench, lasers and optical benches. Drafting facilities for mechanical, electronic and printed circuit boards.
- Machining - CNC Mill/Precision engine lathe and other machine shop facilities to manufacture precision components.

EXPERIENCE: The "Brewer Ozone Spectrophotometer" was jointly developed by Sci-Tec and the Canadian Government. The Brewer is a highly sophisticated instrument capable of monitoring ozone (O3) and sulfur dioxide (SO2) atmospheric overburdens and vertical concentration profiles. In addition, this instrument is presently being used in monitoring the horizontal irradiance in the ultraviolet and has been further developed to provide automatic azimuth and elevation tracking with additional features allowing for unattended operation. The Brewer

is sold world wide to various governments, universities and scientific organizations.

The "Cosmos Tracking System" was developed to meet demand for a two-axis, microcomputer controlled point/tracking system. Applications for this device include pointing specialized scientific or industrial instruments at celestial objects and tracking as it moves through the objects' trajectory. Because of the medium load capability (100 lbs maximum), they expect the market to expand in the near future to cover a wide range of industrial, space and military applications.

An exclusive manufacturing and marketing license was secured for the "High Line Data Acquisition System" (HILDA). This instrument is the foremost system for measuring vibration on high voltage (730 kV) transmission lines. The ability of the system to provide remote, unattended measurements over a long time frame is expected to increase utility and maintenance/installation groups' demand for this instrument.

Worldwide exclusive licenses exist to manufacture and market two petroleum industry related products - the Fluid Level Monitor and the Posi-Stop Block Limit Control System. These products reached commercialization in early 1985.

The Petro Tag will uniquely facilitate automated inventory control of contained hazardous and non-hazardous fluids in the petroleum and petro chemical industries. The Petro Tag is cost-comparable and a more accurate device than existing electronic and mechanical monitors.

The Posi-Stop Block Limit Control System is a patented solid state device designed to prevent the traveling block on a drilling rig from moving past preset upper and lower limits in the derrick. This micro-processor based product assists in preventing rig personnel injuries from hazardous traveling block breaks as well as assisting rig operators to determine and increase drilling efficiency. The Posi-Stop System is seen as a replacement for conventional systems due to reliability and ease of use and installation.

KEYWORDS: Data Acquisition; Environment; Image Processing; Instrumentation; Machining; Microprocessors; Remote Control Systems; Remote Sensing; Software Development; Software Services; Space Systems; Systems Design; Systems Engineering; Telemetry Systems; Testing/Test Equipment.

REVISED: February 88

SCINTREX Ltd

ADDRESS: 222 Snidercroft Road
Concord, Ontario, Canada
L4K 1B5

CONTACT: Dr H O Seigel, President - (416) 669-2280

HISTORY: Scintrex Ltd began as Sharpe Instruments Ltd in 1947 and was incorporated as Scintrex Ltd, a public Canadian owned company, in 1967.

Scintrex Defense Products Division is a supplier to the US DOD of high sensitivity portable (Mark 22) magnetometers for explosive ordnance detection. In addition, it supplies area radiation monitors (AN-GDQ-3) for the determination and transmission of the level of nuclear radiation around strategic locations. Similar military-specification radiation monitors are being developed for mobile applications (ship, vehicle and aircraft installations). An explosives vapor detector (bomb sniffer) has been developed in conjunction with the National Research Council of Canada for defense against acts of terrorism. The potential application of laser-based, active remote sensing methods to certain defense problems is now being investigated. In addition, a detector of PGDN vapors from OTTO II Torpedo fuel has been developed on behalf of the Canadian Department of National Defence and provided to the Canadian Navy for use in their depots, ships and submarines to protect personnel against these toxic vapors.

CAPABILITY: The Contract Instrumentation Division of Scintrex began developing monitoring instrumentation in 1974 for CANDU nuclear power plants. Since then, the company has manufactured tritium monitors, reactivity control logic cabinets, shut-off rod logic modules, high radiation hand-held monitors and logic panels for safety shut-down systems. CANDU reactor operators in Ontario, Quebec, New Brunswick, Korea, and Argentina use this equipment.

The Exploration and Analytical Equipment Divisions of Scintrex are a major part of its business. They include the design, development and manufacture of geophysical and geochemical instruments for the mining industry, and analytical instruments for chemical laboratories. Over the years, geophysics has become the key exploration tool for discovering new mineral deposits. The steady depletion of surface ore bodies and consequent need to detect buried deposits have produced a growing dependence on geophysical methods. Scintrex is a leader in the design, development and manufacture of mining exploration equipment. Its products, services and skills have contributed directly to numerous major mineral discoveries in different parts of the world. Out of this experience, there is an expertise in developing portable analytical equipment for remote, on site chemical analyses.

The Systems Engineering Group of Scintrex is highly experienced in the installation of sensing systems in aircraft, helicopters and vehicles for mobile applications. Many magnetic, electromagnetic, radiometric and laser installations have been made, operated and serviced.

Ruggedized, portable gas chromatographs have been developed which are optimized for detecting various vapors of interest to defense forces, including those arising from explosives and torpedo fuel, to date. Detectors for illicit drugs are being currently developed using similar principles.

AVERAGE WORK FORCE: Electronic Engineers - 12
Mechanical Engineers - 2
Chemists - 5
Geophysicists - 3
Physicists - 4
Technicians - 40
Machinists - 20
Sales, Office Staff & Others - 83

GROSS SALES: 1986 - \$12.1M
1987 - \$11.5M (Est'd)

PLANT SIZE: 70,000 Sq Ft

EXPERIENCE: Scintrex has had experience with the US Army and Navy (contracted to build nuclear radiation monitoring systems and explosive ordnance detectors); Ontario Hydro (contracted to supply hand-held radiation dosimeters for nuclear power plants); and other CANDU reactor users (contracted to build a variety of radiation monitoring devices) and the Canadian Department of National Defence (development and supply of PGDN and radiation monitors).

KEYWORDS: Atomic Absorption Spectrophotometers; Beta Ray Monitors; Dosimeters; Drug Detection; Electromagnetics; Gamma Ray Monitors; Geochemical Equipment; Geophysical Equipment; Gravity Sensors; Hazardous Gas Detection; Magnetic Sensors; Ordnance Detectors; Radiation Monitoring Systems; Remote Sensing; Toxic Gas Detectors; Trace Gas Detection; Tritium Monitors; Ultraviolet Fluorescence Systems.

REVISED: January 88

SED SYSTEMS Inc

ADDRESS: P. O. Box 1464
Saskatoon, Saskatchewan, Canada
S7K 3P7

CONTACT: Mr David Heath, Senior Marketing Manager
(306) 933-1446

HISTORY: SED Systems Inc is an advanced technology systems engineering and production company located in Saskatoon, Saskatchewan, Canada. They evolved from the Space Engineering Division of the University of Saskatchewan. Originally, their activities consisted of the design and construction of rocket payloads for upper atmospheric research. Since their incorporation as a private company, SED has pursued a development policy which has led them increasingly into commercial markets with innovative products derived from aerospace technology. SED was incorporated in 1972.

CAPABILITY: SED supplies systems engineering and custom manufacturing in space and communications advanced technology. The major products and services offered are:

- Communications systems engineering, custom satellite communications earth stations, complete satellite telemetry tracking and command earth stations, satellite ground control equipment, customized telemetry and tracking systems, sounding rocket payloads, and scientific instrumentation for use on the space shuttle.
- Two-way, voice and data satellite communications system, SKY SWITCH™, for private networks; and TVRO systems and subsystems for satellite earth stations.

Diversification is one of SED's major strengths. An assessment of the range of the company's products and services shows that they are based on a relatively narrow range of technologies that have been developed in depth. The specific technologies are highly complementary which allows the penetration of highly diversified markets with innovative products resulting from knowledge acquired in other fields. Complementary technologies have also strengthened SED by permitting staff mobility in response to market fluctuations and to facilitate employee development.

AVERAGE WORK FORCE: Professional - 120
Technical - 240

GROSS SALES: 1986 - \$19.0M
1987 - \$25.0M

PLANT SIZE: 125,000 Sq Ft

EQUIPMENT: SED has a variety of specialized facilities including computer systems, earth stations and payload integration facilities; Class 1000 clean room; a medium volume PCB production facility with QA to military specifications; and a vacuum chamber.

EXPERIENCE: SED experience in the space and defense areas include:

- **SPACE:**
 - Payloads - Sounding rocket and balloon payloads (1965-present) (produced over 64, Canadian National Research Council); Firewheel sub-satellite (1980 launch on Ariane), NRC (Max Planck Institute - Germany); and Wide Angle Michelson Doppler Imaging Interferometer - Atmospheric Test Instrument (1980-present-NRC).
 - Mission Planning and Support - Communications Technology Satellite - CTS or Hermes (1970-1976) [planned attitude acquisition phase, designed ground control station and developed software, Canadian Department of Communications (DOC)].
 - Satellite Telemetry, Tracking and Command Stations - ANIK A (TAC station for A2 (1972), Telesat Canada); ANIK C/ANIK D (transportable tracking station - located in Guam (1982), Hughes Aircraft Co); and LANDSAT/GOES (1972-present) [Canadian tracking station, Canadian Center for Remote Sensing (CCRS)]; and Brazil Telecommunications Satellite System Satellite Control Facility (1982-1985).
 - Ground Control Equipment - ANIK C, ANIK D, and SBS (1978-1982) (variety of equipment (50) including command generators and upconverters and telemetry displays, Hughes Aircraft Co).

- Communications Earth Terminals – A wide variety of over 200 terminals including low cost 4 and 12 GHz TV receive only, and 2 way fixed and transportable terminals (4/6 and 12/14 GHz) (1974-present).

- Satellite Systems Test Sets – ANIK C/SBS (12/14 GHz computerized payload test and integration support unit, Hughes Aircraft Co, and DOC); ANIK D – 4/6 GHz (as for ANIK C, SPAR Aerospace and DOC) (1978-1981); and in-orbit test systems for INMARSAT and Luxembourg (1987-1990).

- DEFENSE:

- Digital Switches – NORAD Joint surveillance System (1979-1981) (digital switches to handle up to 84 channels of digitized radar data, Hughes Aircraft Co); and Miscellaneous Digital Switches (1981-present) (as for JSS above, Hughes Aircraft Co).

- Satellite Control Centers – SARSAT Canadian Mission Control Center (1981-1982) (installed at Trenton, Ontario as part of Canada's contribution to the international Search and Rescue Satellite (SARSAT) Program, provides control and monitoring capability for the entire Canadian SARSAT system, Department of National Defense).

- Tracking Systems – Air Defense Aerial Target Tracking System (1981-present) (developing a tracking antenna, telemetry receiving system for use with target drones at the Defense Research Establishment Suffield in Alberta, Department of National Defense).

- Communications Systems – Project Eureka (1981-1983) (designed, developed and installed a full, 2-way satellite communications ground system in Ottawa and Eureka to provide a data link for the DND (Project Hurricane), and Telesat Canada).

- SED is the system designer and the system integration manager for the external and miscellaneous interior communications systems, and the meteorological systems for the six new Canadian Patrol Frigates for PARAMAX Electronics (a subsidiary of Sperry) (1983-Present).

KEYWORDS: Aerial Target Tracking System; Communications Systems; Computers; Digital Switches; Ground Control Equipment; Ground Stations; In-Orbit Real-Time Test; Instrumentation; Payload Design; Payload Test Services; Program Management; Satellite Communications; Ground Stations; Satellite Telemetry Tracking Stations; Simulation Programs; Systems Engineering; Systems Studies.

REVISED: January 88

SEI INDUSTRIES Ltd

ADDRESS: 406 – 5940 No. 6 Road
Richmond, British Columbia, Canada
V6V 1Z1

CONTACT: Mr Clive Langton, VP, Marketing – (604) 270-6433

HISTORY: SEI Industries Ltd was incorporated in May 1978 as a product development/marketing company, and since January 1983, has been involved exclusively in the design, manufacture and marketing of its own products.

CAPABILITY: SEI Industries Ltd is primarily involved in the design, manufacture and marketing of fabric related products for the aviation, mining, forestry, and marine industries. Current products include:

- The Bambi Bucket – an all-fabric fire fighting bucket for helicopters. Since its introduction to the world market in 1983, the Bambi Bucket has become the standard for such equipment and is now being specified as the only product acceptable for forest fire-fighting contracts by a growing number of forestry agencies, fire departments and military organizations all over the world.

- The Fuel-Easy – a fully collapsible lightweight, free-standing, flyable fuel container for helicopters is a convenient and cost-effective alternative to fuel drums. The Fuel-Easy reduces the causes of fuel contamination because it fills from the top and is locked for security by a Kamlop cap. It empties from the bottom to prevent wastage through unused fuel.

- The Terra Tank – SEI Industries utilizes the latest in high-tensile strength/lightweight fabrics to produce a new generation of ground fuel storage bladders which replace the old generation of bladders made of heavy rubber compounds. This lightweight feature is crucial to the aviation industry. The Terra Tank is used in helicopter operations (often in conjunction with the Fuel-Easy), as well as in many other operations requiring high volume, collapsible, ground fuel storage capabilities. The Terra Tank is also available for POTABLE WATER storage and can be made to meet military specifications. Standard grades for potable water use US Food and Drug Administration approved fabrics. Custom Terra Tanks can be made for boats, trucks, helicopters, fixed-wing aircraft, etc.

- The Jet-Net – is SEI's answer to the logistical problems of high seas marine personnel search and rescue operations. Developed with assistance from the Canadian Coast Guard, the Jet-Net is an inflatable, self-propelled, remote controlled rescue net designed for use from helicopters, ships, oil rigs, etc. Helicopter rescue situations are greatly aided by use of the Jet-Net because it can be inflated and lowered away from the victim to protect them from the rotor blade downwash. The Jet-Net can then be directed by a crew member by remote control to the victim. Once captured in the Jet-Net, the victim is winched aboard and flown to safety.

- The Buoywall – is an open top portable water tank used for remote firefighting where there is inadequate supplies of water. They are also used in urban or rural areas where there is a need for a water reservoir. It is also used as a dip tank for helicopters using SEI's Bambi Bucket. The Buoywall assists any situation where water storage is necessary. Once emptied, the tank can easily be moved as it folds down into a convenient pile, ready for shipment or storage.

Other capabilities include – the design and manufacture of high-thrust electric thruster motors for marine craft; inflatable float design and manufacture for light aircraft; and technical problem-solving involving new-generation high strength/lightweight fabrics.

AVERAGE WORK FORCE: 40

GROSS SALES: 1986 – \$1.3M
1987 – \$2.0M

PLANT SIZE: 5,000 Sq Ft

EQUIPMENT: Equipment includes Electronic RF welding equipment for welding of coated fabrics, assorted sewing and machining equipment, 6000 gal test tank with crane (max capability 1,000 lbs), and in-house computer systems – IBM and Wang.

EXPERIENCE: Present customers include various departments in the Canadian and US Governments, as well as other government, military, paramilitary and commercial operations world-wide.

KEYWORDS: Collapsible Storage Containers; Fabric Structures; Fire Fighting Equipment; Fuel Storage; Fuel Systems; Helicopter External Load Equipment; Inflatable Floats; Inflatable Rescue Equipment; Life Saving Equipment; Rescue Equipment; Search & Rescue Equipment; Tanks (Collapsible); Thruster Motors (Electric); Underwater Salvage Equipment; Water Reservoirs; Water Storage; Water Transport.

REVISED: February 88

SENSYS

ADDRESS: 36 Bentley Avenue
Nepean, Ontario, Canada
K2E 6T8

CONTACT: Mr Andrew Lebel, Director of Marketing & Sales – (613) 727-0604

HISTORY: SENSYS is a business unit of Atomic Energy of Canada (AECL). SENSYS was created in January 1987 to commercially develop Ferrosan™, a ferrous wear debris monitor and other sensor technology for equipment health monitoring.

CAPABILITY: Design and production of leading edge sensor systems. Backed by the internationally recognized AECL research laboratories, SENSYS brings established expertise, proven product testing and business reality to the intelligent sensor marketplace.

AVERAGE WORK FORCE: PhD – 1
Engineers – 9
Others – 20

GROSS SALES: 1988 – 350K (Est'd)

PLANT SIZE: 15,000 Sq Ft

EQUIPMENT: Complete digital electronics production facility with direct access to all the equipment resident at AECL's two major research laboratories.

EXPERIENCE: Ferrosan™ units are currently under global evaluation testing with various helicopter and airframe OEM's, engine manufacturers, airlines, defense establishments, utilities, and petrochemical operators.

KEYWORDS: Sensor Systems; Diagnostic Systems; Engine Health Monitoring; Condition Monitoring, Predictive Maintenance.

REVISED: June 88

SHELLCAST FOUNDRIES Inc

ADDRESS: 10645 Lamoureux
Montreal North, Quebec, Canada
H1G 5L4

CONTACT: Mr B B Morgenstern, President – (514) 322-3760

HISTORY: Shellcast Foundries Inc is a Canadian-owned company founded by the President/Owner in 1970. The company has experienced a very steady and impressive increase in both its technological and production capabilities. It has a US subsidiary, Shellcraft Industries Inc located in Winooski, Vermont, and associate facilities in Europe.

The company's founder/president was previously engaged in the management of an investment casting foundry. The company has grown from a facility of 6,000 sq ft employing major outside services such as X-ray and testing of materials, to a fully integrated facility (total in-house capability) exceeding 50,000 sq ft.

CAPABILITY: Shellcast Foundries Inc are founders of non-ferrous precision investment castings – by the lost wax process. Its major customers are in the aerospace, defense electronics, and electronics industries. Their foundries are capable of producing small and intricate castings of 1" plan area to large complex castings of a maximum of 36" cube, to the highest MIL and commercial standards. They are equipped to produce castings by either the shell or the solid mould process.

AVERAGE WORK FORCE: Engineers – 10
Others – 140

GROSS SALES: 1986 – \$ 9.0M
1987 – \$10.0M

PLANT SIZE: 50,000 Sq Ft

EQUIPMENT: Equipment includes Robotics in production, in-house computerized production planning and financial systems – Spectograph and coordinates measuring machines both with computer print-

outs, tensile test and hardness test equipment, a complete metallurgical laboratory, non-destructive test lab (x-ray and penetrant inspection).

EXPERIENCE: Present customers include most of the major contractors in the aerospace and defense industries in North America and they also have major customers in Europe, Israel and Japan.

KEYWORDS: Castings; Enclosures (Electronic); Foundry; Investment Castings; Shell Castings; Solid Mould Castings; Thin Wall Castings.

REVISED: January 88

SHERRITT GORDON MINES Ltd

ADDRESS: Fort Saskatchewan, Alberta, Canada
T8L 2P2

CONTACT: Dr Maurice A Clegg, Dir, Sherritt Research Center – (403) 998-6516

HISTORY: Sherritt is a highly diversified company with a US subsidiary located in Portland, Oregon (Sherritt Fertilizers Inc). Sherritt was incorporated in 1927 as a mining company. In 1954, their processing plant at Fort Saskatchewan was opened. Located at this latter site is the Sherritt Research Center which is their R&D arm.

CAPABILITY: Besides refining nickel & cobalt, Sherritt Gordon carries out R&D at their Research Center in the area of powder metallurgy. Also at Ft Saskatchewan, Sherritt has their Special Products Division which manufactures a wide range of secondary products based on Sherritt's raw materials and technology. These products include nickel strip and coinage, a wide range of special powders and composite powders, dispersion strengthened nickel, magnetic alloys and wear resistant materials. Sherritt is active in developing dispersion strengthened alloys and abradable seals for turbine engines. They have recently expanded their research activities to include rare earth cobalt magnets, wear resistant materials, and ultra fine metal powders for sintered electronic circuits, and electrically conductive plastics for shielding electromagnetic interference (EMI).

Sherritt's research and development work continued in these areas and several new products reached commercial production – notably composite powders for turbine seals, wear resistant materials for the mining industry, and ultra fine nickel and copper powders for electronics.

AVERAGE WORK FORCE: Total (Research) – 75
PhDs – 15
MSs – 4
BSs – 14
Others – 42

GROSS SALES: 1986 – \$390.8M
1987 – Not Available

EQUIPMENT: Sherritt's Research Center is well equipped for process research in hydrometallurgy and product research. This includes autoclaves, solvent extraction and ion exchange equipment, standard chemical laboratory equipment, and an analytical laboratory. Also included are powder presses, sintering furnaces, rolling mills, vacuum induction melting equipment, and flame & plasma spray guns. Physical testing equipment includes tensile testing, stress rupture, wear resistance, metallography, transmission and scanning electron microscopes, electron microprobe, x-ray diffraction, and various electrical conductivity measurements.

EXPERIENCE: A large portion of Sherritt's total metal sales go to the US which includes fabricated metal products, such as dispersion strengthened nickel and composite powders for turbine engines. The products, which may be used in military aircraft, are sold to engine manufacturers. Sherritt is interested in doing business with the USAF when the research area is consistent with their research objectives. Research and development projects have been carried under USAF contracts in the late 1960s and early 1970s. These contracts were in the area of dispersion strengthened nickel-chromium alloys. The research specifically dealt with improved oxidation resistance and mechanical properties.

KEYWORDS: Abradable Seals; Alloys; Castings; Cobalt-Samarium Magnets; Composite Powders; Conductive Plastics; Conductive Parts; Continuous Casting; Dispersion Strengthened Alloys; EMI Shielding; Engine Components; Engine Systems; Magnets; Metal Powders; Nickel; Nickel Coinage; Nickel Powders; Nickel Strip; Powder Metallurgy; Rare Earth Magnets; Specialty Alloys; Thermal Spraying; Ultra Fine Metal Powders; Wear Resistant Materials.

REVISED: February 88

SIGNA + FLASH Ltd

ADDRESS: 9 Parmalea Crescent
Weston, Ontario, Canada
M9R 2X8

CONTACT: Ms Penny Simmons, Vice President - (416) 241-6709

HISTORY: Signa + Flash is a family-owned Canadian company founded in 1979 by its current president and founder, Mr A H Simmons. Mr Simmons started Signa + Flash after retiring his position as founder and 20-year presidency of Braun Electric (Canada) Ltd.

CAPABILITY: Signa + Flash is primarily involved in the creation, design and manufacture of a line of portable battery-operated strobe lights, in particular, the pocket-sized MAY-DAY. The MAY-DAY features a dual on/off switch; that is, it can be actuated either manually or by its unique and completely automatic water-activated switch. As well as flashing intermittently, the larger double-barrelled Signa + Flash strobe light flashes the Morse code SOS. Both lights are intended as alternatives or complements to roadside or marine flares and use regular batteries.

The company has also demonstrated their capabilities in the recent design of a portable sequenced runway lighting system that has analog and digital design capabilities. As well, CAD capabilities, electronic and mechanical.

AVERAGE WORK FORCE: Technologist - 1
Others - 4

GROSS SALES: 1986 - \$ 60,000
1987 - 150,000

PLANT SIZE: No Data

EQUIPMENT: No Data

EXPERIENCE: Present customers include various departments of the Canadian Government, National Defence and Transport Canada, and industries in Canada, the US and abroad. Two US companies utilize one strobe component in their finished products (smoke detectors). As well, the portable battery-operated strobes are being reviewed in Canada and two off-shore countries for use as portable emergency runway and helipad locator beacons. MAY-DAY and SIGNA-FLASH hold Canadian Coast Guard approvals.

KEYWORDS: Strobe Light; Marine Signalling Devices; Flares; Locating Devices; Visual Signalling Devices; Runway Markers; Helipad Markers; Lifejacket Lights; Air Crew Lights.

REVISED: March 1988

SIMMONDS PRECISION CANADA Ltd

ADDRESS: 2752 Slough St
Mississauga, Ontario, Canada
L4T 1G3

CONTACT: Mr Andrew Byrne, General Manager - (416) 678-7430

HISTORY: Simmonds Precision Canada Ltd is a wholly-owned subsidiary of Simmonds Precision Products Inc which in turn is a

wholly-owned subsidiary of Hercules Incorporated. The company has been in Canada since 1947 and has been at the current location since 1975.

CAPABILITY: Simmonds Precision Canada Ltd is the repair and overhaul center for most Simmonds products in Canada. This includes fuel quantity gauging systems, ignition exciters, torque indicators and actuators.

AVERAGE WORK FORCE: Engineer - 1
Others - 6

GROSS SALES: 1986 - \$0.475M
1987 - \$0.500M

PLANT SIZE: 2,800 Sq Ft

EQUIPMENT: Test equipment for electronic and electromechanical equipment.

EXPERIENCE: Present customers include most Canadian airlines, many Canadian business aircraft operators, and Canadian Departments of Supply & Services, National Defense, and Canadian OEM's.

KEYWORDS: Fault Diagnosis; Instrument Repair; R&O (Instruments); Testing/Test Equipment.

REVISED: January 88

SKYWAVE ELECTRONICS Ltd

ADDRESS: 300 March Road, Suite #304
Kanata, Ontario, Canada
K2K 2E2

CONTACT: Mr R G Lyons, President - (613) 592-0908

HISTORY: SkyWave is a Canadian-owned high technology company specializing in digital signal processing for radio and satellite communications. Founded in 1984, it is located in the Kanata Industrial Park.

CAPABILITY: SkyWave is principally involved in the design and manufacture of state-of-the-art voice and data communications equipment for radio and satellite communications, particularly for airborne, mobile and transportable systems. Their main products are:

- Satellite Voice/Data Channel Unit - Model SCU-1
- Suitcase Satellite Voice/Data Terminal
- 2400/4800 bps Vocoders - Model LPC-357
- NAVLINK (air-to-ship) Data Link
- Digital Squelch/Vox Unit for HF Radio

AVERAGE WORK FORCE: Phds - 1
Engineers - 9
Others - 3

GROSS SALES: 1987 - \$1.0M
1988 - \$2.5M (Est'd)

PLANT SIZE: 4,000 Sq Ft

EQUIPMENT: SkyWave maintains well equipped engineering development facilities for DSP, RF & Digital Engineering, and Computer facilities - IBM, Macintosh, TMS 320/32020/320C25, V40, and 68HC11.

EXPERIENCE: SkyWave's present customers include various departments in the Canadian Government, UK, and Australia, and commercial customers in the US, Spain, Austria, Korea, Taiwan, and PRC.

KEYWORDS: Satellite Terminals; Voice & Data Communications; Digital Signal Processing; Air/Ground Data Links; HF Radio; Modems; RF Communications; Telephone Communications.

REVISED: February 88

THE SNC GROUP

ADDRESS: 2, Place Felix-Martin
Montreal, Quebec, Canada
H2Z 1Z3

CONTACT: Mr Nash A Sidky, Senior Vice President, Marketing & Sales (514) 866-1000

HISTORY: Founded in 1911, The SNC Group quickly earned a high reputation for excellence in engineering and in technical financial studies. The growth of the company is an outstanding success story. Its wide ranging services are provided by some 40 divisions, subsidiaries and associate companies. Members of the group have carried out projects or studies in more than 100 countries.

CAPABILITY: Long established as a leading Canadian engineer-integrator-constructor with worldwide projects, The SNC Group today operates in three main lines of business – engineering-construction, defense manufacturing and contracting, and integrated information technology.

In managing large projects such as airports, harbors, telecommunication networks, pipelines, metallurgical plants, refineries and regional electrification, SNC has developed advanced computer systems for the control of quality, cost, time and readiness in design, procurement and construction. Using its high precision materials management system, SNC purchases, inspects, expedites and delivers more than 150,000 freight tonnes of goods and equipment annually from world sources. SNC is experienced in the management of equipment intensive projects using advanced systems and procedures. Earned value and performance analysis techniques are used on many of its large capital projects. As engineer or entrepreneur, SNC has wide experience in high technology industries ranging from electronic components to laser-pressed discs.

SNC's information technology sector provides engineering services and turnkey projects for microwave, satellite and mobile radiocommunications, electromagnetic radio spectrum management, information management and computer-aided dispatching, and air traffic and vessel traffic control systems. It supplies turnkey hardware and software packages for specific management and control uses. In geomatics, it provides proprietary software products and services that simplify the mapping and management of property and equipment featuring alphanumeric graphic display and user oriented operation.

In the defense sector, the SNC Group is Canada's leading manufacturer of munitions, ranging from small caliber to heavy artillery, tank and naval supplies microprocessed based fire and damage detection and control systems for naval and marine use, and is currently supplying the Canadian Patrol Frigates and Trump programs. SNC defense is a major program integrator of large and small defense acquisition programs.

The SNC Group's R&D network has a staff of over 80, active in the research and development of new processes and products ranging from computer science applications to engineered materials.

AVERAGE WORK FORCE: PhD's – 40
Engineers – 500
Others – 3900

GROSS SALES: 1985 – \$223M
1986 – \$350M

PLANT SIZE: No Data

EQUIPMENT: The SNC Group's equipment includes the latest in computer systems and workstations from Digital, Intergraph, and IBM.

EXPERIENCE: SNC's present and past customers include various departments in the Canadian Government, The North Atlantic Treaty Organization, and major Canadian industries involved in defense projects.

KEYWORDS: Project Management; Engineering & Construction; Communication Systems; ATC; Spectrum Management; Ammunition; Munitions.

REVISED: February 88

SPAR AEROSPACE Ltd

ADDRESS: Executive Offices
Royal Bank Plaza, South Tower
P. O. Box 83
Toronto, Ontario, Canada
M5J 2J2

Corporate Office
6303 Airport Road, Suite #403
Mississauga, Ontario, Canada
L4V 1R8

* Government Relations Office
77 Metcalfe St, Suite #200
Ottawa, Ontario, Canada
K1P 5L6

Satellite and Aerospace Systems Division
21025 Trans-Canada Highway
Ste-Anne-de-Bellevue, Quebec, Canada
H9X 3R2

Communications Systems Division
21025 Trans-Canada Highway
Ste-Anne-de-Bellevue, Quebec, Canada
H9X 3R2

Remote Manipulator Systems Division
1700 Ormont Drive
Weston, Ontario, Canada
M9L 2W7

Defence Systems Division
1235 Ormont Drive
Weston, Ontario, Canada
M9L 2W6

Defence Systems Division
P. O. Box 13050
Kanata, Ontario, Canada
K2K 1X3

Gears & Transmissions Division
825 Caledonia Road
Toronto, Ontario, Canada
M6B 3X8

Aviation Services Division
825 Caledonia Road
Toronto, Ontario, Canada
M6B 3X8

Subsidiaries:

Astro Aerospace Corporation
6384 Via Real
Carpinteria, CA
93013-2993

Commercial Telecommunications Corp (COMTEL)
2811 Airpark Drive
Santa Maria, CA
93455

CONTACT: *Mr D W Stapley, Director, Government Business Development (613) 563-0230

HISTORY: Spar commenced operations as a public company in January 1968, following the acquisition of the Special Products and

Applied Research (SPAR) Division of The deHavilland Aircraft of Canada Ltd. The company developed by internal growth and through acquisitions including:

- 1969 – The assets of York Gears Ltd
- 1972 – Astro Research Corporation of California, now Astro Aerospace Corporation.
- 1977 – The assets of the Government and Commercial Systems Division of RCA Ltd and certain assets of the space electronics manufacturing unit of Northern Telecom Ltd.
- 1984 – COMTEL of California

CAPABILITY: Spar Aerospace Limited is a Canadian-owned company engaged in the design, development, manufacture and servicing of systems and products for the space, communications, defense, aviation and remote manipulator markets. The company employs more than 600 engineers and technicians, one of the largest technological groups in the private sector in Canada.

In twenty years of growth, Spar has gained international recognition as a diversified high technology company and has achieved financial stability by balancing the steady sales base of its gears and transmissions and aviation services operations with businesses serving the fast-growing markets of space, defence, communications, and telerobotics. Spar's areas of expertise are outlined below:

- **SPACE** – Spar's facility in Ste-Anne-de-Bellevue near Montreal is the principal supplier in Canada and a major international manufacturer of civilian and defence satellite communications (up to EHF) and surveillance systems, including satellites and satellite subsystems.

Spar and its predecessor companies have contributed to the design and manufacture of over 50 satellites and subsystems, including the fabrication of structures and payloads for all the Canadian and many international satellites. The company's contract from Telesat Canada in 1979 to supply two 24-channel *Anik D* communications satellites was the first such prime contract to be granted to a Canadian company. *Anik D1* was successfully launched in August 1982 and *Anik D2* was launched in 1984. Development of the *Anik E* series communications satellites is currently underway for launch in 1990.

In 1982, Spar was awarded a prime contract to provide two satellites and a related ground control system for EMBRATEL, the Brazilian government-owned telecommunications company. The project known as Sistema Brasileiro de Telecomunicacoes por Satellite (SBTS) was completed in 1985. This is the largest export satellite contract won by Spar and will be the first domestic communications satellite system in Latin America. In addition, Spar is working on the following major communications satellite projects – Intelsat VII Telecom II; Olympus; MSAT; and Radarsat, a remote sensing satellite to be employed by the department of Energy, Mines and Resources.

Spar's subsidiary Astro Aerospace Corporation, designs and develops lightweight deployable structures for space and ground applications. These include the patented STEM antenna product line and Astromast deployable structures used in many spacecraft to deploy antennas, experiments and solar arrays.

- **COMMUNICATIONS** – Spar designs and manufactures satellite earth stations and related projects. The development of the Time Division Multiple Access/Digital Speech Interpolation (TDMA/DSI) equipment was largely completed during 1983 and the first terminal was delivered to Teleglobe Canada in 1984. The system is also being offered in several international markets.

SPARCOM, the company's low cost telephony satellite earth terminal developed in conjunction with the Department of Communications, offers unique advantages to users in remote locations and in private networks, including improved communications with oil rigs operating off the east coast of Canada.

Spar's subsidiary, COMTEL, designs and builds light and medium rate earth station nets for such customers as Dow-Jones Inc, NASA and US Defense Department.

Spar has signed a multi-year joint development and technology transfer program with the People's Republic of China.

- **DEFENSE** – Spar develops and manufactures electro-optical, surveillance and telerobotics for the Canadian Armed Forces and international markets. It also provides technical support to the Forces, particularly systems engineering. Facilities include a manufacturing plant, optical, electronics and systems laboratories, and a dedicated computer for developing military software and the real-time processing and display of complex optical data.

Spar is a leader in the field of remote heat sensing technology, having worked for 18 years to develop the unique AN/SAR 8 infrared surveillance system for the passive detection of ships, missiles and aircraft for defense and navigation purposes. Following successful trials of the system by the Canadian and US Navies, a project agreement was signed by the two governments in 1983 to undertake, on a joint basis, the full scale engineering development of this equipment.

Spar is manufacturing the Forward Looking Infrared (FLIR) system for the Canadian Forces Low Level Air Defence System and in addition, provides several configurations of FLIR devices for land and airborne applications.

- **AVIATION PRODUCTS** – Spar is an industry leader in the production of high precision aerospace gears and transmissions. The company manufactures and assembles lightweight, high-speed, high-torque power transmission systems and equipment for gas turbine engines and fixed and rotary wing aircraft. This facility also manufactures, assembles and tests the joints of the Remote Manipulator System (RMS) for the Space Shuttle.

In 1982, Spar signed an initial contract with Sikorsky Aircraft to produce the main, intermediate and tail gearboxes for the Sikorsky H-60 series helicopter. As well, the company manufactures the tail rotor, intermediate gearboxes and main rotor shafts for the Sikorsky S-76 commercial helicopter. A contract has recently been received from Sikorsky Aircraft for the manufacture of 191 power input modules for Blackhawk helicopters.

In 1986, General Electric Company awarded Spar contracts for follow-on production of accessory gearboxes and other components for engines that power turboshaft helicopters and turboprop and turbojet aircraft. Spar produces accessory gearboxes for General Electric's J85-21 turbojet engine (used in the F-5E/F aircraft), the T700 turboshaft engine (used in the Black Hawk, Sea Hawk, Advanced Attack, and Bell 214ST helicopters), and the CT7 turboprop engine variants. Engine gearboxes are supplied for General Electric's new J79-17X engine development program, the CF6-80 commercial transport engine and for the CFM56 turbofan engine, a joint project of General Electric and SNECMA of France. Gearbox components are also manufactured for Avco Lycoming's T53, T55, and ALF 502 engines.

The company fabricates the transmission and components for the Boeing Vertol CH-46 helicopter, transmission gears for the Westland Lynx helicopter (UK) and gear box components for the Puma helicopter made by Aerospatiale of France.

- **AVIATION SERVICES** – Spar repairs and services aircraft components, sells aviation products and accessories, and overhauls helicopters.

Services cover engine and flight instruments; components of electrical, oxygen, navigational and autopilot systems; constant speed drives; accessory gearboxes; and components for flight control and heating systems. Customers are military and commercial operators in Canada, the US, Mexico, and Central and South America. A large part of Spar's business is with 17 aircraft equipment manufacturers in North America and Europe, which have appointed the company as a Canadian warranty and service station for their products. In 1986, Spar received a contract for repair and overhaul of a number of components for the NATO E3A AWACS fleet.

For helicopters, Spar provides an authorized customer service facility for Bell, Aerospatiale and Hughes. Services include the sale of parts and accessories, the repair and overhaul of mechanical, hydraulic and avionic components, rebuilding and maintaining airframes, and providing field service. Customers are located in Canada, the US, Mexico, Central and South America, and Indonesia.

• **REMOTE MANIPULATORS** – A major project being completed at Spar is the production of the Remote Manipulator Systems (RMS) for the US Space Transportation System. This contract awarded in 1979 calls for the delivery of three systems to the National Aeronautics and Space Administration (NASA) through 1984. Canadarm, the original RMS, was successfully tested for the first time on the Space Shuttle "Columbia" in November 1981 and continues to perform flawlessly on space flights. It was produced in Canada under the agreement between the National Research Council of Canada (NRCC) and NASA. Spar was the prime contractor to NRCC for the design, development and manufacture of this flight system. Plans are in hand for the supply of additional RMS's on an as required basis.

Spar, under a contract from Ontario Hydro, has designed and delivered a remote manipulator and control system to replace and repair fuel tubes in nuclear reactors. In addition, Spar, Ontario Hydro and the Canadian Fusion Fuels Technology Program are engaged in the concept definition stage of a project to apply remote manipulator technology to the Tokamak fusion reactor project in Princeton, NJ. Using similar technology, under an MOU with Inco, Spar has developed a remotely controlled and operated Rock Bolter, to enhance to safety and productivity of Inco's hard rock mining operations.

AVERAGE WORK FORCE: Engineers & Technicians – 700
Others – 1400

GROSS SALES: 1986 – \$191M
1987 – \$230M (Est'd)

KEYWORDS: Airframe Components; Antennas; Communications; Computer Produced Maps; Control Systems; Digital Mapping; Electro-Optics; Engine Components; FLIRs; Gear Boxes; Ground Stations; Helicopter Subsystems; Infrared Instrumentation; Mapping; Mechanical Arms; R&O (Aircraft); R&O (Avionics); Remote Manipulator Systems; Remote Sensing; Satellite Subsystems; Satellites; Space Based Radar; Space Systems; Structures; Telerobotic Products; Transmissions.

REVISED: January 88

SPARTON OF CANADA Ltd

ADDRESS: 99 Ash Street
London, Ontario, Canada
N5Z 4V3

CONTACT: Mr Douglas E Johnson, President & General Mgr –
(519) 455-6320

HISTORY: Sparton, incorporated under Federal charter in 1930, is a wholly owned subsidiary of Sparton Corp, Jackson, MI.

CAPABILITY: Sparton specializes in the development, engineering, and manufacture of specialized electronic products for the military, industrial, and Original Equipment Manufacture (OEM) markets. Their R&D activities include development of microbuoys, expendable bathy-thermal systems, new improved low noise passive sonobuoys, depth-compensated ring shell acoustic projectors, ice penetration systems, and switch-mode electronic power supplies.

Sparton's Engineering Department staff covers professional disciplines of electrical/electronic engineering, mechanical engineering, physics, hydro-dynamics, and hydroacoustics. They are experienced in the preparation and management of engineering projects from proposal through to implementation (development, specifications, testing, and production).

Sparton of Canada Ltd is a qualified producer meeting the requirements of DND 1015 and US MIL-Q-9858A Quality Assurance Programs. There is a resident military QC detachment on the premises. Sparton is cleared by DSS Industrial Security for projects up to SECRET classification. Current product lines are active and passive sonobuoys for military customers, acoustic projectors and switch mode and linear power supplies for large and small computer systems.

AVERAGE WORK FORCE: Production – 150/200
Engineering Dept:
MSc – 4
BSc – 10
Tech – 24
Others – 7

GROSS SALES: 1986 – \$14.2M
1987 – \$16.8M

PLANT SIZE: 170,000 Sq Ft

EQUIPMENT: Sparton's engineering facilities include fully equipped laboratories, hydrodynamic test tank, RF shielded rooms, computer terminal access to a wide range of engineering software including FF2E, SPICE and OSCAR; and two IBM 370 systems and two Perkin Elmer Corporate computers.

EXPERIENCE: Sparton is a supplier of passive sonobuoys to the Canadian Government; active sonobuoys (AN/SSQ62B) to the Canadian Government, to the US Navy, and to other overseas users; OEM supplier of various types of regulated power supplies to Canadian manufacturers; responsible for the development of Depth Compensated Ring Shell Projectors and BT systems for the Canadian Government; is now in the development stage of an ice penetration sonobuoy for the Canadian Government; and is also developing variants of Ring Shell Sound Projectors. Applications for the latter device are anti-submarine warfare (ASW) crew training, dipping sonar, towed array active adjunct and scientific investigations of ocean sound propagation characteristics or sound detection systems.

KEYWORDS: ASW; Acoustic Sensing; Active Sonobuoys; BT Sonobuoys; Environmental Sensors; Geophysics; Hydrophones; Ice Penetration; Passive Sonobuoys; Power Supplies; Sonobuoys; Underwater Ring Shell Sound Projectors.

REVISED: January 88

SPECIALIZED WELDING & FABRICATION Ltd

ADDRESS: 2222 South Sheridan Way, Unit #10
Mississauga, Ontario, Canada
L5J 2M4

CONTACT: Mr Peter M Draycott, Vice President & General Mgr –
(416) 823-4080

HISTORY: Specialized Welding and Fabrications Ltd is a Canadian-owned company founded in 1964.

CAPABILITY: Specialized Welding and Fabrication Ltd provides a special service of welding, custom fabricating, and radiographic and fluorescent penetrant inspection to the aircraft and allied industries. The company was founded by the two major share holders whose life-time experience in aircraft manufacturing, servicing, inspection and tool design, provided the foundation upon which this company was established. Working to quality controls and procedures designed specifically to meet the requirements of the Department of National Defense, and the Department of Transport, Air Services Branch, ensures that product quality is always acceptable. The exceptional skill and versatility demanded of the staff is achieved through in-plant training and the experience of working with a wide variety of aircraft materials. Only fully certified material is used and all shipped material is certified as having been processed and inspected to the appropriate specification.

AVERAGE WORK FORCE: Management and Engineers – 2
Accounting – 1
Production – 3
Inspection – 1

GROSS SALES: 1986 – \$400K
1987 – \$400K

PLANT SIZE: 3,000 Sq Ft

EQUIPMENT: Welding – 300 amp AC/DC welding machines, Cobra-matic GMAW machine; Fabricating – Shear, press brake, notcher, turret punches, drill press, sanding equipment and hand tools; Inspection – Westinghouse 250Kv constant potential X-Ray machine, Picker 150Kv X-Ray machine, and fluorescent and dye penetrant equipment.

EXPERIENCE: Present customers include: Aeroquip (Canada) Inc, Air Canada, The deHavilland Aircraft of Canada Ltd, Dowty Equipment of Canada Ltd, Garrett Canada, Genaire Ltr, IMP Group Ltd, Aerospace Division – Spar Aerospace Ltd, Tube-Fab Ltd, Wardair Canada Inc, and Walbar of Canada Inc. Much of the work for these companies is under government contract.

KEYWORDS: Airframe Components; Engine Components; Fluorescent Penetrant Inspection; Inspection; R&O (Components); Radiographic Penetrant Inspection; Welding; X-Ray Inspection.

REVISED: February 88

SPECTRUM SIGNAL PROCESSING Inc

ADDRESS: Canada
#301 – Discovery Park
3700 Gilmore Way
Burnaby, British Columbia, Canada
V5G 4M1

Western USA
240 "H" Street
Blaine, WA 98230

Eastern USA
460 Totten Pond Road
Waltham, MA 02154

CONTACT: Mr Michael J Mertens, President – (604) 438-7266

HISTORY: Spectrum Signal Processing Inc is a new company incorporated in July 1987 in British Columbia dedicated to pursuing the Digital Signal Processing (DSP) business initiated by its predecessor, the now-inactive "Pacific Microcircuits Ltd" (an affiliate of the Mitel Corp established solely for integrated circuit design).

CAPABILITY: Spectrum Signal Processing Inc offers the widest range of Digital Signal Processing (DSP) tools for the IBM-PC in North America. Spectrum has attained market leadership by offering four types of DSP tools:

- Development Systems – Based on single-chip DSP micro-processors such as Texas Instruments' TMS 320C25, Analog Devices' ADSP-2100, NEC's 77230 and Motorola's 56001 – these plug-in boards offer DSP developers and engineers general-purpose DSP in their preferred development platform (the IBM-PC).
- DSP Software Tools – To provide full support to the DSP development process, Spectrum provides a mix of proprietary and 3rd party software packages such as: Crossware & Simulators, 'C' Compilers, DADiASP Data Analysis, SignalLink 320 Data Acquisition, Monitor Software, Macro Assembler/Linkers, and DISPRO Filter Design.
- Applications Systems – Spectrum provides high performance, real-time data acquisition by allowing users to "mix and match" DSP co-processor boards (based on the processor mentioned above) with data acquisition boards via a standardized expansion bus. This allows users to easily migrate from the development to the applications environment.
- Voice Systems – Spectrum's voice systems target the Voice Response market. Two current products predominate: 7763/64 Speech Synthesizer/Recognizer and Speech Synthesis Module.

AVERAGE WORK FORCE: Electrical Engineers – 2
Technologists – 2
Marketing – 3
Management/Admin – 5

GROSS SALES: No Data

PLANT SIZE: 2,600 Sq Ft (Burnaby, BC)
1,500 Sq Ft (Boston, MA)

EQUIPMENT: No Data

EXPERIENCE: Spectrum's client list includes: Bell Communications, Lockheed Government Systems, Boeing Aerospace, Sandia National Labs, Naval Underwater Systems Center, Fairchild Semiconductor, US Dept of Defense & NSA, Center for Speech Technology, MacDonald Dettwiler & Associates, Lear Siegler, Charles Stark Draper Labs, and Rolm Corp.

KEYWORDS: Digital Signal Processing; DSP; Realtime Data Acquisition; Singlechip DSP; Fast Fourier Transforms; Digital Filtering; Secure Communications; A/D and D/A; Spectrum Analysis; Speech Synthesis; Speech Recognition; Digital Audio.

REVISED: February 88

SPIECE ASSOCIATES

ADDRESS: Box 268, Station A
Winnipeg, Manitoba, Canada
R3K 2A1

CONTACT: Mr E L Spiece, President – (204) 895-7743

HISTORY: Spiece Associates was founded in 1979 to provide task-oriented management and consulting services to the global high-technology industries.

CAPABILITY: Spiece Associates is capable of providing high technology companies and government agencies involved with high technology industries with a full selection of task-oriented management and consulting services. Services provided include: Project Management, Strategic Planning, Project/Program Audits, Project Risk Analyses, Economic Feasibility Studies, Cost Location Studies, Marketing Research, Industrial Development Assistance, Proposal Preparation, Preparation of Business Plans, etc. Spiece Associates personnel are also available for Marketing, Strategic Planning and Business Development management positions within governments and industry on a short term contract basis.

AVERAGE WORK FORCE: MBAs – 1
BSc – 2
Other – 1

All personnel are experienced in the aerospace and other high technology industries.

GROSS SALES: 1987 – \$0.3M

PLANT SIZE: No Data

EQUIPMENT: No Data

EXPERIENCE: Aerospace business clients include prime manufacturers, component and systems manufacturers, service companies and government departments and agencies in Canada, the US and Western Europe.

KEYWORDS: Economic Studies; Management Consulting; Market Research; Program Management; Risk Analysis.

REVISED: April 88

SPILSBURY COMMUNICATIONS Ltd

ADDRESS: 120 East Cordova St
Vancouver, British Columbia, Canada
V6A 1L1

CONTACT: Mr Pete deWit, Distribution Marketing – (604) 684-4131

HISTORY: Spilsbury is a Canadian owned company incorporated in 1941. Magnesync Moviola in the US is a sister company.

CAPABILITY: Spilsbury specializes in radiotelephone equipment, antennas, and navigational aids for long-range frontier and coastal marine communications. The company develops and manufactures HF single sideband radio communication equipment for land and marine use, fixed and mobile. They are also concerned with the overall concept of providing a system of communications rather than with the manufacture of specific units. One of the major areas of innovation in this field has been the design of a unique series of antennas which increases the effective communicating power of a radio by ten to fifteen times over a conventional installation. These Spilsbury, center-loaded, variable tuned, HF, whip, antennas are used in portable, mobile and fixed service on land, sea and air. In addition to the above, Spilsbury manufactures VHF/FM radiotelephone equipment for mobile and fixed station land or marine use. Other specialized equipment includes low frequency, non-directional beacon systems for medium range aeronautical or marine navigation installations. Spilsbury builds a complete line of Digital Voice Repeaters for instant recall of telephone or radio messages, Digital Voice Loggers, ATIS Automation Terminal Information Systems; VOLMET Systems, Weather Radio Systems, and Airline Arrival/Departure Systems.

AVERAGE WORK FORCE: Professional (Technical) – 16
General Assembly – 20
Others – 35

GROSS SALES: 1986 – \$6.7M
1785 – \$8.2M

PLANT SIZE: 38,000 St Ft

EXPERIENCE: Spilsbury equipment is used in over 50 countries including the US.

KEYWORDS: Airline Arrival/Departure Info; Antennas; Beacons; Center-Loaded Antennas; Communications; Digital Voice Repeaters; Digital Voice Loggers; Fixed Radios; HF Antennas; HF Radios; HF Whip Antennas; Low Frequency Beacon Systems; Mobile Radios; Navigation; Navigation Aids; Non-Directional Beacon Systems; Radiotelephone Equipment; Single Sideband Radios; VHF/FM; Variable Tuned Antennas.

REVISED: January 88

STANDARD AERO Ltd

ADDRESS: 33 Allen Dyne Road
Winnipeg International Airport
Winnipeg, Manitoba, Canada
R3H 1A1

CONTACT: Mr Ken Norman, Manager, Business Development – (204) 775-9711

HISTORY: Standard Aero is Canada's largest independent overhauler of aircraft engines. The company was started in 1935 as an overhauler of reciprocating engines – turbojet overhaul began in 1960. In 1987, Standard Aero was purchased by Avcorp Industries Ltd, a diversified Canadian aerospace company with headquarters in Montreal, Canada.

CAPABILITY: Standard Aero's head offices and overhaul facilities are located at the Winnipeg International Airport. With an experienced and dedicated workforce of 816, SAL is well positioned to meet the needs of both its commercial and military aviation customers. Trained service technicians provide expert repair and overhaul services for the following gas turbine engines:

- Allison T63/250 series (all models of turboshaft engines)
- Allison T56/501 series (turboprop engines)
- Allison 501 series (industrial engines)
- Lycoming T53 series (turboshaft engines)
- Lycoming T55 series (turboshaft engines)
- General Electric T58 series (turboshaft engines)

- Pratt & Whitney Canada PT6A series (engines)
- Sundstrand/Turbomach APUs
- And all related accessories

In addition to the overhaul facility in Winnipeg, SAL's North American operations include a network of regional service centers in Dallas, TX; Van Nuys, CA; Charlotte, NC; Vancouver, BC; and Montreal, Que.

Allison Gas Turbines has appointed Standard Aero's London, England operation as distributor and direct service dealer for T56/501 gas turbine engines for the European area.

An international branch in Bellevue, WA, exports parts and overhaul services to all seven continents. Foreign commercial and military customers rely on SAL to supply them with specialized parts from over 2000 manufacturers.

Standard Aero has complete engineering, quality control, parts remanufacturing, field services and test facilities for its worldwide customer base.

AVERAGE WORK FORCE: Engineers – 35
Mechanics/Technicians – 150
Others – 631

GROSS SALES: 1986 – \$140M
1987 – \$160M

PLANT SIZE: 270,000 Sq Ft

EQUIPMENT: Complete in-house machining operation including metal and plasma spray, turning, grinding and EDM equipment.

EXPERIENCE: The company provides service to the Canadian Armed Forces, the Canadian Government, most helicopter operators in Canada, and fixed wing operators using the Allison 501 engine.

KEYWORDS: Aircraft Engine Overhaul; R&O (Engines).

REVISED: February 88

STEVESTED MACHINERY & ENGINEERING Ltd

ADDRESS: 7943 Progress Way
Tilbury Industrial Park
Delta, British Columbia, Canada
V4G 1A3

CONTACT: Mr I Z (Steve) Lovas, CET, President – (604) 946-7621

HISTORY: Stevested Machinery & Engineering Ltd was established in 1970. The main focus has been on precision machining. The company moved to its present location in Tilbury Industrial Park in 1978 where it has now 23,000 sq ft of working area.

CAPABILITY: The company is one of the most advanced machine shops in Western Canada and capable of handling anything from medium to large complicated aircraft parts and assemblies required by today's aerospace industries. During the past two and a half years, Stevested purchased a large true 5 axis machining center and a large 3 axis turning center. Both these machines are designed specifically to handle the machining problems of sophisticated parts encountered in the aircraft industry. Other CNC equipment has been purchased in the past, but these machines are quite standard in a technologically advanced machine shop. These machines are programmed by an Apollo Based Graphic NC CAD/CAM Programming System.

The company's Quality Assurance Program has been refined through many changes and revisions to meet US and Canadian military specifications. At present, Stevested Machinery & Engineering Ltd is approved by Bell Helicopters, Raytheon, and Litton Systems, pending approval by Pratt & Whitney and Boeing of Seattle.

AVERAGE WORK FORCE: Office Staff – 5
QA Manager – 1
Others – 19

GROSS SALES: 1986 – \$1.57M
1987 – \$1.32M

PLANT SIZE: 23,000 Sq Ft

EQUIPMENT: CNC Machining (large parts, small quantities); CNC production (smaller parts, large quantities); General Machining (large turned parts to 13.5 ft); General Machining (large horizontal boring mill parts); Fabricating to 20,000 lbs (steel & stainless); and Detail & Production Engineering facilities.

EXPERIENCE: Stevested Machinery & Engineering Ltd's customer list includes:

- Triumf UBC – Cyclotron parts & prototype work for high level experimental purposes. Extremely high precision requirements.
- BC Research (Div of Fleet Aerospace) – Prototype work on motion compensating bases for satellite receiving antennae. Moderate precision requirements.
- Decade Industries – Aircraft fixture work. High precision requirements.
- Sunds Defibrator – Pulp & paper equipment. 5 Axis machining center complexity. Extremely high precision and repeatability requirements.
- Lips Canada – Marine industry items. High precision machining on propellers and shafts.

KEYWORDS: Machining; Precision Machining; Welding (Advanced); CNC Machining.

REVISED: February 88

STRITE INDUSTRIES Ltd

ADDRESS: 298 Shepherd Avenue
P. O. Box 2405
Cambridge, Ontario, Canada
N3C 2V9

CONTACT: Mr Joseph D Strite, President – (519) 658-9361

HISTORY: Strite Industries Ltd is a private Canadian-owned company incorporated in 1964, and is an ultra-precision facility serving many high technology companies.

CAPABILITY: Strite Industries specializes in high nickel components for inertial guidance systems manufacturers. Most ferrous and non-ferrous metals are incorporated in their efforts, but they do not machine beryllium. Aluminum housings are a specialty and complete in-house treatments are available.

AVERAGE WORK FORCE: Engineers – 2
Technicians – 8
QC Personnel – 24
Production – 290

GROSS SALES: 1986 – \$10.0M
1987 – 11.0M

PLANT SIZE: 72,000 Sq Ft

EQUIPMENT: CNC precision machining equipment and metal treatment facilities.

EXPERIENCE: Inertial guidance prime contractors and other companies use their services for extremely difficult problem component solutions. Strite Industries Ltd is also presently serving Litton Guidance System; Tinker AFB, OK (spares); Martin Marietta, Redstone Arsenal, AL (spares); Sciex Corp, US Navy (spectrometer components); and Menasco Aerospace Corp (aircraft valve spools and sleeves, actuator ball nuts, etc).

KEYWORDS: Precision Machining; Machining; Component Fabrication; Inertial Guidance Components; CNC Machining.

REVISED: January 88

TARGA ELECTRONICS SYSTEMS Inc

ADDRESS: P. O. Box 8485, 3101B Hawthorne Road
Ottawa, Ontario, Canada
K1G 3H9

CONTACT: Mr Gavin McLintock, President – (613) 731-9941

HISTORY: Targa Electronics Systems Inc is a Canadian company founded in 1981.

CAPABILITY: Targa Electronics is the manufacturer of ruggedized, solid-state mass storage systems. Targa products provide small, low powered, mass memory recording systems for hostile environments. By eliminating the use of mechanically rotated memory and substituting solid-state technology (e.g., bubble technology, E2PROM, CMOS RAM, etc). Targa is able to meet the demands of applications where the quality and value of data is of paramount importance. Their equipment is ideally suited to handle either the rigors of field work (land, air and marine mobile), or the factory floor environment, while offering the convenience of small removable media cartridges of large capacity.

Targa offers several systems to meet different requirements:

- The DR-series data recorders are self-contained bench-top or rack-mounted data storage systems with a variety of interfaces, software protocols and options.
- The FD4500 disk drive Emulators are solid-state memory units that are compatible with most standard floppy disk controllers.
- The CH-series interface units are suitable as low cost data storage components for integration into systems.
- The MB4200 Bubble Memory board for IBM computers and compatible systems.
- The HD4200 high speed, high reliability cartridge RAM drive for IBM and compatible computers.

Targa is also able to supply custom designs where the requirements are not met by the existing range of products.

AVERAGE WORK FORCE: Engineering – 4
Manufacturing – 3
Others – 7

GROSS SALES: 1986 – \$1.1M
1987 – \$1.1M

PLANT SIZE: 4,500 Sq Ft

EQUIPMENT: In-house computer systems include DEC, IBM, Multibus, and Hewlett-Packard. Test equipment includes circuit emulation oscilloscopes, etc., burn-in thermal cycling and test facilities.

EXPERIENCE: Targa products are used by the US Navy in dockside test equipment and deep sea rescue vehicles, and by the US Army in portable communications monitoring and chemical "sniffing" systems. They are also used by the Navies of Great Britain and India. Targa products have been used in airborne flight inspection systems and helicopter-borne test equipment. Targa products are presently used in industrial applications by automobile manufacturers in mobile on-board vehicle tests, by the Canadian Government for both airborne and shipborne survey work, by portable computer manufacturers for ruggedized peripheral mass storage, and by offshore technology companies in support of oil well drilling.

KEYWORDS: Bubble Memory; Computer Mass Memory; Data Loggers; Data Recorders; Floppy Disk Emulators; Mass Storage Systems; Memory; Peripheral Mass Storage; Removable Media Mass Storage Systems; Ruggedized Mass Storage Systems; Solid State Memory.

REVISED: February 88

TARGETAIR Ltd

ADDRESS: R R #4, D-268
Moncton, New Brunswick, Canada
E1C 8J8

CONTACT: Mr Tim McEwen, Manager - (506) 857-2141

HISTORY: Targetair Ltd was formed in 1974 for the primary purpose of retrofitting F-86-E Sabre Jets for Flight System Inc, who in turn converted them to QF.86F drones for the US Army.

CAPABILITY: Targetair Ltd subsequently developed an additional line of target drones known as Targetair Aerial Target Series (TATS). In addition to the manufacturing of drones, Targetair offers a complete line of related services. Professional engineering & consulting services follow the progress of each specific design through research, development and manufacturing phases. All flying of RPV's, testing & evaluations are done by professional operators. Repair and overhaul services are available. Targetair offers an extensive 5 week Drone Pilot Training School, bi-annually, at which operators are trained in the flying and maintenance of the TATS 1 (5 ft wing span, 80 mph) drones. Operator training is also available for the TATS 103 (12 ft wing span, 150 mph) drones. All manufacturing and flying facilities are located within a 144 acre private airfield in Moncton, New Brunswick.

AVERAGE WORK FORCE: Engineers - 2
Others - 16

GROSS SALES: 1987 - \$1.1M
1988 - 1.4M (Est'd)

PLANT SIZE: 17,200 Sq Ft

EQUIPMENT: Complete manufacturing facility to manufacture aerial target drones. Most of equipment is woodworking and composite related.

EXPERIENCE: Targetair Ltd is currently contracted with the Canadian Department of National Defense for supply and services related to military training with aerial target drones.

KEYWORDS: R&O (RPV); RPV; Pilot Training (RPV); Consulting (RPV).

REVISED: March 88

TELECONSULT Ltd

ADDRESS: 402 W Pender Street
Vancouver, British Columbia, Canada
V6B 1T6

CONTACT: Mr E L Janssens, General Manager - (604) 684-1144

HISTORY: Teleconsult Ltd is an independent firm of engineering consultants providing a full range of engineering services in all major areas of telecommunications. The firm was the result of a merger between Mr N M Lopianowski and Mr A C Gardiner and was incorporated in 1974.

CAPABILITY: The scope of work performed by Teleconsult includes needs analysis, marketing studies, feasibility studies, advisory studies, system engineering and design, cost estimating, specifications, tender processing and evaluation, construction supervision, project management, acceptance testing, instructional services, maintenance philosophies and planning.

Teleconsult's areas of technological specialty include Satellite Communication (thin and heavy route), Long and Short Haul Transmission Systems (microwave, UHF, VHF, coaxial, and fiber for voice, data, and video), Telephony (network design, switching, cable distribution), Business Communications (PBXs, voice services, data integration), Multiplex (FDM & TDM), Broadcasting (AM, FM, Television, CATV), Supervisory & Control Systems, Cable Carrier, Telegraphy, Vehicular Mobile Systems, Data Transmission Systems, Interface with Communication Systems, Electromagnetic Compatibility Studies, and Special Application Communication Systems (law enforcement, public safety, municipal government, recreational services, libraries, schools, hospitals, urban transit, etc).

AVERAGE WORK FORCE: Professionals - 9
Administrative - 2

GROSS SALES: 1986 - \$0.8M
1987 - \$1.0M

PLANT SIZE: 2,500 Sq Ft

EQUIPMENT: Xerox 1035 duplicating system, Xerox 850 word processing system, eight IBM PC computers networked, computer aided drafting software, laser and graphic printers, extensive capability in word processing, accounting, engineering and project management programs, terminal access to Telex, Fax and electronic mail (Envoy100), and public domain data bases (iNet).

EXPERIENCE: Teleconsult has served a diverse domestic and international clientele including government agencies, transportation authorities, telephone utilities, law enforcement and safety agencies, industrial enterprises, cable television operators, broadcast stations, etc. Some customers include: Alcan Chemical and Smelting Works, Asian Development Bank, Canadian International Development Agency, Department of Communications, Canadian Police Information Center, GTE Sprint, Knowledge Network of the West Communications Authority, Microtel Ltd, NorthwTel Inc, Telephone Organization of Thailand, Telesat Canada, USAF (sub-consultant of Bell Lavalin), World Bank, and Yukon Territorial Government.

KEYWORDS: Acceptance Testing; Advisory Services; Broadcasting; Business & Office Communications; Cable Carrier; Communications Consultants; Consulting (Communications); Cost Estimating; Feasibility Studies; Instructional Services; Maintenance Planning; Needs Analysis; Program Management; Satellite Communications; Studies; Supervisory & Control Systems; Systems Design; Systems Engineering; Telecommunications; Telegraphy; Telephone Communications; Terrestrial Communications; Transmission Systems; Vehicular Mobile Systems.

REVISED: January 88

TELEMUS ELECTRONIC SYSTEMS Inc

ADDRESS: 310 Moodie Drive
Nepean, Ontario, Canada
K2K 8G3

CONTACT: Col Don MacCaul (Ret), Marketing Manager, Defense Systems (613) 726-1102

HISTORY: Telemus Electronic Systems was incorporated in October 1982 in Ottawa, Canada to produce high technology MIC products as well as to design and manufacture EW products for the ECM and ESM markets, both in Canada and the US.

The company has a broad base of experienced personnel involved in taking advanced microwave and ECM products from concept through to delivered hardware. The capabilities include RF hardware design and development, packaging, software support and design through analysis and simulation.

CAPABILITY: Telemus Electronic Systems Inc is involved in the design and manufacture of high-speed digital and microwave subsystems and systems to address problems in electronic warfare. At the systems level, Telemus is developing an ECM upgrade system

incorporating a Digital RF Memory (DRFM). The sub-system products include DRFM's, Digital Instantaneous Frequency Measurement Receivers (DIFM), Intra-pulse Analysis Receivers, and wideband microwave frequency dividers and prescalers. Presently Telemus is developing low-noise and frequency-agile synthesizers utilizing new quieter analog and digital direct synthesis techniques.

The capabilities in both digital and microwave areas also allow Telemus to respond to custom product requirements. Microwave frequency counters for both CW and pulsed signal measurements, microwave oscillators, and a DF System Test Set are some of the products that have been developed for clients.

AVERAGE WORK FORCE: Engineers - 15
Others - 20

GROSS SALES: 1986 - \$1.8M
1987 - \$2.5M

PLANT SIZE: 10,000 Sq Ft

EQUIPMENT: Equipment includes - MIC production lab, Tempest shielded room, DEC microvax II computer, Photo lithography lab, Micro soldering and micro bonding equipment, microwave computer aided design system (MICAD), Schematic Capture CAD, Microwave phase and amplitude network analyzer, Microwave scalar network analyzers, Sweepers and sources, Spectrum analyzers (20 GHz), Logic analyzers, Microprocessor development system, and Oscilloscopes, power meters, and counters.

EXPERIENCE: A Canadian Navy ECM System Upgrade using a DRFM will go to sea-trials in fall 88. Telemus is currently supplying its third generation family of digital RF memories (4 bit x 1.2 Gbps) to clients in the UK, Sweden, and the US. Successful field trials have been completed on our ELINT receiver designed to fingerprint radar signals by analyzing unintentional modulation parameters. The Canadian Government has also contracted Telemus to develop two new synthesizer designs and a Ultra High-Speed A/D and D/A sub-system. Telemus is supplying a 400 MHz - 8 GHz prescale for signal activity capture to a US Government agency. For further references contact Telemus.

KEYWORDS: Coherent Countermeasures Systems; Coherent RF Division; Custom Software; ECM; ESM Products; Electronic Warfare; Frequency "Halver"; Frequency Counters; Loopless Memories; MIC Design & Production; Microwave Prescalers; RF Memory (Digital); Radar Signature Analysis; Synthesizers.

REVISED: February 88

THOMSON-CSF SYSTEMS CANADA Inc (TCSC)

ADDRESS: 350 Sparks St, Suite #406
Ottawa, Ontario, Canada
K1R 7S8

CONTACT: Mr Norman R A Smyth, President - (613) 594-8822

HISTORY: Thomson-CSF Systems Canada Inc is a Canadian company incorporated in 1984 with principal office in Ottawa, Ontario. Thomson Systems business is Systems Management. Thomson Systems has been established to meet the needs of the Canadian, North American and world markets for the management and delivery of sophisticated complex systems and their associated logistics support.

CAPABILITY: Thomson Systems has the resources, the multidisciplinary capabilities and the sophisticated business practices to respond to complex and functionally diverse requirements in aerospace, communications, command and control, marine and transportation for military, government, industrial, and commercial customers. With its Systems Engineering expertise, its software development capability, its logistics engineering tools, and its proven management know-how, Thomson Systems is able to develop and

deliver to its clients, systems which meet all performance, cost, schedule and logistics requirements. As a true Systems Management company, Thomson Systems is not an equipment manufacturer, and as such, it is free to integrate equipment from any subcontractor which best meets the customer's needs.

Thomson Systems is a subsidiary of Thomson-CSF, a member of the French based multinational corporation, Thomson-SA, that operates in over 80 countries.

Thomson Systems is staffed with a Canadian team of the highest caliber. The professional engineering staff are top level systems engineers with a successful track record in the management of major national and international programs. Thomson Systems currently operates out of a 6800 sq ft facility that has a secure area which is equipped with a TEMPEST facility for housing equipment assigned to classified projects. Computers and office equipment are both owned and leased. Sufficient resources, people and infrastructures are in place to handle medium sized projects (\$100 Million).

AVERAGE WORK FORCE: PhD - 2
Engineers - 16
Others - 10

GROSS SALES: 1986 - \$1.9M
1987 - \$3.1M

PLANT SIZE: 6,800 Sq Ft

EQUIPMENT: Secure facilities, Tempest Room Apollo DN 550, IBM PC XTs, and 3 micro VAX (1 secure).

EXPERIENCE: Present customers include various departments in the Canadian Government and industries based in Canada, the US and Europe.

KEYWORDS: Computer Simulation; Effectiveness Evaluation; ILS; Life Cycle Costing; Logistics Engineering; Operational Analysis; Program Management; Systems Engineering; Systems Management; Systems Studies.

REVISED: January 88

3-L FILTERS Ltd

ADDRESS: 427 Elgin Street N
P. O. Box 371 Cambridge, Ontario, Canada
N1R 5V5

CONTACT: Mr Les Kadar, Mgr, Marketing - (519) 621-9949

HISTORY: 3-L Filters Ltd is a Canadian filtration system and cartridge manufacturing company founded in 1965 by the present owners, Mr. John Kadar and Mrs. Magdalene Kadar, president and vice president of the company. The company has a US plant located at 56 Harvester Ave, Batavia, NY.

CAPABILITY: 3-L Filters Ltd is primarily involved in the design and manufacture of aviation, marine, industrial and nuclear filtration systems, and filter cartridges. The aviation division products are micron filters, fuel water separators, fuel monitors, fuses, nozzles, and refueling hoses for airports (fixed or mobile).

All Canadian airports, and some US and world-wide airports, refuel aircraft with 3-L equipment. The function of the 3-L system is to filter out the solids from jet fuel and to separate water from fuel guaranteeing clean dry fuel for the aircraft. 3-L provides domestic and world-wide service, product assurance, including reliability and maintainability analysis, documentation, testing and free training.

AVERAGE WORK FORCE: PhD - 1
Engineers - 6 Others - 76

GROSS SALES: 1986 - \$6.2M
1987 - \$6.3M

PLANT SIZE: 55,300 Sq Ft

EQUIPMENT: Equipment includes in-house testing lab, and complete R&D facility with pressure vessel fabrication, metal forming, and welding and testing equipment. Other equipment includes cartridge manufacturing, pleating, winding, and knitting equipment, curing ovens and metal stamping, and a fully equipped machine shop.

EXPERIENCE: Customers include oil companies such as Esso, Exxon, Shell, Gulf, Texaco, Petrocan, Mobil, Chevron, Sunoco, Petrosar and others; DOD, CP Air, Air Canada, Boeing, Delta Air, Westinghouse, General Electric, Pratt & Whitney, De Laval Turbines, and many other industries including the USAF.

KEYWORDS: Air Gas Separators; Cartridges; Coalescer; Filters; Fuel Monitors; Fuses; Nozzles; Pressure Vessel Filters; R&O (Refueling Systems); Refueling Hose; Refueling Systems; Separator Cartridges; Separators; Water Purification Systems.

REVISED: February 88

TIL-TEK Ltd

ADDRESS: P. O. Box 550
Kemptville, Ontario, Canada
K0G 1J0

CONTACT: Mr S E Tilston, President - (613) 258-5928

HISTORY: TIL-TEK Ltd is a privately-owned Canadian company founded in 1979 to conduct research and development in the field of antennas, filters, and related electromagnetic problems. TIL-TEK Manufacturing Incorporated is a wholly-owned subsidiary of TIL-TEK Ltd and manufactures all commercial antennas designed by the parent company.

CAPABILITY: TIL-TEK Ltd is involved in the design and development of antennas and related systems. Antennas have been designed for all common VHF and UHF bands and are currently being manufactured by its subsidiary company. TIL-TEK is extensively involved in the design and development of advanced EHF antenna systems at 22 and 44 GHz for various government agencies, as well as the design and manufacture of the HF antenna interface unit for the WISP experimental package in the US Space Shuttle program. Other developments include a 225-400 MHz 8 channel fast switching network and a 30-90 MHz RPV aircraft antenna, and HF high power Tx/Rx fast switches.

AVERAGE WORK FORCE: PhD - 4 (Consultants)
Engineers - 1
Others - 10

GROSS SALES: No Data

PLANT SIZE: 5,000 Sq Ft

EQUIPMENT: RF test and measurement equipment from 100 kHz to 44 GHz. Use of Antenna Lab and Electromagnetics lab at the National Research Council of Canada.

EXPERIENCE: TIL-TEK's customers include a number of government departments and commercial industries including: Communications Research Council, Defense Research Establishment (Ottawa), Dept of Communications, Dept of Transport, National Research Council of Canada, Canadian Broadcasting Corp, Alberta Government Telephones, Saskatchewan Telephone, Manitoba Telephone System, Canadian Astronautics Ltd, SR Telecom Inc, Farinon Canada Ltd, and Telletra Espanola.

KEYWORDS: Antennas; EHF Antennas; Electromagnetics; Filters; HF Antennas; HF High Power Transformers; RF Subsystems; RPV Antennas; UHF Antennas; VHF Antennas.

REVISED: May 88

TIMMINCO Ltd

ADDRESS: 130 Adelaide St West, Suite #2900
Toronto, Ontario, Canada
M5H 3P5

CONTACT: Mr Ian Robinson, Vice President, Marketing - (416) 364-5171

HISTORY: Timminco Ltd is a Canadian organization resulting from a series of mergers and acquisitions since the formation of Chromium Mining and Smelting Corporation Ltd in 1934.

CAPABILITY: Timminco Ltd operates two businesses, specialized metals and industrial adhesives, through two separate divisions:

- Timminco Metals is a world class producer of ferrous and non-ferrous metals - such as strontium, calcium and magnesium, for the aluminum, automotive, aerospace, atomic energy and steel industries. With plants in Canada, the division supplies North America, Europe and the Pacific Rim. Timminco's product line in the division includes: ferrosilicon, magnesium metal, magnesium alloys, sacrificial anodes, desulfurizing products, calcium metal, calcium alloys, strontium metal, strontium alloys, and magnesium extrusions.

- Timminco Adhesives which includes Industrial Adhesives in Canada and Universal Adhesives in the US is a leading producer of adhesives and coatings for use by industries in North America. From its seven plants in Canada and the US, the division produces over 700 specially formulated adhesives, serving over 2,000 industrial customers in a wide range of businesses. Timminco's product line in this division includes: emulsions, natural and synthetic latexes, polyvinyl alcohols, dextrines and starches, polychloroprene contact cements, natural and synthetic rubber cements, lacquers, one and two-component polyurethane adhesives, hot melts, epoxies, urethane adhesives, and modified rubber-based cold seals.

While Timminco's two businesses differ in the products they make and the markets they serve, they are alike in their emphasis on the highest standards of technology, engineering, chemistry, quality control, product development, production efficiency, and timely responsiveness to the specific and exacting requirements of industrial customers.

AVERAGE WORK FORCE: Total - 800

GROSS SALES: 1985 - \$92.0M
1986 - \$96.0M

PLANT SIZE: No Data

EQUIPMENT: No Data

EXPERIENCE: No Data

KEYWORDS: Metals; Ferrous Metals; Non-Ferrous Metals; Adhesives.

REVISED: February 88

TOWER AEROSPACE PRODUCTS Inc

ADDRESS: P. O. Box 306, Station M
Bay 8, 3424 - 26 Street N E
Calgary, Alberta, Canada
T1Y 4T7

CONTACT: Mr Sandy McLeod, President - (403) 291-2264

HISTORY: The parent company, Tower Aircraft Hardware Inc is an international supply source and support operation based in Calgary, Alberta. Its primary role is as a heavy jet support distributor for Canada and nine other countries, and has successfully completed nine years in the field. Tower Aircraft Hardware Inc stocks components and parts for 707, 727, 737, DC8, Electra (Cosmos), Hercules, Lockheed, Convair and Bell. Tower Aerospace Products Inc was formed in August 1987 in anticipation of serving several aerospace programs now coming into focus for Canada and to seek future international business.

CAPABILITY: Tower Aerospace Products Inc is primarily involved in the design and manufacture of aerospace accessory equipment. Presently under manufacturing license are emergency locator transmitters and helicopter accessories such as auxiliary fuel tanks, fire fighting systems and supplemental cargo racks. Also under license to manufacture are cockpit control panels.

AVERAGE WORK FORCE: Full Time – 3
Aeronautical Eng Staff – 6 (Available on Subcontract)

GROSS SALES: 1986 – \$1.5M
1987 – \$3.0M

PLANT SIZE: 25,000 Sq Ft

EQUIPMENT: Computerized international material sourcing system and electronic test equipment.

EXPERIENCE: Tower Aerospace Products Inc's present customers include – various departments in the Canadian Government and Canadian Armed Forces, Agusta Aviation Corp, McDonald Douglas, Hughes, and Helicopter Support Inc. Tower Aerospace Products Inc is interested in doing business with the USAF.

KEYWORDS: Aircraft Accessories; Emergency Locator Beacons; Aircraft Parts; Auxiliary Fuel Tanks; Fire Fighting Systems.

REVISED: March 88

TRACKER INDUSTRIES Ltd

ADDRESS: 6A Tilbury Court, Unit #5
Brampton, Ontario, Canada
L6T 3T4

(Mailing Address)
P. O. Box 1094, Station A
Toronto, Ontario, Canada
M5W 1G6

CONTACT: Mr Lou Fedyna, President – (416) 454-0891

HISTORY: Tracker Industries was established in 1974, to provide products and services associated with the use of electronic and computer systems. To date Tracker has concentrated on supplying technical services, designed products, and engineering to the automotive and aerospace industries. Tracker Industries Ltd is a privately owned, Canadian company.

CAPABILITY: Tracker provides custom design/integration/manufacture of electronic and computer circuits and systems that are used in real-time control and data acquisition environments, and SCADA applications.

Real-time control programming using assembly and high level languages has been implemented for industrial automation applications.

- Software Experience: Operating systems – UNIX, MS-DOS, OS-9; Languages – BASIC, APL, "C", FORTRAN, ADA, Motorola and Intel assembly; and Other – Manufacturing Automation Protocol (MAP).

- Hardware Experience: Mini/microcomputers – DEC, IBM, HP, Olivetti; Programmable Logic Controllers – GEC and Allen-Bradley; Magnetic and optical bar code readers, printers, and systems; Computer controlled security systems; Ruggedized portable computers; and Laser & fiber-optic communications devices.

- Present Activity: Industrial automation and SCADA systems.

AVERAGE WORK FORCE: Engineers/Programmers – 9
Others – 4

GROSS SALES: 1986 – \$0.8M
1987 – \$1.1M

PLANT SIZE: 3,000 Sq Ft

EXPERIENCE: Tracker Industries' clients include General Motors, McDonnell Douglas, Bell Helicopter, Boeing, and Federal & Provincial governments departments.

KEYWORDS: Aviation Software; Build-To-Print; Consulting; Control Systems; Data Acquisition; Computers; Laser Communications; Microcomputers; Software Development; Software Services; Systems Intergration.

REVISED: February 88

TRIDEX SYSTEMS Inc

ADDRESS: 20 Colonnade Road, Suite #105
Nepean, Ontario, Canada
K2E 7M6

CONTACT: Dr Cedric V W Armstrong, President – (613) 727-5255

HISTORY: Tridex is a privately owned, federally incorporated, Canadian corporation founded in 1979. Tridex is committed to solving computationally-intensive problems for industrial, military and government clients with excellent price/performance ratios. Tridex's expertise over a number of years in an industrial setting has been applied to the development of the Tridex 4432 parallel processing system produce line – a system with unique features providing unparalleled performance for specific computationally-intensive applications.

CAPABILITY: Tridex's series of parallel processors, the Tridex 4432 parallel processing system product line, has an excellent price/performance ratio. It is specifically targeted at such computationally-intensive application areas as:

- Circuit simulation and fault simulation in PCB and IC design
- Structural analysis
- Real-time, computationally-intensive process control
- Real-time, high reliability expert systems
- Multi-target tracking and related radar signal processing functions

The product line is a complete solution consisting of hardware, software, customer support and education which satisfies the needs of the various customers in these markets.

The Tridex 4432 product line includes: Tridex 4432/4 Parallel Processor Systems providing 10 MIPS of high-speed computing; and Tridex 4432/16 Parallel Processor System providing 316 MIPS of near supercomputer speed.

Tridex's parallel processing strategies have resulted in high performance and high reliability computer systems. This involves real-time tasks running in parallel on different processing modules (PMs), loosely connected by high speed busses. The interconnection structure used is termed a spanning bus hypercube. The distributed operating system has proven linearity in performance, and employs message-oriented parallel processing at the task level.

Tridex has the unique distinction of commitment to the most innovative high-speed processing, fault tolerance and real-time performance applied to both the Tridex product line and the specific needs of the client.

Tridex's team of computer scientists provides many years of innovation and expertise in computer system design, implementation and testing in both hardware and software. Highly computationally intensive and algorithms requiring high throughput and fast response time have been designed to run in parallel on Tridex's computer systems.

Tridex's commitment to the client is through the application of hardware and software engineering for both custom designed or off-the-shelf system integrated computer systems.

AVERAGE WORK FORCE: Technical Staff – 9
Administration – 3

GROSS SALES: 1988 – \$1.2M

PLANT SIZE: 3,500 Sq Ft

EQUIPMENT: Several personal computers and microprocessor development systems, and test equipment for custom hardware design and breadboarding.

EXPERIENCE: Major projects have included the development of a fault-tolerant digital signal processor for space-based radar, the design of a fault-tolerant distributed computer system for space applications, and studies related to space-based radar. Previous projects have included the development of a high-speed data acquisition system for low-angle tracking radar, a multiprocessor simulator for multitarget tracking studies, and the evaluation of parallel fault-tolerant computer systems for use in defense applications. In addition, training course development and presentation has been provided to a number of customers.

KEYWORDS: Computers (Parallel); Distributed Processing; Parallel Processing; Fault-Tolerant Systems; Radar Processing; Systems Engineering; Training (Computer Systems).

REVISED: April 88

TUL SAFETY EQUIPMENT Ltd

ADDRESS: 1432 Aberdeen Street
Hawkesbury, Ontario, Canada
K6A 1K7

CONTACT: Mr J C (Chuck) Derby, President – (613) 632-1411

HISTORY: The company now known as Tul Safety Equipment Ltd, was previously RFD Canada, established in Granby, Quebec in 1951 by its parent company RFD, situated in the United Kingdom. In 1963, RFD Canada was sold and renamed Tul Safety Equipment Ltd. Tul remained in Granby until January 1969 when it moved to its present location in Hawkesbury, Ontario. There have been two expansions since then with another expected in late fall 1988.

CAPABILITY: Tul is a Ministry of Transport approved inflatable life-raft and lifejacket manufacturing, repair and overhaul facility, as well as being approved to DND 1015/NATO AQAP-1.

Tul are suppliers of safety equipment to the Canadian Armed Forces, Ministry of Transport, all Canadian air carriers, shipping fleets, as well as fishing fleets. Tul is also the major supplier of all webbing straps and associated hardware to General Motors of Canada for the Light Assault Vehicle (LAV) as supplied to the American Armed Forces. Tul is qualified to service, repair and overhaul helicopter floats, and to manufacture aircraft & automobile safety harnesses.

Some of the international companies represented in Canada by Tul are: Polyplastex United (aircraft interiors), Permaceel Tapes, Malabar Hydraulics, and Columbus Jack Corporation.

Tul maintains an approved network for repair and overhaul facilities from Newfoundland to British Columbia to ensure its customers do not suffer any unwarranted delays in satisfying their requirements.

In conjunction with its above mentioned capabilities, Tul has initiated and maintains a strong research and development profile with ongoing research and development for NASA, Canadian Armed Forces and industry.

AVERAGE WORK FORCE: Management – 20
Others – 70

GROSS SALES: 1986 – \$3.2M
1987 – \$3.1M
1988 – \$4.0M (Est'd)

PLANT SIZE: 30,000 Sq Ft

EQUIPMENT: Tul's specialized equipment includes 2 heat sealing machines.

EXPERIENCE: Our present customers include various departments in the Canadian Government and industry, both in Canada and the US. We have also exported to Norway, Japan, Australia and other countries. Major customers include Department of National Defence, Air Canada, Canadian Airlines, and General Motors.

KEYWORDS: Life Support Equipment; R&O (Rafts); R&O (Lifejackets); Rafts; Lifejackets; Webbing Straps; Safety Harnesses.

REVISED: February 88

TW MANUFACTURING Inc

ADDRESS: 3700 Richelieu
St-Hubert, Quebec, Canada
J3Y 7B1

CONTACT: Mr Bob Meindersma, President – (514) 656-8080

HISTORY: Founded in 1975, TW Manufacturing Inc has since established a reputation second to none for dependability and quality as a manufacturer of precision machined parts for the aerospace and related industries.

CAPABILITY: TW Manufacturing's manufacturing capacity is diversified and it satisfies both telecommunications and aircraft fields. Their customers are assured that specifications and demands will be met through the endeavor of our competent and experienced workforce.

TW Manufacturing Inc is a recognized sub-contractor for major Canadian and American aircraft industries. Their current efforts are directed mainly towards the engine and landing gear sectors.

In the engine area, they manufacture such diversified parts as bearing housings, flanges, oil filter housings, oil nozzles, etc., ranging in size from fractions of an inch to several inches. Primary customers include Pratt & Whitney Canada.

In the landing gear area, they manufacture torsion bolts, metering pins, cylinders, locknuts, etc., ranging in size as mentioned above. Primary customers are McDonnell Douglas, Menasco Aerospace, Heroux Ltd and also Canadair.

In the air frame area, they manufacture various structural components. Primary customers include McDonnell Douglas and Canadair.

In the telecommunications area, they machine components for circulators, reject filters, flanges for various waveguides, couplers, terminations, isolators, etc., in aluminum, brass and copper.

AVERAGE WORK FORCE: No Data

GROSS SALES: No Data

PLANT SIZE: 11,000 Sq Ft

EQUIPMENT: Full complement of precision machining and grinding equipment.

EXPERIENCE: TW Manufacturing Ltd customers include prime contractors in the aerospace and telecommunications market.

KEYWORDS: Machining; Precision Machining; Component Fabrication; Aircraft Parts; Telecommunications Components.

REVISED: February 88

UDT INDUSTRIES Inc

ADDRESS: 2125 East, St-Catherine East
Montreal, Quebec, Canada
H2K 2H9

CONTACT: Mr Alberto Stagnaro, Purchasing Agent - (514) 526-9454

HISTORY: UDT was incorporated in 1942 under the name of Universal Die & Tool. Name was changed to UDT Industries Inc in 1975 to reflect more accurately their machine shop business. The company is Canadian owned and there are no other Canadian or US subsidiaries.

CAPABILITY: UDT's major products are machined parts ranging from light-medium to hard core items, such as fittings, splice plates, hinges, bulkheads, slat-tracts, spars, dog legs, spar caps, leg assemblies, etc., made from plate stock, forgings, extrusions, aluminum alloys, steels, titanium, etc. CNC and conventional equipment are utilized.

An aluminum alloys heat treating electrical air furnace is part of UDT's capability, 5 ft diameter by 18 ft high. It is continuously performing quench & age hardening of major structural parts for McDonnell Douglas & Lockheed Aircraft from AL-AL 7075 T 411 & 2014 T 411 condition F to T6 or T73 condition. UDT works to MIL-I-45208 and DND AQAP-4 & 6. Tolerances are maintained as per customer's requirements.

AVERAGE WORK FORCE: Engineers - 1
Inspectors - 5
Machinists - 60
Programmers - 2
Others - 24

GROSS SALES: 1986 - \$11.2M
1987 - \$11.6M

PLANT SIZE: 100,000 Sq Ft

EQUIPMENT: NC equipment includes vertical machining centers, horizontal machining center, vertical profiling milling machines, vertical profiler bed type (3 & 4 axis), a 5 axis machining center, and a 3 spindle, 5 axis, 2 gantry profiler with a 90 ft bed.

EXPERIENCE: UDT's customers include McDonnell Douglas Canada Ltd (DC 9 & DC 10), Canadair (from T33 to Challenger), Enheat, deHavilland Aircraft, Fleet Industries (Lockheed Product), NATO, USAF, CCC, DND, Rohr, Research & Development Canada (Propulsion Pod), ITT Gilfillan (Antenna Radar), McDonnell Douglas Corporation - St Louis (F-18), and Grumman Aerospace.

KEYWORDS: CNC Machining; Heat Treating; Machining; Precision Machining.

REVISED: January 88

ULTRA LASERTECH Inc

ADDRESS: 6415 Viscount Road
Mississauga, Ontario, Canada
L4V 1K8

CONTACT: Mr T F E Loster, VP, Marketing & Sales - (416) 677-8091

HISTORY: Ultra Lasertech is a high-technology company incorporated in 1979 with a laser technology base and licensing derived from RCA. There are no other Canadian divisions and no US subsidiaries.

CAPABILITY: Ultra Lasertech is engaged in the design and manufacture of custom CO₂ lasers and wave guide lasers. They are involved in R&D associated with laser photoacoustics, laser spectroscopy, and laser communications & radar. Other areas of expertise include remote sensing, pollution detection, ultra high power laser modeling and design, and laser applications. Their product line includes sealed, continuous wave, isotopic CO₂ lasers; tuneable CO₂

lasers; a CO₂ laser optoacoustic detector; industrial type sealed CO₂ lasers; laser stabilizers; laser power supplies; mirror mounts; stark cell frequency controller; frequency stabilizer and NH₃ laser.

AVERAGE WORK FORCE: Total - 13 (4 Part Time)

GROSS SALES: 1986 - \$600K
1987 - \$600K

PLANT SIZE: 3,000 Sq Ft (R&D Laboratories)
1,000 Sq Ft (Production Facility)

EQUIPMENT: A laser based optoacoustic facility for measuring absorption co-efficients of gases and vapors in the 9 - 12 um region. Measurements can be made at reliable pressure and temperature. A facility for fabricating hard seals required for CO₂ laser structures of glass and ceramic materials. These seals can be made between various thermally mismatched materials.

EXPERIENCE: From it's principals, the company has a background of some 12 years experience in sealed CO₂ laser technology and ultra high power, fast flow CO₂ laser development. Since its founding in 1979, Ultra Lasertech has continued developments in long life, sealed CO₂ laser systems, tunable and non-tunable, to power ranges from 5-90 watts CW and with various CO₂ isotopes. These projects include the development of the ¹³CO₂, ¹⁴CO₂ and ¹⁸CO₂ laser systems covering the 8.9 to 12.1 um range; a folded 75 watt system, a feedback stabilization system based on the optogalvanic effect for controlling the laser to a line center or off-set; a stark cell frequency controller for shifting waveguide lasers by +500 MHz; and a variety of customized laser systems for special research applications. Presently under development is a compact CW or pulsed air cooled, sealed CO₂ laser and a compact excimer laser for medical applications. Also ULI has, since 1979, a continuing program in laser based optoacoustic research and development. These projects include the development of CO₂ laser optoacoustic trace gas analyzer for detecting ambient nitric acid vapors to the 1 ppb level; a balanced dual spectro-phone chamber; a stark modulated optoacoustic detector that can detect amonia of concentrations of 0.2 ppb in air; the measurement of the optoacoustic signatures of 30 hazardous gases of environmental and industrial concern - it is anticipated that this technique is suitable for the detection of hydrazine at low ppb levels; the investigation concerning detection of PCBs and explosive vapors; and precise measurements of water vapor at various partial pressures and temperatures in the 9 to 12 um region.

ULI has delivered laser system to companies around the world. Among these are NASA, JPL, Vought Aerospace, NOAA, McDonnell Douglas, Naval Research Labs, Brookhaven, Max Planck Institute, Horiba & Sumitomo. ULI has also performed contract research for the Department of National Defense, National Research Council and Atmospheric Environment Service.

KEYWORDS: CO₂ Lasers; CO₂ Optoacoustic Detector; Continuous Wave CO₂; Eximer Laser; Frequency Stabilizers; Isotopic CO₂; Laser Controllers; Lasers; Mirror Mounts; Optoacoustic Trace Gas Analyzer; Photoacoustics; Pollution Detection; Power Supplies; Sealed CO₂; Spectroscopy; Stark Cell; Tuneable CO₂; Waveguide Lasers.

REVISED: January 88

UNISYS CANADA Inc

ADDRESS: 50 O'Connor, Suite #1302
Ottawa, Ontario, Canada
K1P 6L2

CONTACT: Mr R Y Guimond, Director, Marketing & Program Management (613) 563-4903

HISTORY: Unisys Canada Inc Defence Systems was established in Canada in 1977. It is a diverse Canadian company providing systems and products to the Canadian government and major defense contractors. It specializes in the manufacture of ruggedized electronic hardware and is the supplier of the Canadian navy standard computer. Since its beginning, Unisys has grown in annual sales to more than \$35 million (US) in 1987.

CAPABILITY: Unisys Canada Inc Defence Systems has developed capabilities in four facilities across Canada – each supported by an experienced technical and administrative staff.

The manufacturing plant in Winnipeg serves as the company's head office. This facility offers customers a full range of engineering and manufacturing capabilities with precision equipment capable of handling all aspects of MIL-SPEC assembly including quality assurance, environmental stress screening, test engineering, production engineering, production/material/procurement control, configuration/data management, specific assembly capabilities, sub-assembly test, and final test.

The Winnipeg facility is certified for document storage up to secret level and is qualified to the following Canadian NATO and US/DOD requirements: AQAP-1, AQAP-4, AQAP-6, AQAP-13, MIL-Q-9858A, MIL-I-45208A, and MIL-STD-45662. With its advanced production facilities, the Winnipeg plant can put designs and concepts quickly into production. Expertise has been developed in areas such as the manufacture of cabinet assemblies, coil wound devices, cable and harnesses, printed circuit assemblies, core memory stringing, wire wrapping, PROM programming, mechanical assembly, and high density & high reliability MIL-SPEC power supplies.

Unisys maintains a medium sized facility in Ottawa, Ontario, near the Department of National Defence headquarters, ensuring close liaison with our prime customer. This facility is staffed with a group of systems and application engineers experienced in developing advanced systems for command, control, surveillance, fire and control and training programs for DND and other major defence contractors. An extensive base of experience supports this group's ability to evaluate and undertake analysis of complex systems projects to ensure cost effective solutions.

In Halifax, Unisys has a small organization that provides direct on-site support to the East Coast and forces of DND. This is an experienced group of senior application engineers actively involved in the life cycle support of the CP-140 Aurora Aircraft and the Halifax Fleet Operations. This group also provides the required support for systems that are or will be deployed operationally with DND, such as Shipboard Integrated Processing and Display system (SHINPADS), Message Handling System (MHS), and Message Processing System (MPS).

Unisys also has a major facility in Montreal with a complete range of capabilities in operational analysis, systems modeling and simulation, software design, coding, debug, test, integration and documentation, software quality assurance and management of real-time software development projects. Since 1984, this group has been dedicated to the Canadian Patrol Frigate Project.

AVERAGE WORK FORCE: Management – 11
Professional – 20
Administration – 52
Sales – 2
Technical – 63
Clerical – 52
Assembly – 143
Total – 524

GROSS SALES: 1986 – \$41.8M
1987 – \$45.8M

PLANT SIZE: Winnipeg – 79,430 Sq Ft
Ottawa – 8,299 Sq Ft
Halifax – 150 Sq Ft

EQUIPMENT: Unisys Canada Inc Defense Systems has a wide range of advanced equipment including: Apollo/Mentor CAD system, Logic Analyzers, Processor Emulators, Oscilloscopes, Multimeters, ROM simulators, Digital VAX 11/750, Spectrum Analyzers, Environmental Test Chamber, Automated Card and Final Test Systems, Flow Solder Machines, Component Lead Formers, Semi-Auto Dip Inserters, and Static Controlled Work Stations.

EXPERIENCE: Unisys Canada Inc Defence Systems has developed considerable experience through involvement in a wide range of engineering and manufacturing projects for customers within the company, with outside contractors and with the governments of Canada and the US.

Among the engineering efforts undertaken by CSD Canada include: the AN/UJK-502 Engineering Pre-Production Program, and the AN/UJK-501 Engineering Pre-Production Program. The development of an engineering development model (EDM) of the SHINPADS Serial Data Bus, and they carrying the EDM into production for the CPF and MATCALS, and the improved Memory Development Program in which CSD Canada provided the full scale engineering development model to provide a form-fit function replacement for the AN/AYK-10 mated film memory.

In addition to the major efforts, CSD Canada has been involved in a number of research projects of a smaller scale.

Unisys has acquired considerable experience on major programs for customers in Canada and abroad. Included in this experience is major work performed for the Department of National Defence as a subcontractor on the Canadian Patrol Frigate Project and the Tribal Class Update and Modernization Project. Unisys provided the SHINPADS serial data bus hardware and major software elements on these projects.

Unisys has also recently signed a contract with the Department of Defense to provide the US Navy with a form fit function replacement for the AN/AYK-10 Mated Film Memory on-board the S-3 ASW aircraft.

KEYWORDS: Computers; Computer Parts; Measurement & Control Systems; Distributed Processing; Local Area Networking; Vibration/Acoustic Intensity Measure; Multi-Layered Board Assemblies; Pre-Wired Board Assemblies; PC Board Design & Fabrication; PC Emulators; Power Supplies; Video Display Systems; Core Wound Products; Core Memory Arrays; Magnetic Tape Transports; Maintenance Consoles; Harnesses; Switches; Information Handling Products; Software Services.

REVISED: February 88

VAC-AERO INTERNATIONAL Inc

ADDRESS: 1371 Speers Road
Oakville, Ontario, Canada
L6L 2X5

CONTACT: Mr Ross E Pritchard, President – (416) 827-4171

HISTORY: VAC-AERO is a Canadian owned, high technology company offering heat treating, brazing, electron beam welding, and repair and coating services to the aerospace, airline, avionics, electronics and other key industries throughout the US and Canada. In addition, VAC-AERO designs, manufactures and sells specialized heat treating and vacuum furnaces to these industries.

VAC-AERO was originally founded in 1959 in Oakville, Ontario, and a Montreal Division was established in 1967 to meet the growing demand for its services from Quebec area customers.

CAPABILITIES: VAC-AERO holds processing approvals from all major aerospace manufacturers for the following services:

Thermal processing of OEM components:

- Vacuum heat treatment of high strength steels – Landing gear components, structural airframe parts.
- Vacuum heat treatment – Turbine parts, shafts, turbine blades, casings, nuclear components.
- Vacuum Brazing – Turbine nozzles, compressor stators, afterburner casings, combustion cowls, wave guides, aluminum cold wall assemblies and heat exchangers, nuclear parts.
- Electron beam welding – Turbine assemblies, electronic components.
- Plasma spray coating – Combustion liners, fan and stator casings, miscellaneous parts.

Repair and overhaul of jet engine components:

- VAC-AERO is approved by Transport Canada and various aerospace companies for a variety of repairs using plasma spray, vacuum brazing, tungsten arc and electron beam welding.
- Specific components repaired include: compressor stators, turbine vanes and nozzles, combustion chambers, shafts and miscellaneous components.

Manufacture of new parts to print:

- VAC-AERO can also manufacture brazed and electron beam welded assemblies to customer specifications and drawings. They specialize in components such as aluminum vacuum brazed heat sinks and cold wall assemblies for radar and avionics equipment. VAC-AERO offers a complete line of cold wall vacuum furnaces ranging from small laboratory models to large bottom loading production units. They have supplied these furnaces to a wide variety of customers in the aerospace, nuclear and other high technology industries.
- In addition, they can supply ancillary furnace equipment such as high temperature molybdenum fixtures, water recirculating units, and work handling systems. They also offer complete turnkey installation services, extensive operator training programs and post sale preventive maintenance service.

AVERAGE WORK FORCE: Engineers – 11
Others – 92

GROSS SALES: 1986 – \$8.5M
1987 – \$8.7M

PLANT SIZE: 40,780 Sq Ft (Oakville Division)
9,250 Sq Ft (Montreal Division)

EQUIPMENT: VAC-AERO employs the following equipment:

- Vacuum oil quenching furnaces capable of hardening part sizes to 72 in. dia. x 84 in. high, vacuum brazing and heat treating furnaces suitable for temperatures to 2700sF and ultra high vacuum levels to 1x10⁻⁶ torr.
- CNC machining centers, a fin forming machine, and a computer controlled co-ordinate measuring machine, combined with an electron beam welder (chamber size 36" L x 36" H x 52" W, extendible to accommodate shafts to 72" L) provide full in-house capabilities for the manufacture of parts to print.
- Plasma coating equipment including Metco 3M, 45kW and Metco 7M, 80kW plasma guns, and a METCO AR-1000 Robot.
- In-house facilities for repair and overhaul including lathes, vertical mills, grinders, and EDM equipment for machining.
- Complete metallurgical laboratory in addition to normal dimensional checking equipment, complements quality control capabilities.

EXPERIENCE: Present customers include numerous companies in the aircraft, avionics, electronics and nuclear power generation industries. VAC-AERO holds current processing approvals from the following companies: Canadian Forces; Boeing Aircraft Co; Canadair; The deHavilland Aircraft of Canada Ltd; McDonnell Douglas Aircraft Co; General Dynamics; Grumman Aircraft; Pratt & Whitney Aircraft, Hartford, CT; Pratt & Whitney Canada; General Electric, Burlington, VT and Lynn, MA; Garrett Airsearch Mfg; Litton Systems (Canada); Litton Systems (USA); Hawker Siddeley Canada, Orenda Division; Menasco Canada Ltee; Menasco, Burbank, CA; Spar Aerospace; Bristol Aerospace Ltd; McDonnell Douglas; Cleveland Pneumatic; Bell Aerospace, Fort Worth, TX; Sikorsky Aircraft, Stratford, CT; DAF Indal Ltd; Fleet Industries; Kaman Aerospace, Bloomfield, CT; and Avco Lycoming, Stratford, CT.

KEYWORDS: Brazed Aluminum Heat Sinks; Electron Beam Welding; Machining; Plasma Spray Coating; R&O (Engine Components);

Vacuum Brazing; Vacuum Furnaces; Vacuum Heat Treating; Heat Treating; Metal Coatings; Brazing; Build-To-Print; Coatings (Plasma Spray); Coatings (CODEP); Diffusion Coatings (CODEP).

REVISED: January 88

VADEKO INTERNATIONAL Inc

ADDRESS: 2600 Argentia Rd
Mississauga, Ontario, Canada
L5N 5Z4

CONTACT: Mr Bill Bishop, Vice President, Sales & Marketing –
(416) 821-3222

HISTORY: Established in 1981 by key players from the Canadarm program, this wholly Canadian owned systems engineering company has grown to encompass a broad spectrum of advanced technologies, including large scale robotics, electro-optics, math modeling, simulation and thin film deposition. Agra Industries of Saskatoon acquired 50% of Vadeko shares in 1987.

CAPABILITY: Vadeko is recognized as an aerospace industry leader in the development and manufacture of large scale robotic systems. Vadeko's systems utilize off-line programming and math modeling.

Staff capabilities and experience permit Vadeko to lead a project through the initial stages of requirements definition, system conception and design to development, manufacture, assembly, integration and test.

AVERAGE WORK FORCE: 120 (Professional Staff)

GROSS SALES: 1987 – \$20.5M
1988 – \$26.0M (Est'd)

PLANT SIZE: 45,000 Sq Ft (Office & Plant)

EQUIPMENT: CAD system, electrical/electronics laboratory, mechanical laboratory, machine shop, assembly/integration/test area with 20 ft clear ceilings.

EXPERIENCE: Vadeko's experience includes:

- Solid Rocket Motor Manufacturing – Major rocket motor manufacturers and the US Navy use Vadeko Robotic Systems for coating application, propellant inspection and repair of solid rocket motors. The Vadeko Bore Inspection Tool Systems (BITS) assists Morton Thiokol in maintaining the performance and reliability of Shuttle Rocket Boosters (SRB's). Hercules Aerospace uses the Vadeko Automated Robotic Painting systems (ARPS) to apply specialized coatings to the inside and outside of Titan and Delta rocket boosters. A smaller system, the Automated Case Bondliner (ARPS) performs coating application to a variety of strategic rocket motors for the US Navy.
- Robotic Aircraft Painting – Vadeko's fully automatic, robot painting systems solve the major problems of aircraft painting; expensive downtime, consistency and uniformity of coating application, and the hazard to human workers from increasingly toxic paint formulations. An extensive background in spray coating technology ensures that Vadeko systems are ideally suited to a variety of coatings, including "stealth" and other low-observability materials. Vadeko is currently involved in the development of the Canadian Automated Aircraft Painting Center, and is a major bidder on the Robins AFB aircraft painting system for F-15 fighters.
- Related Technologies – Vadeko has extensive experience in large scale robotics systems for a variety of applications, including the CN Railcar Painting system, the Robotic Undercar Cleaning system, the Ontario Hydro Nuclear repair system, and the Tridon automated assembly system. As a leader in Thin Film Deposition technology, Vadeko is currently involved in a variety of related applications, including document security devices, superconductivity, optical inspection and monitoring and special coating application. Thin film and robotics

technologies have come together synergistically in the production of automated manufacturing systems for Compact Disks and CD ROMs.

Vadeco's customers include Morton Thiokol, Hercules Aerospace, US Navy, US Air Force, IBM, Canadian Forces, National Bank of Canada, Government of Canada, Ontario Hydro Nuclear, and CN Rail.

KEYWORDS: Large Scale Robotics; Robotic Aircraft Painting, Rocket Motor Robotics, Space Systems; Thin Film Deposition; Automation; Optical Monitors; Optical Inspection; Compact Disc Manufacturing; Reverse Vending Machines; Recycling Equipment, Systems Engineering; Off-Line Programming; Underwater Vehicles; Nuclear Repair Equipment; Engineering Consultants; Aircraft Painting; Consulting (Engineering).

REVISED: February 88

VARIAN CANADA Inc

ADDRESS: Varian Canada Microwave Division
45 River Drive
Georgetown, Ontario, Canada
L7G 2J4

CONTACT: Mr G Plhak, Marketing – (416) 877-0161

HISTORY: Varian Canada Inc is a wholly owned subsidiary of Varian Associates of Palo Alto, CA. The Canadian operation, located near Toronto, Ontario, was originally incorporated in 1955 to supply microwave tubes to the Canadian military.

The engineering and manufacturing segment of the company, Varian Canada Microwave Division (VCMD), operates under the umbrella of the Electron Device Group of the parent company, Varian Associates Inc, Palo Alto, CA. This group forms the largest electron tube manufacturing operation in the free world. Since its inception, the Canada Microwave Division has grown steadily and expanded its original charter to include many unique and customized products for worldwide markets (75% of sales are exported). Currently, the product line is split evenly between electron tubes and electronic equipment.

CAPABILITY: The following is a brief description of the major products manufactured at Varian Canada Microwave Division. Since many of the products were designed by the Division, full facilities and capabilities exist in-house for customizing to the needs of individual customers. Both MIL and commercial specifications can be met.

- **Travelling Waves Tubes:** These tubes are produced for microwave Line-of-Sight (LOS) Communication applications and cover frequencies ranging from 3.5 GHz to 15 GHz at power levels up to 50 watts. The product line includes a complete selection of conventional technology TWTs as well as metal-ceramic high efficiency and high linearity tubes. The company has the capability to customize existing designs to meet customer's unique requirements, and to develop retrofit packages to upgrade older field installations.

- **Power Klystrons:** This product line consists of a series of power klystrons used primarily as high power amplifiers in satellite earth stations and troposcatter communication applications. These are available at frequencies of 5, 6, and 14 GHz with power levels up to 3 kilowatts. Various channel tuner configurations are available, including a microprocessor-controlled, automatic-channel tuner.

- **Reflex Klystrons:** VCMD has an extensive line of reflex klystrons typically used in communications and radar systems for airborne and ground based applications, plasma diagnostics, spectroscopy, meteorological instrumentation and other experimental and scientific applications. The line ranges from the lower frequency tubes (8 to 25 GHz) with power outputs from 10 to 450 mW up to millimeter reflex klystrons ranging from 30 to 220 GHz with output powers from 5 to 800 mW.

- **Extended Interaction Klystrons:** This product line originated at the VCMD facility and extensive development efforts are continuing. The products address the very high frequency ranges for microwave applications, ranging from 30 GHz to 280 GHz. EIKs are rugged, lightweight, compact and are capable of generating medium rf power levels in either continuous or pulsed modes. The cw power levels of these klystrons range from 1 kW at 18 GHz to 1 watt at 280 GHz. Peak power outputs range from several kilowatts at 30 GHz to 60 watts at 220 GHz. These EIKs are well suited as rf power sources for a wide range of applications such as – Fire control radar; terrain following radar; illuminators; weather radar; plasma heating; radio astronomy; surveillance radar; satellite communications; tracking radar; radar modelling; and fusion diagnostics.

- **Millimeter Wave Subsystems:** VCMD offers a range of millimeter wave transmitter subsystems which consist of a modulator, a power supply and control circuitry driving the Varian line of Extended Interaction Klystrons. These transmitter systems operate in discrete frequency bands ranging from 30 to 220 GHz for pulsed and CW applications and can be designed to meet customer requirements to commercial or MIL specifications.

- **Power Supplies:** The basis of this product line is a complete series of power supplies which complement VCMD's electron tubes. However, in addition, specialized, complex power supplies have been developed and manufactured by the Division to both MIL and commercial specifications, requiring capabilities such as: high and low voltage outputs; DC or AC inputs; multiple outputs; stringent noise and regulation requirements; and unique shapes and sizes. Power levels up to 30 kW and voltages up to 50 kV have been achieved. Power supplies are available for laser and x-ray systems.

VCMD is able to qualify and test to MIL and commercial specifications. Customized products are a specialty of the Division. Organizational and administrative systems are in place to ensure the smooth execution of commercial and military contracts requiring exceptional attention to detail. These include fully computerized and on-line Manufacturing Resources Planning and a complete Quality Assurance system appropriate for MIL requirements.

AVERAGE WORK FORCE: Total – 300

GROSS SALES: 1986 – \$24M
1987 – \$20M

PLANT SIZE: 100,000 Sq Ft (2 Facilities)

EQUIPMENT/FACILITIES: VCMD has, in-house, all of the extensive facilities and capabilities needed for the manufacture of high quality electron tubes and electronic equipment. A few of the facilities which support such precise and delicate design and manufacturing activities are: "Watchmaker accuracy" machine shop; in-house manufacturing of high voltage transformers; test facilities for microwave tubes, subsystems and power supplies; clean rooms; vacuum sealing facilities; electric discharge machining; environmental test facilities; hydrogen and vacuum furnaces; and laser welding.

EXPERIENCE: VCMD has in excess of thirty years of experience working with original equipment manufacturers of microwave and satellite telecommunications equipment. The Division has also been involved in various development programs for power supplies and other electronic subsystems to customers' specifications for many years.

Military programs have been a successful part of VCMD's operation. The largest single program lasted three and one-half years and was valued at approximately \$6.0M. In 1979, the company produced a space qualified instrument which was successfully flown on a NASA satellite designed to measure the earth's magnetic field. As well as private industry throughout North America, Europe and the Far East, the clientele also includes the Canadian, US and several European Governments, plus various agencies, laboratories and research institutions associated with these governments.

KEYWORDS: Amplifier Subsystems; Amplifiers; Control Circuitry; Extended Interaction Klystrons; Klystrons; Millimeter Wave Subsystems; Power Amplifiers; Power Klystrons; Power Supplies; Pulsers; Reflex Klystrons; Satellite Communications Power Amp; Solid State Devices; Travelling Wave Tubes; Waveguides; Laser Power Supplies; X-Ray Power Supplies.

REVISED: January 88

VICTRIX Ltd

ADDRESS: Box 1807
Guelph, Ontario, Canada
N1H 7A1

CONTACT: Mr H Lawry, Vice President - (519) 836-1480

HISTORY: Incorporated in 1975 (100% Canadian owned).

CAPABILITY: Approximately 80% of their R&D and manufacturing is for the Canadian Department of National Defense. Typical engineering projects include:

- Technical investigations and engineering services to DND on marine weapon systems drives and controls.
- Engineering services to industry on control systems for machinery and large winches.
- Engineering services to industry on sound and vibration problems in gear systems.
- Designed and developed 1.2 m plastic parabolic antenna for 11.6 GHz satellite receiving.
- Developed production techniques for fabrication of outdoor unit to house LNA of satellite receiving antenna.
- Investigated dielectric feed horn problems and developed modifications.
- Engineering services on avionics flight surfaces control systems.

Manufacturing capability include the following items:

- Amplifiers, reactors, special transformers, & RF coils
- Fiberglass microwave dish antennas
- Small gears and gear reducer assemblies
- Extrusion and molding of miscellaneous plastic and rubber parts
- Aircraft smoke signal markers pyrotechnics
- Cable assemblies
- Marine projectile line throwing devices
- Inflatable mast antennas
- Marine weapon system drive and controls
- Modular practice bombs

Victrix also has an R&O capability for radar duplexers, precision electronic components and power supplies.

AVERAGE WORK FORCE: Engineering & Technical - 10
Machinists - 5
Production People - 10 to 30
Quality Control Manager - 1

GROSS SALES: 1986 - \$4.50M
1987 - \$4.75M

PLANT SIZE: 30,000 Sq Ft (2 locations)

EQUIPMENT: Machining (CNC), vacuum molding, fiberglass layup and forming, & electronic laboratory to 20 GHz measurement, and pyrotechnic manufacturing.

EXPERIENCE: DND:

- Marine Weapon System Drive Controls

- Aircraft Smoke Signal Markers
- Marine Line Throwing Device
- Portable Antenna Masts
- Modular Practice Bombs

DOC:

- Satellite M/W Parabolic Dishes

KEYWORDS: Ground Station Antennas; Modular Practice Bomb; Plastic Fabrication; Portable Antenna Masts (Surface); Practice Bomb; Pyrotechnics; Smoke Markers; Weapon System Controls; Machining.

REVISED: January 88

VIRTUAL PROTOTYPES Inc

ADDRESS: 5252 de Maisonneuve West, Suite #318
Montreal, Quebec, Canada
H4A 3S5

CONTACT: Mr Eugene Joseph, President - (514) 483-4712

HISTORY: Virtual Prototypes is a privately-owned Canadian company incorporated in November 1980 under the name of Softec Consulting. The company changed its name to Virtual Prototypes Inc in 1985 to reflect its commitment to develop and promote its proprietary Virtual Prototyping technology. The company has a US subsidiary, Virtual Prototypes Inc, located in Dayton, OH.

CAPABILITY: Virtual Prototypes has developed a unique technology for rapid prototyping of control and display systems called VAPS (the Virtual Prototyping system). By using VAPS crewstations, cockpits and consoles are represented with touch sensitive graphics and driven by real time simulation. These 'virtual prototypes' have the same functionality as their real counterparts and may be connected to an existing customer simulation. The key benefit of the technology lies in its flexibility and ease of use. VAPS can be used by non-programmers to perform tasks that would normally require programming.

VAPS is used in such diverse applications as cockpit prototyping, submarine combat system design and the design of command, control and communications consoles. Multiple VAPS systems can be interconnected to simulate larger systems, requiring cooperating operators. For flight applications, Virtual Prototypes Inc can supply a generic flight simulation model that can be parameterized to fly any type of fixed-wing aircraft.

VAPS has applications in concept exploration, visualization, and training. The company delivers VAPS as an off-the-shelf product. Virtual Prototypes Inc also provides engineering services involving the application of its technology to particular customer problems and training services.

AVERAGE WORK FORCE: Engineers - 20
Others - 10

GROSS SALES: 1987 - \$1.4M

PLANT SIZE: 7,000 Sq Ft

EQUIPMENT: Silicon graphics superworkstation network, Virtual Prototyping System Design software, and simulation software.

EXPERIENCE: Present customers include various Canadian government departments, and industries in Canada, the US and overseas. Major customers include Northrop Corporation (Aircraft Division), USAF (Flight Dynamics Lab, WPAFB), General Dynamics (Ft Worth Division), USN (Naval Underwater Systems Center), Boeing Military Aircraft Co, Texas Instruments, RCA, Raytheon Co, McDonnell Douglas Helicopters, Computing Devices Corp, and the Canadian Department of National Defence.

KEYWORDS: Rapid Prototyping; Man/Machine Interface; Computer Graphics; Expert Systems; Flight Simulation; Crew Station Design; Automatic Code Generation; Software Rehosting; Digital Terrain; Operability Prototype; Tactical Console; Virtual Cockpits; Human

Factors Design; Graphics Editor; Touch Screen; Flight Control Interfaces; Out-of-Window Displays; Tactical Simulation; Performance Evaluation; Prototyping (Rapid).

REVISED: January 88

VORTEK INDUSTRIES Ltd

ADDRESS: 1820 Pandora Street
Vancouver, British Columbia, Canada
V5L 1M5

CONTACT: Dr G G Albach, President - (604) 251-2451

HISTORY: Vortek is a private Canadian company, incorporated in 1975 in the Province of British Columbia, with no other branches or US subsidiaries.

CAPABILITY: Vortek designs and manufactures the world's most powerful arc lamps and related optical systems. Production lamps are available with input powers up to 300,000 watts, using a patented internal cooling method. Radiant heating systems using these lamps are sold for production-line semiconductor processing, large-area sunlight simulation, industrial heat-treating, laser damage studies and advanced thermal testing. Lamp production includes material handling, precision machining, electrical and mechanical assembly and final testing. In-house R&D facilities are used for testing new product designs and for development of specialized lamp systems on a contract basis.

AVERAGE WORK FORCE: Scientists & Engineers - 5
Others - 15

GROSS SALES: No Data

PLANT SIZE: 10,000 Sq Ft

EQUIPMENT: The company has developed sophisticated fabrication techniques for liquid-cooled tungsten electrodes, and operates the only commercial tungsten electrode fabrication facility in Canada. Engineering of large, high-power optical systems is done using an in-house computer system. The company fabricates liquid-cooled optical assemblies, and maintains a large area rhodium metal plating facility for reflector production.

EXPERIENCE: The company is an OEM supplier of ultra-power arc lamps and optics to Eaton Corp in Boston, for use in semiconductor annealing equipment. USAF, NASA and DNA use Vortek lamps for laser development and radiation testing. Large area solar simulators are installed in Canada and Europe.

KEYWORDS: Electrodes; Heating; High Intensity Light Source; Lamps (High Power); Laser Simulation; Lighting (High Power); Optics; Semiconductor Processing; Solar Simulation.

REVISED: February 88

WARDROP ENGINEERING Inc

ADDRESS: 6725 Airport Road, Suite #600
Mississauga, Ontario, Canada
L4V 1V2

CONTACT: Mr Ernie Card, Vice President - (416) 673-3788

HISTORY: Wardrop Engineering Inc is a Canadian multi-disciplinary engineering company. Founded in 1955, it has grown to be a major engineering company providing diversified engineering services across Canada and internationally.

CAPABILITY: Wardrop Engineering provides a multi-disciplinary engineering service to aerospace and other high technology industries. Throughout our 30-year history, we have worked hard to maintain our position on the leading edge of technology, striving for excellence in our service, our products, and our people. Wardrop offers a complete range of engineering services from our four offices across

Canada, as well as international project offices, to a wide variety of clients. These services include feasibility studies, conceptual designs, prototyping, development, detailed design, fabrication, commissioning, and operating assistance. In addition, Wardrop designs, prototypes and develops specialized components, systems and mechanisms for the aerospace and related industries. We also provide systems integration, numerical analyses (stress, thermal and seismic), reliability analyses, as well as failure and maintainability analyses. In addition, we have expertise in electronics, instrumentation and control systems, as well as software engineering. Areas of specialization within the aerospace industry include ground support equipment, integration and test facilities, equipment and facilities for microgravity research, environmental test facilities, robotics, and automated remote handling.

AVERAGE WORK FORCE: Professional Engineers - 72
Technicians & Technologists - 76
Others - 22

PLANT SIZE: 30,000 Sq Ft

EQUIPMENT: Wardrop Engineering employs VAX and IBM in-house computer systems for engineering, analysis, engineering computations, as well as computer aided design and drafting.

EXPERIENCE: Wardrop Engineering has over 30 years experience providing engineering services to high-technology industries within Canada and internationally. Representative projects undertaken by our staff in the aerospace field include:

- Conceptual design of mechanical ground support equipment and integration and test facilities for the mobile servicing system - Canada's contribution to NASA's Space Station.
- Detailed design of mechanical ground support equipment for ANIK-E Communications Satellite.
- Design for furnace and other facilities for materials processing and manufacturing in micro-gravity.
- Design, development and supply of ground support equipment and integration and test facilities for the Space Shuttle Remote Manipulator System (CANADARM).
- Preliminary design of STARLAB - the Australian/Canada/US Space Telescope.

Design, analysis, prototyping, development and supply of various mechanisms, rigs, fixtures and components for the aerospace industry.

KEYWORDS: Engineering Services; Feasibility Studies; Project Management; Computer Analysis; Software Engineering; Systems Engineering; Systems Integration; Reliability Analysis; Failure & Maintainability Analysis; Ground Support Equipment; Integration and Test Facilities; Microgravity Equipment; Environmental Testing; Robotics; Remote Handling; Prototyping; O&M Planning; Automation.

REVISED: January 88

WESTERN AEROSPACE TECHNOLOGY Ltd

ADDRESS: 170 - 393 Palmer Road N E
Calgary, Alberta, Canada
T2E 7G4

CONTACT: Mr E L Bunnell, President - (403) 291-3323

HISTORY: Western Aerospace Technology Ltd is a privately-owned aerospace company incorporated 6 January 87 with facility locations in Edmonton and Calgary, Alberta. The company specializes in repair, overhaul and maintenance of transport and military aircraft.

CAPABILITY: Western Aerospace Technology Ltd is primarily involved in heavy maintenance, repair and modification of 727, 737, 707, C130, Electra and DC-8 aircraft. The military oriented activity

is primarily related to CF and F5 airframe component overhaul. We also offer consulting services in respect to airline facilities, operation and equipment. The company hold Ministry of Transport and Department of National Defence inspection approvals.

AVERAGE WORK FORCE: Total - 100 (Approx)

GROSS SALES: 1988 - \$1.8M

PLANT SIZE: 101,060 Sq Ft (Edmonton)
90,092 Sq Ft (Calgary)

EQUIPMENT: Western Aerospace Technology's equipment include standard shop equipment and tools to support 737 checks.

EXPERIENCE: Western Aerospace Technology's customers include various Canadian airlines with a strong desire to do business of a similar nature in the US. The company is developing a F5 capability which we believe will interest worldwide foreign countries.

KEYWORDS: R&O (Aircraft); Aircraft Maintenance.

REVISED: January 88

WESTERN PROPELLER COMPANY Ltd

ADDRESS: #200 - 2451 Clearbrook Road
Clearbrook, British Columbia, Canada
V2T 2Y1

Shop Locations:

#124 - 7080 River Road
Richmond, British Columbia, Canada
V6X 1X5

Box 6333, Station C
7940 Yellowhead Trail
Edmonton, Alberta, Canada
T5B 4K7

1930 Sargent Avenue
Winnipeg, Manitoba, Canada
R3H 0C9

2283 Anson Drive
Mississauga, Ontario, Canada
L5S 1G6

CONTACT: Mr K Gary Sloane, Director - (604) 853-8704

HISTORY: Western Propeller Company Ltd and associated locations are wholly owned Canadian corporations dating back to 1948. Economics and qualified staff allowed for expansion to Winnipeg in 1957, Mississauga (Toronto) in 1969 and to Richmond (Vancouver) in 1980.

CAPABILITY: Within the corporations, Western Propeller provide sales, overhaul and repair to all Hartzell propellers and governors, all McCauley propellers and governors, all Woodward governors, all Dowty RotoI propellers, Hamilton Standard propellers and governors up to Douglas DC-6, including deHavilland Dash-7 and Dash-8 aircraft.

AVERAGE WORK FORCE: Licensed Engineers - 8
Administration - 7
Others - 40

GROSS SALES: 1986 - \$5.5M
1987 - \$6.2M

PLANT SIZE: 40,000 Sq Ft (4 locations)
1,000 Sq Ft (Admin Office)

EQUIPMENT: All, but not limited to, manufacturers required working tools, test equipment and manuals. Further in-house upgrading to state-of-the-art digital equipment as available. Latest NDT procedures, equipment and training.

EXPERIENCE: Western Propeller Company Ltd's long term customers include:

- Canadian Government (Department of Supply & Services), Royal Canadian Mounted Police, and Ministry of Transport - contractual sales, overhaul & repair.
- Time Airways (Airline) - open market customer.
- Air Canada (Airline) - contractual NDT work.
- Provincial Government Air Services across Canada - open market customer.
- Field Aviation (FBO) - open market customer.
- Air Ontario (Airline) - open market customer.

KEYWORDS: R&O (Propellers); Governors (Propeller); Controllers (Propeller); Non-Destructive Testing.

REVISED: January 88

WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT

ADDRESS: Pinawa, Manitoba, Canada
R0E 1L0

CONTACT: Mr Raymond O Sochaski, Mgr, Commercial Ops Office
- (204) 753-2311

HISTORY: The Whiteshell Nuclear Research Establishment (WNRE) came into being in 1963 for the purpose of developing the organic cooled nuclear power reactor concept. WNRE is part of the Atomic Energy of Canada Research Company (AEC-RC), which in turn is a part of Atomic Energy of Canada Ltd (AECL). The latter is a crown corporation of the Government of Canada.

Canada's nuclear program had its beginning during the Second World War when a team of Allied scientists was assembled in Montreal for work related to the development of atomic weapons. With the end of the war, the Canadian effort was redirected, and since then all work on atomic energy has been concerned with peaceful uses.

The program was initially administered by the National Research Council of Canada, but by 1952 it had expanded so much it was placed under a new, specialized organization (AECL). In the fall of 1979, a commercial Operations Office was established at WNRE for the purpose of marketing site services, products and transferring technology.

AECL pursues a wide range of activities, from basic science to wholly commercial operations, with the main effort being devoted to the development, testing, commercialization and marketing of CANDU reactors, heavy water, isotopes, irradiation equipment and nuclear fuel.

AECL is a Crown Corporation with a total staff of approximately 6500 people. The Corporate Office is located in Ottawa, Ontario.

CAPABILITY: WNRE is an Research & Development site. It performs fundamental and applied research, develops processes, products and components, and has a large staff of experienced people in most disciplines and trades. Their greatest asset is the ability to innovate, develop, test, commercialize and market a concept.

AVERAGE WORK FORCE: Professional - 300
Technical - 330
Clerical - 175
Prevailing Rate - 200

GROSS SALES:	1985/86	1986/87
Annual Budget	\$78M	\$82M
Gov't Appropriation	\$69M	\$69M
Commercial Revenues	\$ 9M	\$13M

PLANT SIZE: Approximately 10 major buildings which house R&D facilities; engineering offices; machine, construction and maintenance work shops; administrative offices; protective services; fire department; and stores and warehousing. Very rough area of all facilities is 150,000 m².

WNRE has a variety of facilities and expertise available for undertaking commercial work, e.g.:

- Other irradiation devices – a gamma-irradiator, Van de Graaf and fast neutron generator.
- "Hot Cell" facilities capable of handling up to 106 Curies of radioactive material.
- Various test "loops" for materials, component and corrosion testing.
- Comprehensive metallurgical and mechanical testing facilities with expertise in testing ferrous and non-ferrous metals, ceramics, glasses, rocks and composites.
- Expertise in electron microscopy, acoustic emission, fracture mechanics, etc., that can be applied to solving problems involving deformation, hydrogen embrittlement, stress corrosion cracking, creep cracking and fracture.
- Extensive analytical chemistry facilities including micro-analytical, radiochemical, neutron activation, mass spectrometry, atomic absorption spectroscopy, plus a strong capability for the characterization of surfaces by such means as scanning electron microscopy, scanning auger microscopy, secondary ion mass spectrometry and photoelectron spectroscopy.
- A research chemistry group adept in the measurement of the thermo-dynamic properties of solutions at high temperature and pressure, in the application of electrochemical techniques to the study of corrosion and film formation, in the study of gas phase reactions, and in several areas of colloid and surface chemistry.
- Combustion test facilities to study the detailed deflagration and detonation behavior of mixtures of combustible gases from the fundamental chemistry of combustion to engineering scale verification or demonstration experiments.
- Environmental research laboratories and field test facilities with experienced staff to study the impact of chemical and radioactive effluents of the environment.
- Biophysical research laboratories with expertise in virology, cell biology, radiobiology, biochemistry and biophysics.
- A geotechnical research capability which includes an underground research laboratory for excavation damage experiments for different excavation techniques, development of in-situ stress measurement techniques, evaluation of rock thermal/mechanical properties, hydraulic conductivity and rock porosity measurements and various geochemistry experiments.
- Expertise in modelling fluid heat transport systems and high pressure steam/water behavior.
- Consulting service groups encompassing nuclear engineering, risk analysis, development of computer models, mathematical analyses and meteorological assessments.

EXPERIENCE: AECL has been in existence for approximately 36 years. During this time, it has developed the CANDU-pressurized heavy water reactor system. It has helped to commercialize the radioisotope industry in the medical, pharmaceutical and industrial fields; developed and commercialized the Canadian heavy water industry. Canada is currently the world's largest producer of this commodity. In addition, AECL has been instrumental in developing the Canadian nuclear fuel industry and has played a large part in developing the US nuclear fuel designs, for both military and civilian reactors. It has also played a major role in developing and commercializing zirconium alloys.

More recently, AECL has been charged with the responsibility of managing the Canadian Waste Management program. It includes conceptual planning, fundamental research, development, testing, piloting, verification, acceptance, optimization, and providing specifications for the commercial system. Spent fuel storage (wet and dry), transportation, fission products removal and waste disposal are subsets of the total program. All of this work is being coordinated from WNRE. AECL's major assets are experienced staff and state-of-the-art facilities and equipment. Its reputation as a respected leader in the nuclear and non-nuclear industries is acknowledged both domestically and internationally.

KEYWORDS: ASME Codes; Biological Environment; Chemical Analysis; Chemical Processing; Chemistry; Colloid Chemistry; Combustion Research; Computer Code Development; Corrosion Science; Derived Release Limits; Detonation; Disposal (Nuclear Waste); Electrochemistry; Electronics Nuclear; Environment; Explosions; Fluid Dynamics; Fracture Mechanics; Health Physics; Hydraulics; Instruments (Nuclear); Irradiations; Isotopes; Materials Characterization; Materials Testing & Development; Mechanical Testing; Medical Biophysics; Metallography; Metallurgy; Neutron Activation; Non-Destructive Testing; Nuclear Engineering; Nuclear Waste Management; Physics; Quality Assurance; Radiation; Radiation Shielding; Radioactive Wastes; Rail Transport; Reactors; Risk Analysis; Separation Processes; Surface Chemistry; Tailings; Thermal Analysis; Toxic Chemicals; Trace Analysis; Vitrification; Waste Management.

REVISED: January 88

W. R. DAVIS ENGINEERING Ltd

ADDRESS: 1260 Old Innes Road
Ottawa, Ontario, Canada
K1B 3V3

CONTACT: Mr J D Younger, Vice President, Development – (613) 748-5500

HISTORY: W R Davis Engineering Ltd was founded in 1975 as Davis & Associates. In 1980, the corporate name was changed to W R Davis Engineering Ltd. In 1984, an affiliate, DEMAC Software Ltd, was created to provide software support. Today the company continues to grow in all areas of electro-mechanical engineering and production with significant expansion into international markets.

CAPABILITY: W R Davis Engineering Ltd was initially formed as a consulting engineering company to provide mechanical and electrical consulting engineering. This continues and the mechanical field can be further subdivided into: stress, shock, vibration, heat transfer and fluid analysis, and vehicle and human engineering and mechanical component/systems design. The electrical field has branched into: electronic system design, and control system design and analysis. Software development has been added to supplement other activities. A military engineering group which addresses land, air and naval applications, using the core mechanical and electrical groups has emerged. The military group has been enhanced with illustrators and technical writers to enable the production of technical documentation.

Hardware production and modification capabilities have emerged as a result of engineering projects. Specifically, the company can provide structural fabrication in steel, stainless steel and aluminum, vehicle modification and kitting, hydraulic systems fabrication and mechanical component/system fabrication. Electronic fabrication is available in a fully equipped laboratory.

Specific products are infrared signature suppression devices, wave generation systems for all sizes of test basins, active shaft grounding systems for naval vessels, a variety of vehicle test devices, low quantity production electronic systems, outfitted military special equipment vehicles, and vehicle data acquisition systems. Much work involves one-of prototypes. Examples include vehicle test systems, light emitting diode lighting systems, a road roughness and rolling resistance test rig, a 7m long submarine model for wind tunnel testing and 10m high interactive displays for Expo '86.

Much of the design and build work performed by W R Davis Ltd culminates with a test program. The company also analyzes, modifies and tests hardware provided by others. A comprehensive project involving protective masks is an example.

AVERAGE WORK FORCE: PhDs - 3
Engineers - 25
Others - 57

GROSS SALES: 1986/87 - \$6.0M
1987/88 - \$9.0M

PLANT SIZE: Manufacturing - 23,000 Sq Ft
Warehouse - 5,000 Sq Ft
Office - 15,000 Sq Ft

EQUIPMENT: W R Davis' equipment includes:

- Test - Basic test equipment plus programmable data logger, mobile vehicle data acquisition systems (plus sensors). Use of external test facilities at Transport Canada Motor Vehicle Test Center, National Research Council, and Canadian Department of National Defense Naval Engineering, Land Engineering, and Quality Engineering Test Establishments.
- Electronic Laboratory - Electronics laboratory equipped for prototype and low quantity production and testing.
- Mechanical Shop - Equipped with the basics which include a full complement of welding equipment.
- Computing Facility - PDP-11/23, VAX 730 and Micro VAX plus a full complement of PCs (8) and peripherals (plotters, laser printers). External access to PDP 11/73, Honeywell CP6, IBM mainframe and CYBERS. In-house software includes Primavera, PrimaVision, ANSYS, Symphony, Micro Soft Fortran Compiler, Tango, Smart Work, DBase III, and the Harvard Project Manager.

EXPERIENCE: W R Davis' customers include the Canadian Department of National Defense, Transport Canada, the National Research Council of Canada, St John Shipbuilding Ltd (Canadian Patrol Frigate Program), Pratt and Whitney Canada (DDH-280 Destroyer Update Program), David Taylor Research Center (US re Active Shaft Grounding), International Ship Study Company (West Germany re NFR 90), Icelandic Harbor Authority (Iceland re Wave Analysis Equipment), KIA Motor Corporation (Korea re Automobile Test Services and Equipment), and Hyundai Motors (Korea re Automobile Test Services and Equipment).

KEYWORDS: Engineering Services; Product Development; Prototyping; Infrared Signature Suppression; Testing/Test Equipment; Military Vehicle Engineering; Shock/Vibration Analysis; Thermodynamics Analysis; Manufacturing; Welding; Electronic Fabrication; LED Technology; Mechanical Fabrication; Finite Element Analysis; Software Development; Component Militarization; Feasibility Studies; Turnkey Systems; Project Management; Technology Assessment; Human Engineering.

REVISED: February 88

ZARGES AFC CANADA Ltd

ADDRESS: 3839 Burnside Road, S E
Calgary, Alberta, Canada
T2G 3Z4

CONTACT: Mr Brent Rawlinson, President - (403) 287-1311

HISTORY: Zarges AFC Canada Ltd is a Calgary-based, Canadian-owned company incorporated in 1980.

CAPABILITY: Zarges specializes in the manufacture and distribution of custom cases, containers and transport systems for military and civilian applications. All manufacturing is to NATO standards.

AVERAGE WORK FORCE: Total - 20

GROSS SALES: No Data

PLANT SIZE: 7,000 Sq Ft

EXPERIENCE: Zarges products are currently in use with the Armed Forces of West Germany, Austria, Sweden, Italy, Canada, England, and the Netherlands. Cases are fabricated for electronics, medical equipment avionics, test and calibration equipment, optical, weapons, etc. Interiors can include special foam liners, aluminum dividers, tray, rack mounts and shock mount systems.

KEYWORDS: Armament (Cases); Cases (Custom); Custom Packaging; Packaging (Custom); Test Equipment (Cases); Medical Equipment (Cases); Instrumentation (Cases).

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