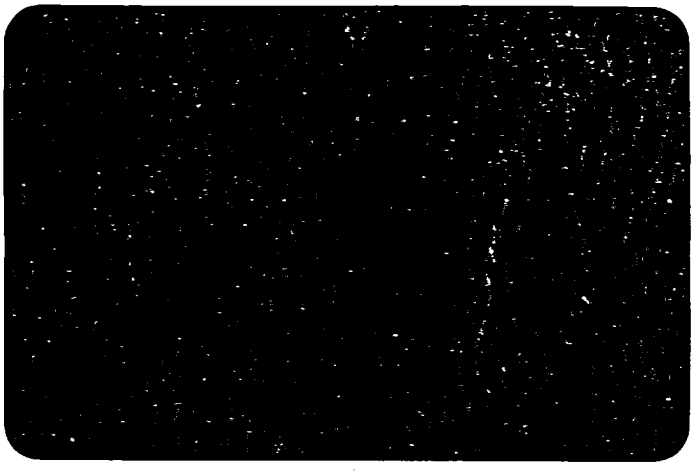
Canada

External Affairs and
International Trade Canada

Affaires extérieures et
Commerce extérieur Canada



Prepared by the International Trade Development Branch

Publication préparée par le Secteur de l'expansion du commerce extérieur

External Affairs and International Trade Canada

Affaires extérieures et Commerce extérieur Canada

CANADIAN

SPACE-RELATED PRODUCTS

AND SERVICES

FOR WORLD MARKETS

Aerospace and Defence Programs Division (TAG)
International Marketing Bureau
External Affairs and International Trade Canada
125 Sussex Drive
Ottawa, Ontario
K1A OG2

May 1992

AASTRA AEROSPACE INC.

1685 Flint Road
Downsview, Ontario
M3J 2W8

Contact: H. Scholaert, Director, Business Development
Tel: (416) 736-7070
Fax: (416) 736-7178

Keywords: Systems Engineering, Advanced Structures, Smart Structures, Advanced Materials, Advanced Ceramics, Coatings.

Product/Service: Systems Engineering Services, with specific expertise in the fields of advanced structures and materials.

Recent Successes:

Mechanical Stability Study of Large Space-Based Radar Phased Arrays, for the Canadian Department of National Defence.

Design, Implementation and Testing of a Space-Based Radar Simulation Laboratory for the Canadian Department of National Defence.

Development and Demonstration of Smart Structures Actuator/Sensor Subsystems for the Canadian Space Agency (CSA).

Design and Development of a Microgravity Protein Crystallization Facility for the CSA Space Station User Development Program.

Development of Sol-Gel Ceramic Coatings for the Protection of Space-Based Structures for the CSA.

ADGA SYSTEMS INTERNATIONAL LIMITED

116 Albert Street
Suite 601
Ottawa, Ontario
K1P 5G3

Contact: J.K. Burke, P.Eng., Senior Vice President
Tel: (613) 237-3022
Fax: (613) 237-3024

Service: ADGA has supported the space industry both nationally and internationally since 1977. This support has ranged from the conduct of engineering studies into satellite communications technology to the provision of technical assistance for the operation and maintenance of satellite ground facilities. Canadian clients include the Department of National Defence, Canadian Space Agency, the Canada Centre for Space Science, the Canadian Department of Communications, the Communications Research Centre, and the consulting firm of Ernst and Young. International clients include Intelsat and INMARSAT.

Keywords: Satellite Communications Engineering; Computer Systems and Software Services; Operations and Maintenance; Aerospace Engineering; Project Management; Independent Verification and Validation.

Recent Successes:

- Provision of engineering support services to the RADARSAT Program, and preparation of the RADARSAT Performance Evaluation Model, Canadian Space Agency;
- Provision of engineering support for the preparation of the Mobile Servicing System Training Program, Canadian Space Agency;
- Operation and Maintenance of the Prince Albert Satellite Tracking Station, Canada Centre for Remote Sensing;
- Study of potential frequency allocations for mobile satellite services and feeder links, INMARSAT.

Of Special Note: Strategic alliance formed with SD-Scicon, U.K. to pursue further INMARSAT studies and to support them in Canadian ventures.

AECL RESEARCH

Chalk River Laboratories
Chalk River, Ontario
K0J 1J0

Contact: D.V. Parsons, Manager, Physical Sciences Commercial Office
Tel: (613) 584-3311
Fax: (613) 584-2227

Service #1: Neutron Diffraction: Residual Stress and Texture Measurements - Neutron diffraction is a well-established technique for measuring internal residual strains and texture in engineering components. Its unique strength is that residual stress gradients through components can be obtained easily, non-destructively, and with no sample preparation. The method consists of the deep penetration of thermal neutrons into a material, and the accurate measurement of diffraction angles.

Keywords: neutron diffraction; residual stress; texture.

Recent Successes: In the past six years, AECL Research has provided a neutron diffraction R & D contract service for clients in Canada, the U.S.A. and Europe including NASA, Sandia and Lawrence Livermore National Laboratories, Thiokol, Pratt & Whitney, British Petroleum Research Institute.

Service #2: Electron-beam processing of advanced composites - AECL Research's 1-10/1 accelerator is used to develop and process a wide range of advanced materials and composites for industrial applications. Electron-beam processing is used for curing, cross-linking and grafting polymer materials, and may be used to improve the properties of composites such as radiation-curable carbon-epoxy prepegs and wood-plastic composites.

Keywords: composites; electron-beam curing/processing; radiation curing/processing.

AIT ADVANCED INFORMATION TECHNOLOGY CORPORATION

9 Auriga Drive
Nepean, Ontario
K2E 7T9

Contact in Canada: Don Smith, President
Tel: (613) 226-7800
Fax: (613) 226-3066

Contacts Overseas:
U.S.A. - Stuart Card, Director, Business Development
Tel: (703) 817-0906
Fax: (703) 817-0909

U.K. - (AIT International) Robert Deacon, Director, Business Development
Tel: 011-44-256822799
Fax: 011-44-256811854

Keywords: Project Management; Systems Engineering; Ground Support Equipment; Satellites; Space Instruments; Software.

Products and Services: AIT supplies high technology products, research and development, project management and systems engineering services within the aerospace, defence and government industrial sectors on a world-wide basis.

Within the space industry sector, AIT has significant experience in the following disciplines: project management; systems engineering; ground systems mission software for remote control and diagnostics of space instruments (satellite payloads); integration, testing and environmental qualification of space platform payloads; on-orbit activation and testing of space platform payloads.

Recent Successes: AIT was prime contractor for the Wind Imaging Interferometer (WINDII), which was launched September 12, 1991 on-board the Upper Atmosphere Research Satellite (UARS). The WINDII is successfully providing high altitude wind and temperature data.

AIT is providing on-going support for the ground and flight software elements which control operation of the WINDII instrument.

AIT was recently awarded a multi-year contract by the Canadian Space Agency to establish and operate a Contractor Management Office for management of the Canadian Mobile Servicing System being developed for NASA's Space Station Freedom.

AIT is interested in establishing strategic alliances to apply its skills and experience in international space projects.

ALLIED-SIGNAL AEROSPACE CANADA
GARRETT CANADA

255 Attwell Drive
Rexdale, Ontario
M9W 6L7

Contact in Canada: Bob Polk, VP, Sales & Marketing
Tel: (416) 798-6684 **Fax:** (416) 798-1394
Overseas Offices: Allied-Signal Service Corporation, Unit 3A, Harlequin Centre, Southall Lane, Southall, Middlesex, UB2 5NH England
Tel: 8954347 **Fax:** 44-(81) 571-2234

Keywords: Garrett Canada is a premier manufacturer of electro-thermal management systems continually improving processes to satisfy customers.

Product/Service: Electro-thermal management systems are considered the common core business of Garrett Canada - environmental control systems, window heat control systems, electronic bleed air control systems, integrated closed-loop environmental control systems; aircraft cabin, cockpit and bay temperature control systems; electronic air flow sensing systems; the company offers repair and overhaul capabilities on its own equipment, as well as support of Allied-Signal aerospace sector products; emergency locator beacons.

Garrett Canada's advanced systems capabilities have been recognized and proven in the NATO arena through the company's participation in a number of Canadian government and multi-national collaborative programs in the areas of flight control actuation, power supplies, mission electronics and specialized test systems.

The company has specialized skills in COMSEC, TEMPEST, EMP design and test and digital signal processing. The company offers these services on a sub-contract basis.

Space Related Activities: Garrett Canada is employing its aerospace technologies and capabilities to the space environment. Working in collaboration with other Allied-Signal Aerospace Company divisions, Garrett Canada is participating in the design, development and manufacturer of electronic controls and specialized smart sensors (temperature, flow, speed and quantity) for environmental and life support systems, launch vehicle thrust vector control and stability augmentation systems, and solar power systems.

Of Special Note: To augment its major product line of electronic environmental control and bleed air management systems, new developments are planned. One of these provides a unique ice protection system which will help eliminate present environmentally hazardous de-icing procedures. Others include: improved windshield heat controls suited for wider range of aircraft applications; and smart actuators and sensors.

ANDREW CANADA INC.

606 Beech Street West
Whitby, Ontario
L1N 5S2

Contact: Dr. George Tong, Marketing Manager
Tel: (416) 668-3348
Fax: (416) 430-3964

Product/Service: Andrew Canada has grown and expanded with the dynamic Canadian communications industry, designing and manufacturing terrestrial microwave and earth station antenna systems and supplying transmission lines (coaxial cable and waveguide) and related equipment, including towers and equipment shelters. Andrew Canada also has an established reputation as a designer and manufacturer of air traffic surveillance, weather radar and navigation aid antennas, tactical antenna systems and special application antennas such as tracking and intercept, built to meet exacting government and military specifications. Andrew Canada has the worldwide mandate for marketing a complete line of transportable and fixed station HF antennas, as well as its ability to design and fabricate aluminum and steel structures and associated electronic devices for military, government and communications needs.

Andrews Field Service Department offers a comprehensive customer service package, including program management, delivery, site civil works, tower erection and antenna assembly and installation, system testing and guarantees.

Andrew Canada has the capability to provide complete program management and turnkey installations from systems concept, through engineering and manufacturing, to installation and commissioning.

Keywords: Navaid, radar, weather radar, communication, antennas, transmission lines, cables, surveillance, navigation, tactical, military, HF antennas.

Recent Successes: Total Sales $48,000,000 Cdn (1990); Export Sales $7,000,000.
24 L-band radar antennas for the Canadian Radar Modernization Project (RAMP); AEGIS MK99 Fire Director Radar Pedestal contract, North Warning System communications network contract; Microwave Landing System (MLS) study contract; Next Generation Weather Radar (NEXRAD) antennas; NAVELEX; Wind Profiler antenna systems.

ARCTIC SCIENCES LIMITED

1986 Mills Road
R.R. #2
Sidney, British Columbia
V8L 3S1

Contact: John Marko, Director, Remote Sensing
Tel: (604) 656-0177
Fax: (604) 656-2162

201 Brownlow Avenue
Suite 59
Dartmouth, Nova Scotia
B3B 1W2

Contact: Robert McKenna, Remote Sensing Specialist
Tel: (902) 468-8871
Fax: (902) 468-5341

Product/Services: Use of remote sensing data (satellite or airborne) to provide useful information for applications involving oceanographic and sea-ice research, and environmental monitoring and assessment for offshore, coastal zone and inland waters.

Keywords: Remote sensing, image analysis, sea-ice tracking.

Recent Successes: Development of automated system for mapping sea-ice velocities from sequential sets of satellite imagery.

Of Special Note: Interested in strategic alliances for providing service or products for major offshore projects in Europe or Asia. Also interested in working with companies or agencies in developing countries.

ARRAY SYSTEMS COMPUTING INC.

401 Magnetic Drive
Unit 24
Downsview, Ontario
M3J 3H9

Contact: Elisa Fraquelli, Product Manager, Export
Tel: (416) 736-0900
Fax: (416) 736-4715

Product/Service: Array Systems Computing specializes in software development and systems integration for signal and image processing applications. Since the company's inception in 1981, Array staff have worked on systems ranging from microcomputers to supercomputers and are familiar with various operating environments and programming languages. Array has supplied computerized systems for military and commercial applications, and based on a variety on sensors including satellite, radar and x-ray.

For the Canadian Department of National Defence, Array Systems recently developed the software for an airborne Synthetic Aperture Radar (SAR) signal processor used in maritime surveillance. SAR can also be used for topographic mapping and remote sensing. Array has also provided the Canadian Space Agency a conceptual design of the SAR processor for the RADARSAT Satellite. For the Atmospheric Environment Service and the Canada Centre for Remote Sensing, Array has supplied several components and complete systems for the acquisition, processing and analysis of meteorological data from the NOAA/TIROS satellites.

Keywords: Synthetic Aperture Radar, Meteorological Satellites, Remote Sensing.

A-R TECHNOLOGIES INC.

220-13155 Delf Place
Richmond, British Columbia
V6V 2A2

Contact: Chris Trsek, Director - Marketing
Tel: (604) 273-1717
Fax: (604) 273-1263

A-R Technologies Inc. is a Transport Canada Authorized Maintenance Organization (AMO), specializing in high tech repair and overhaul of turbine components. Founded in 1982 by company President Augustin Trsek, A-R Technologies Inc. was able to convince aircraft operators that there were big savings to be made in having worn out components repaired to exacting aviation standards without compromising safety. Today the company employs some 30 expert staff and boasts technology not found anywhere else in North America. A-R Technologies Inc. is located 15 minutes from Vancouver International Airport. Its facility totals some 20,000 square feet of modern surroundings.

Services: Under the AMO designation, A-R Technologies Inc. repairs and overhauls aircraft/aerospace components utilizing the following in-house services: High Temperature vacuum furnace brazing; Vacuum Brightening of superalloys; Dayton Cleaning Process for superalloys (fluoride-ion cleaning); Heat Treatment; High Velocity plasma/thermo spray; Non-Destructive Testing; Airflow calibration services; Manual and semi-automatic GTAW welding; Precision and CNC machining; Repair development; Engineering and metallurgical services; Stripping of diffused coatings.

Products: A-R Technologies Inc. has gained a reputation for providing its expert capabilities in repair and overhaul to an extensive list of aircraft owners, engine distributors and engine manufacturers. It supports both single aircraft operators as well as whole fleets of aircraft. A-R Technologies Inc. has its motto of quality performance and reliability well established within the industry. With the anticipated growth of the aerospace industry in the Pacific Rim, A-R Technologies Inc. is poised for significant growth to even better serve the aerospace community.

Recent Successes: A-R Technologies Inc. has recently been selected and approved as a sub-contractor to Spar Aerospace Ltd. for the Canadian Space Station Program.

ATLANTIC CENTRE FOR REMOTE SENSING OF THE OCEANS

6155 North Street
Suite 301
Halifax, Nova Scotia
B3K 5R3

Contact: Dr. Andrew Thomas, Executive Director
Tel: (902) 455-0099
Fax: (902) 455-4271

Product/Service: Satellite and airborne digital image processing for oceanographic and marine science. Satellite oceanographic consulting, data analysis, application of satellite data to marine environmental research, monitoring, mapping.

Keywords: satellite data, digital image processing, oceanography, marine science.

Recent Successes:

- contracts to supply single images of specific targets.
- contracts for time series of images of regions measured by satellite thermal and ocean colour sensors.
- market identification and quantification for oceanographic satellite data.

ATLANTIC RESEARCH CANADA INC.

1900 City Park Drive
Suite 400
Gloucester, Ontario
K1J 1A3

Contact: Tony Canning, Vice President, Business Development
Tel: (613) 727-5040
Fax: (613) 727-1262

Products/Services: Supplier of professional services related to: Integrated Logistics Support, Systems and Specialty Engineering, Training, Configuration Management, Information Security, Technical Publications and Manuals, Project and Proposal Management, Automated Data Systems, Test Engineering and Support, Electromagnetic Environmental Effects.

Keywords: Logistics, Systems, Engineering, Software, Test, Management, Training, Publications.

Recent Successes: Design, development, integration and test of a complex Stores Management System Test Set for the CF-18 Fighter Aircraft.

Major subcontractor for the Canadian EH-101 Helicopter program.

Major subcontractor for Canadian IRIS Radio System program.

AVIATECH/FLEXIBULB

9000 Parent Blvd.
Trois Rivières, Québec
G9A 5J3

Contact in Canada: Francois Tellier, Director, Customer Service
Tel: (819) 374-9250 or (514) 335-0166
Fax: (819) 374-5143 or (514) 332-2251

Overseas Offices: Jacques Landry, Oyonnax, France
Tel: 74-73-24-24
Fax: 74-73-80-90

Product/Service: Aircraft pilot seats, cabin interiors, galleys.

Keywords: Aircraft interiors and cabin equipment.

Recent Successes: Participation in CL-415 program at Canadair.

Of Special Note: Certified supplier/vendor to major international airlines.

B & I MANUFACTURING LIMITED

69 Glacier Street
Coquitlam, British Columbia
V3K 5Z1

Contact: Robin Crabb, Marketing Director
Tel: (604) 464-5622
Fax: (604) 464-6645

The company operates out of a 20,000 sq. ft. manufacturing facility in British Columbia.

Using the latest technology in CAD/CAM programming and CNC equipment, B&I Manufacturing Ltd. produces structural components for prime space and aerospace companies in the U.S. and Canada.

B&I designs and manufactures jigs and fixtures from its own toolroom department, which also services the airline industry with tooling and ground support equipment.

Our CNC equipment is linked to the CAD/CAM system for receiving customer electronic data and programming. All programs are down-loaded to CNC machines via DNC.

We have doubled our facilities over the past two years and are proud to have a cost-conscious quality driven company that delivers on schedule.

Transportation:
General: B&I is involved in many facets of the transportation industry. Our company is quality approved by original manufacturers such as Boeing, LTV, Spar and Kenworth; and with such end users as Canadian Airlines and BC Transit.

Airplane Industry: Structural components in stainless steel, alloy steel and aluminum are produced for the 747, 767, 757 and 737 family of airplanes. B&I has contracts on all programs being produced by our toolroom for Rolls Royce RB211 and General Electric CF80 engines; also ground support equipment for Boeing and Airbus airplanes.

Space Program: The Canadian Space Program is supported with hardware and tooling for the Mobile Servicing System program. These components are supplied by B&I to Spar Aerospace as part of NASA's Space Station Freedom Program.

Trucking: Truck parts are produced by B&I for Kenworth's production facilities in Seattle and Chillicote trolley and coach parts for GM and Flyer vehicles operated by the British Columbia transit system.

Marine: The marine industry has been supported through the manufacture of robotic, telemetry and thruster assemblies for remote and manned submarines.

BERCHA GROUP

1220 Kensington Road N.W.
Suite 250
Calgary, Alberta
T2N 3P5

Contact: Dr. F.G. Bercha, President
Tel: (403) 270-2221
Fax: (403) 270-2014

Remote sensing, airborne data acquisition, data processing, interpretation, mapping.

The Bercha Group is a leading Canadian consulting firm specializing in remote sensing, industrial engineering, risk analysis and research and development services in the environmental and resource fields.

The Bercha Group offers such services as mapping and interpretation, data acquisition and image processing for geological, forestry, exploration, and environmental services. The Group operates its own radar, laser, and visible imaging mapping systems, and has wide experience with high technology, multi-band radars and other advanced sensors on both satellite and aircraft platforms.

In operation since 1975, the Bercha Group's client base includes government operations at the municipal, state, and national level, environmental consulting firms, major petroleum and mining companies, and a number of leading research and development organizations.

BRISTOL AEROSPACE LIMITED

P.O. Box 874
Winnipeg, Manitoba
R3C 2S4

Contact: David T. O'Connor, Marketing Manager, Propulsion & Space Systems
Tel: (204) 788-2829
Fax: (204) 783-2042

Product/Service: Bristol Aerospace has three space product areas: The Black Brant Program, Orbital Express Program, and Space Payloads.

Black Brant suborbital rockets have been in use for over 25 years. Over 700 have been launched from locations around the globe, with a reliability of over 98 percent. They are currently the work-horse of the NASA Sounding Rocket Program. Other customers include the U.S. Department of Defense, the Swedish Space Corporation, EER Systems, Matra Marconi Space, Aerospatiale, MBB Erno and the Canadian Space Agency. Bristol Aerospace supplies the rocket motors, fins and staging systems for a complete family of rockets. Bristol also supplies an extensive complement of payload support systems, including parachute recovery systems, water recovery systems, ejecting nose cones, fairings, deploying booms, separation systems and telemetry modules. In addition, Bristol offers engineering services for mission analysis and range support.

Bristol Aerospace has designed, integrated, tested and launched over 200 rocket and shuttle payloads, with a combined weight of 180,000 pounds. Bristol has also conducted extensive studies and concept designs for small satellites, and was one of the first organizations to advocate the use of small satellites for space science research.

Keywords: Sounding Rocket, Launch Vehicle, Payload, GAS Payload, Payload Integration, Small Satellite, Satellite Bus, Rocket Motor, Propulsion System, Systems Engineering, Suborbital Rocket.

Recent Successes: In October, 1991, Bristol Aerospace was awarded a contract for the first phase of the development of the Orbital Express Rocket. Bristol is acting as systems integrator and principle contractor to International Microspace Inc. The Orbital Express Rocket is intended to deliver payloads of up to 400 pounds to a 700 kilometre, circular, polar orbit. International Microspace is offering a turn-key service, and is planning for the first launch in 1993. The other members of the industrial team are Thiokol Corporation and Saab Space, of Sweden.

CAL CORPORATION

1050 Morrison Drive
Ottawa, Ontario
K2H 8K7

Contact in Canada: Dr. Bert Blevis, Director, Government Relations
Tel: (613) 820-8280
Fax: (613) 820-8796

Overseas Offices: CAL Systems Limited, Graham Davison, General Manager, Portsmouth Enterprise Centre, Quartremaine Road, Portsmouth, Hampshire, POE 5QT, U.K.
Tel: (705) 662996
Fax: (705) 673518

CAL Pacific Pty. Limited, 103-105 Northbourne Avenue, Canberra ACT 2601, Australia
Tel: 62-572619
Fax: 62-473798

Product/Service: Design and manufacture of state-of-the-art scientific instruments for space, spacecraft power subsystems and components; spacecraft antennas; materials processing in microgravity; data management systems for space applications; systems studies; mechanical, structural and thermal design; and ground equipment for search and rescue satellite systems; and Mobile Satellite Communications.

Recent Successes:
Power Systems - Mobile Servicing System (MSS) for Space Station Freedom; Power and Data Subsystem and Components; RADARSAT Remote Sensing Satellite Program - Power Control Unit; Space-Based Radar Power Simulator.

Antenna Systems - RADARSAT Remote Sensing Satellite Program - Antenna Panels; Ultra-high frequency antenna for SKYNET.

Space Science - Wind Imaging Interferometer (WINDII) for UARS Program; Ultra-Violet Auroral Cameras for FREJA and INTERBALL Programs; Optical Float-Zone Furnace Program; Waves in Space Plasma (WISP).

Search and Rescue - Local User Terminals (LUT); Advanced Technology LUT (ATLUT); Mission Control Centres (MCC).

Mobile Satellite Communications - Mobile Earth Terminals (MET); Portable Briefcase Terminal (PBT); Aeronautical Data Terminal (ADT); Aeronautical Mobile Terminal (AMT).

Keywords: Space Power Systems; Antennas; Scientific Instruments; Payloads; Search and Rescue; Mobile Satellite Communications; Earth Terminals; Ultra-Violet Cameras; Data Management.

Special Note: Interested in pursuing opportunities for joint R&D and strategic alliances.

CALIAN COMMUNICATIONS SYSTEMS LIMITED

300 Legget Drive
Kanata, Ontario
K2K 1Y5

Contact: Brian Jeffery, Manager, Hardware Systems
Tel: (613) 592-3020
Fax: (613) 592-3378

Product/Services: CALIAN Communications Systems Ltd. (CCS) consists of two divisions: Communications Engineering and Technical Services.

The Communications Engineering division has extensive experience in systems analysis and definition studies, hardware and software design and development, and systems integration activities. CALIAN possesses specialized expertise in satellite ground communications systems including carrier monitoring and uplink control systems, spectrum monitoring and management systems, and fading channel simulation.

The Technical Services division specializes in the operation and maintenance of testing laboratories and satellite ground facilities, and in the provision of technical, administrative, engineering and project management support in the aerospace and space communications business sectors.

Keywords: Satellite, Monitoring, Support, Simulation.

Recent Successes: Customers include: Canadian Space Agency, the Canadian Department of National Defence, Telesat Canada, Spar Aerospace, Hughes Network Systems, GE American Communications, European Space Agency, Intelsat, INMARSAT, Electronica ENSA, S.A., and the Government of Mexico.

CANADIAN MARCONI COMPANY

2442 Trenton Avenue
Montreal, Québec
H3P 1Y9

COMPONENTS DIVISION - MAGNETICS

Contact in Canada: Gordon Cook, Group Manager, Power Conversion and Magnetics Products.
Tel: (514) 340-3133 **Fax:** (514) 340-3100

Overseas Office: Sales Representation Limited (U.K.)
Peter A.C. Edwards
Tel: (0252) 879398 **Fax:** (0252) 871388

CMC has built up a wealth of magnetics and RF-related experience, providing devices for use in applications such as space communications, electronic warfare, radar and telemetry. CMC's facility (design, manufacturing, test and quality standards) presently meets the rigorous requirements of MIL-STD-981 Class "S" (Magnetics for manned space applications).

Some product examples are: Transformer Inverter, RF Transformer, Magnetic Module Assembly, Mixer - Signal, Double, Balanced, Two-way Power Divider, Inductor Quad.

COMPONENTS DIVISION - HYBRID MICROCIRCUITS

Contact in Canada: Jean Tetreault, Group Manager, Hybrid Microcircuits
Tel: (514) 340-3000 X-4642 **Fax:** (514) 340-3100

Overseas Office: Sales Representation Limited (U.K.)
Peter A.C. Edwards
Tel: (0252) 879398 **Fax:** (0252) 871388

Keywords: CMC is certified and qualified to MIL-STD 1772. CMC designs and produces thick and thin-film, chip and wire, and surface mount hybrid microcircuits in a Class 10,000 clean room facility.

CMC has been successfully serving the military market since 1964.

Recent Successes: Supplier of hybrids to Spar Aerospace in Canada for application on the RADARSAT program.

CANMAG, CANADIAN ELECTROMAGNETICS LTD.

45 Sylvan Way
Winnipeg, Manitoba
R2R 2B9

Contact: Peter Klein, President
Tel: (204) 697-2951
Fax: (204) 697-4125

Product/Service: CanMag is a Winnipeg-based affiliate of K & S Tool and Die Ltd. It was formed to provide a Canadian supplier to meet the international demand for focusing elements in the particle accelerator industry. Since its inception, it has provided quadruple and sextuple magnets to institutions in Canada and Europe. The ability of the company to manufacture all the components of the finished product makes it unique in Canada.

The manufacture of all components of quadruple and sextuple electromagnets. Vacuum impregnation of magnet coils with epoxy resin. Fine blanking die techniques is used to manufacture steel laminations which are stacked together to form magnet sections. Computer-controlled field mapping for complete magnets. Checking and testing at each stage, many done in conjunction with a computer data acquisition system to ensure a long service life with the lowest chance of failure. Winding and vacuum impregnation servicing of replacement coils for existing equipment.

Recent Successes: The manufacture of all components of electromagnets for the TRIUMF accelerator at the University of British Columbia. The manufacture of all components of electromagnetics for the HERA accelerator in Germany. The manufacture of coils for the University of Manitoba and the University of Alberta.

Of Special Note: Joint ventures/enquiries/arrangements will be considered.

CELLPACK AEROSPACE LIMITED

P.O. Box 1150
71 Hall Street
Lunenburg, Nova Scotia
B0J 2C0

Contact in Canada: Maurice Guitton, General Manager
Tel: (902) 634-8448
Fax: (902) 634-3993

Overseas Offices:
Cellpack Limited
Advanced Composites Division
Zentralstrasse 17
CH-5610 Wohlen, Switzerland
Robert N. Suter, Division Manager
Tel: 011-41-57214111
Fax: 011-41-57214296

Cellpack Aerospace Limited is a Canadian company which was incorporated in November, 1987, for the development, production and sale of advanced composite components and subassemblies for military space and aerospace applications.

Space Related: MPSS/EBA on FLSP (Modular Payload Support Structure for first SL-Mission), SOAS 01 (Shuttle Pallet Satellite), USS (Unique Support Structure for SL/D1-Mission), ASTROSPAS, EURECA (European Retreivable Carrier), ADRM (Antenna Deployment and Retraction Mechanism), Araine Actuator Struts (2nd Stage Engine), ERS 1, OLYMPUS, DFS Kopernikus, COLUMBUS Polar Platform, IBSS, ISO Sunshield Struts, ISO SVM Struts, Cryostate Cones, Several satellite structures.

Products: launch tube, rocket motor cases, struts, composite radio antenna, structure for radiotelescope, space platform, space tube, composite parts, composite floor for airplane, carbon fiber rocket cap, any type of filament winding tubes, pressure vessels, tactical shelter (composite).

Services: We can work with any type of fiber: carbon fiber, glass fiber, quartz fiber, Kevlar, Boron, Spectra (roving, fabric, mat nickel coated fiber, copper coated fiber etc.). Matrix resin thermoset, epoxy, peek, PPS, Phenolics, Polyester, etc. Thermoplastics resin.

Technology Available: Filament winding (wet and prepreg and thermoplastic), Hand Lay-Up, Resin Transfer, Moulding Press (compression moulding), Continuous production of fiber reinforced profiles (pultrustion), Injection Thermoplastic, Laminates sandwich panels, Braiding, Injection resin and thermoplastic parts, Adhesives know-how, Arc-Spray coating, Machining any type of composites, Thermoplastics and metals, Autoclave, 8 ft x 23 ft, Tactical Shelter S-250/S-280.

COM DEV LIMITED

155 Sheldon Drive
Cambridge, Ontario
N1R 7H6

Contact in Canada: Peter Mabson, Director of Marketing
Tel: (519) 622-2300 **Fax:** (519) 622-1691

COM DEV EUROPE - England: Agit Negandhi, Marketing Manager
Tel: 44-296-61-4444 **Fax:** 44-296-61-4400

COM DEV is Canada's largest exporter of equipment for communications and remote sensing satellites and has supplied payload subsystems for 130 spacecraft on over 40 international programs. This represents over 65 percent of the Western world's requirement for multiplexing and switching equipment. COM DEV has built on this success and has developed products for the commercial and defence-related spaceborne, airborne, shipborne and ground based electronics markets.

Product/Service: COM DEV's product range includes the following subsystems: Integrated satellite multiplexers and switching subsystems; On-board IF and Baseband signal processors; Ka-band repeater subsystems; Electro-mechanical switches and switching matrices; Scientific and Millimeter-wave satellite instrument payloads; Specialized antennas and beamforming networks; On-board microwave calibration subsystems and precision noise sources; Millimeter-wave satellite payload subsystems; Ferrite switch matrices and phase shifters; SAW and digital pulse compression subsystems; Radar receivers, transmitters, chirp generators.

Keywords: Multiplexers, Switching subsystems, Signal Processors, Millimeter-wave subsystems, Pulse Compression subsystems, Antenna Products, Ferrite Control Products, Radar receivers.

Recent Successes: COM DEV has received awards in both Canada and Europe in 1991. COM DEV received the 1991 Canadian Export Award and COM DEV Europe received the Queen's Award for Export Achievement. These awards were in recognition of sales in excess of $100,000,000 over the last 2 years.

Special Note: COM DEV is a significant equity partner and is playing an active management role in RADARSAT International. As part of an overall strategy to diversify into to other areas of the satellite communications market, COM DEV has become a partner in the Orion Satellite Corporation and has entered into a joint venture to form SOVCAN STAR Communications Inc. to develop an international satellite communications system between Canada and the Commonwealth of Independent States.

COMLAB INC.

2120 Lavoisier
Sainte-Foy, Québec
G1N 4B1

Contact: Dr. Michel Lecours, Vice President
Tel: (418) 682-3380
Fax: (418) 687-4014

Keywords: Telecommunications, Radio Frequency Electronics, Microwaves, Personal Communications, Data Communications, Radio Modems, High Resolution Radar, Technical Training, Technical Translation.

Founded in 1984, Comlab Incorporated concentrates its activities in the fields of telecommunications, mobile radio, computer communications and electronics.

The following list presents some of the fields in which Comlab can offer its research, development, consulting and design services: Radio frequency systems (HF, VHF, UHF, Microwaves), Antenna systems, Mobile radio systems, Radar systems and signal processing, Interference and electromagnetic compatibility (EMC), Electronic design (HF, VHF, UHF, microwaves), Digital Communications systems, Specialised courses and seminars.

Comlab is headed by four engineers having a total accumulated experience of over 60 years in all major fields of telecommunications.

Among the accomplishments of this team, the design of a complete analog telecommunications training system for Lab-Volt Ltd., stands out. Other major accomplishments include a digital telecommunications training system, a 1-GHz microwave system, and an ultra-high resolution, short-range pulse doppler radar system. These systems, exported to over 20 countries, have won a Canada Award for Excellence in 1986, as well as the World Didac Gold award in 1987 and 1990.

DENDRON RESOURCE SURVEYS LIMITED

880 Lady Ellen Place
Suite 206
Ottawa, Ontario
K1Z 5L9

Contact: Andy Welch, Marketing Manager
Tel: (613) 725-2971
Fax: (613) 725-1716

Product/Services: Technical support related to the application of computer and remote sensing technologies to natural resource management.

Keywords: Service, digital and analogue image analysis, GIS, forestry, environment, wildlife.

Recent Successes: Canada Centre for Remote Sensing, Forestry Applications 1992-1995.

Of Special Note: Services in English, French, Spanish and German.

DSMA INTERNATIONAL INC.

6655 Airport Road
Mississauga, Ontario
L4V 1V8

Contact: R.M. Dzoja, Executive Vice President
Tel: (416) 672-3800
Fax: (416) 672-3507

Overseas Offices/Agents:

DSMA - UK Office, Phil Duggan, 29 Hinchley Road, Nuneaton, Warwickshire, CV11 6LG, United Kingdom
Tel: (44) 203 385557
Fax: (44) 203 353194

L&L Trading Company, Y.C. Lee, 10th Floor, Kwungwoon Building, 70 Kwungwoon-Dong, Chongro-Ku, Seoul 110-310, South Korea
Tel: 02 739 2631 2
Fax: 02 739 2288

Sumitomo Corporation, M. Kawabata, Manager, Aerospace and Defence Section No. 1, Aerospace Department No.2, Sumitomo Corporation, Head Office, 2-2, Hitosubashi 1-chome, Chiyod-ku, Tokyo, Japan
Tel: 03 3217 6387
Fax: 03 3217 6460 1

Mitsui Engineering Co., F. Kitagawa, Manager, Defense Systems Division, Mitsui Engineering & Shipbuilding Co. Ltd., 6-4 Tsukiji 5-chome, Chuo-ku, Tokyo 104, Japan
Tel: 03 544 3411
Fax: 03 544 3031

Product/Service: Design and Turnkey Supply of Custom Test Facilities.

Keywords: Test Facilities; Wind Tunnels; Aerodynamics; Climate Chambers, Acro-Acoustics, Aero-Thermodynamics, Computer Systems, Data Acquisition and Control, HVAC, High Enthalpy, Solar simulation, Supersonics, Transonic, Sub-sonic, Captive-Trajectory.

Recent Successes: Boeing New Low Speed Wind Tunnel, U.S.A.; Boeing Heavy Gas Research Tunnel, U.S.A.; High Speed Wind Tunnel and Computer System Upgrade for NLR, The Netherlands; Large European Acoustic Facility (LEAF), The Netherlands; Restoration of NASA-Ames 12ft. Pressure Wind Tunnel, U.S.A.; Roll-In, Roll-Out Test Section Insert System for NAE, Canada; NASA-Langley 30x60 ft. 1/15th Scale Pilot Wind Tunnel, U.S.A.

EBCO AEROSPACE (A DIVISION OF EBCO INDUSTRIES LIMITED)

8510 River Road
Delta, British Columbia
V4G 1B5

Contact: David Belanger, Vice President & General Manager or
Jerry Solobay, Estimating/Marketing
Tel: (604) 946-4900
Fax: (604) 946-4671

Product/Service: EBCO Aerospace's 43,000 square foot state-of-the-art NC machining facility, was established to service the precision manufacturing requirements of the international aerospace industry. EBCO Aerospace machine tools operate under direct numerical control (DNC) and are capable of machining complex 5-Axis components up to 110 feet long by 13 feet wide.

Keywords: Machining, Multi-Axis, 3-D CAD/CAM, Wingskins, Landing Gear, Airframes, Spars, Ribs, Space Components.

Recent Successes: We have performed machining on sixty-three 10-foot diameter ring sections for the NASA Space Shuttle booster rockets, and are currently manufacturing components for the Canadian Mobile Servicing System under contract from Spar Aerospace.

Commercial aircraft clients include Boeing - BCAG/Auburn/Portland, MacDonnell Douglas, de Havilland, Bristol Aerospace and Canadair. Typical parts include Wing Skins, Fuselage Frames, Spars, Landing Gear and Wing Flap Components, manufactured from Aluminum Alloys, High Strength Steels and Titanium Alloys.

Of Special Note: On many parts, we are the sole source and some of the components are designated as Class 1A Critical. Our Quality System is currently at AQAP 4 standards, and we are in the process of upgrading to Manned Space Flight status.

EDO CANADA LIMITED

1940 Centre Avenue N.E.
Calgary, Alberta
T2E 0A7

Contact: Fraser B. Rea, Director, Marketing and Contracts
Tel: (403) 569-5400 **Fax:** (403) 569-5499

Services: Design, manufacture, test composite components for space applications.
Keywords: composites, lay-up, filament winding, struts, trusses, tubes, reflectors.

Through launch and travel, and in final orbit, components bound for space must be lightweight, strong, thermally stable, and able to perform precise functions in extreme environments.

Advanced composite products designed and manufactured by EDO Canada Ltd. meet these challenges. By combining state-of-the-art composites technology with the expertise of our engineering, fabrication and quality teams, EDO Canada Ltd. is one of the few Canadian companies with the capability to manufacture stable, precise and environment-resistant composite space components. Established in 1979, EDO Canada's space composites program grew naturally from earlier successes in the aerospace and transportation industries. A 1989, Communications Canada program to design, develop, manufacture and test a space-qualified communications satellite antenna reflector (SARPRO) was also instrumental in the growth of the company's space composites capabilities.

SARPRO (Space Antenna Reflector Program) established EDO Canada Ltd. as the only qualified Canadian supplier of advanced composite satellite antenna reflectors. The design is a high precision, dual-gridded system consisting of two offset paraboloidal Kevlar sandwich shells separated by an intercostal structure.

As a result of the unique materials and precise accuracies involved, specialized component tooling and manufacturing processes were developed and verified through a component test program. An assembly flow was defined which centred around a custom-built, four axis trimming station, and a qualification test program confirmed that the completed reflector met structural and electrical requirements.

SARPRO's program directive was to research and develop theories and processes that could be applied to reflectors but could also apply to a broad spectrum of space components such as trusses, tubes and struts.

EDO Canada Ltd. is actively pursuing areas in which our knowledge of space composites will benefit national and international space initiatives.

ELECTRONICS TEST CENTRE

P.O. Box 8330
Station F
250 Karl Clark Road
Edmonton, Alberta
T6H 5X2

Contact: Chris Talliss, Marketing Representative
Tel: (403) 450-5368
Fax: (403) 462-7285

Keywords: Environmental, Electromagnetic Compatibility/Susceptibility Testing Qualification, Standards, MIL-STD.

Product/Service: Testing, evaluation and consulting.

Recent Successes: Qualification testing of Channel tunnel fire monitoring and control system, shock/vibration testing of space qualified components, joint venture to miniaturize Global Positioning System, acceptance testing of Canadian Patrol Frigate radio communication sub-systems.

Of Special Note: The Test Centre is always interested in joint ventures and linkages with industry where our expertise can be utilized.

FIELD AVIATION COMPANY INC.

4230 Sherwoodtowne Boulevard
Suite 300
Mississauga, Ontario
L4Z 2G6

Contact: J. Bryan Hayter, Consultant
Tel: (416) 566-5400 **Fax:** (416) 566-5411

Product/Service: Field Aviation Company Inc., a leading Canadian aviation sales and service company since 1947, offers the following services to the general commercial and military communities around the world: the international sale and brokering of pre-owned business, commercial and military aircraft and helicopters; exclusive distribution of Beech aircraft in Canada; the sale and manufacture of aircraft parts; fixed based operations (FBO) in Toronto and Calgary; airframe repair, overhaul, maintenance and conversion; sale, support and installation of avionics systems, instrumentation and test equipment; aeronautical engineering services; specialized airframe conversions and customized aircraft outfittings, and the provision of aircraft seats. Field's facilities are approved under Canadian Department of Transport and Department of National Defence criteria and meet NATO AQAP-1 requirements, U.S. Military Standard MIL-Q-9858A and U.S. Civil Standard FAR 43-17. The company has offices and branches in Calgary, Toronto, Trenton and Ottawa, and consists of four subsidiary management companies and one division.

Keywords:

- Complete range of fully integrated aviation-related services.
- Complete maintenance, repair and overhaul services within the strictest standards.
- World-wide recognition in the field of specialized aeronautical engineering designs and development.
- A leader in the aerospace and defence avionics industries.
- Canada's exclusive distributor for the Beech Aircraft Corporation.
- Consistently been voted the best Canadian FBO in an annual North American industry survey.

Recent Successes: An exclusive world-wide licensing agreement with de Havilland to manufacture and market components and spare parts for the DHC-4 Caribou and DHC-5 Buffalo aircraft.

A 5 year contract to provide engineering and logistics, that includes 8 Beechcraft C 90 A King Airs, to Canadair as a member of Canadair's training team for the Canadian Forces contracted Flying Training and Support Program.

Of Special Note: Field Aviation Company Inc. is always open to the consideration of strategic alliances, joint R & D projects, or other business relationships that provide mutually beneficial opportunities.

FIRSTMARK TECHNOLOGIES INC.

14 Concourse Gate
Suite 600
Ottawa, Ontario
K2E 7S8

Contact in Canada: S. Michael Faulkner, Vice President, Management Services
Tel: (613) 723-8020 **Fax:** (613) 723-8048
Compurserve: 76557, 3026
Telex: 053-4594 FIRSTMARK OTT

Overseas Offices: Hierogam Russia Ltd.
Tel: (095) 273-3731 **Fax:** (095) 362-8949
Internet: mvz@okbmei.msk.su
Telex: 411-907 ORBIT SU

Contact(s) in Moscow: Anthony J. Kittridge, General Manager or
Maxim Zakurdaev, Deputy General Manager

Products/Services: FirstMark Technologies and Hierogam provide Project Planning and Management Support services and training for large space and communications projects. The company employs experienced specialists in the areas of project, program and product management, hardware and software engineering, configuration management, cost and schedule control, quality assurance and documentation control. A key specialty is in the application of Interface Management on international programs.

Keywords: international, space, aerospace, space science, planning, management training, engineering management, interface management.

Recent Successes: FirstMark Technologies was a key contributor to the planning and organization of the Canadian Space Station Program and the RADARSAT Program for the Canadian Space Agency. In addition, FirstMark is responsible for Interface Management of the UVAI space science instrument on the Interball Project, an international space science satellite being built by IKI of Russia. FirstMark is also responsible under contract with Telesat Mobile Inc. for the development of the Mobile Earth Terminal product specification and product development plan for MSAT.

Of Special Note: The unique experience of FirstMark in the space industry in Canada, combined with its presence and position within the Russian space industry create a unique opportunity for Western firms engaged in large projects and/or joint ventures in Russia to employ western project management expertise in their Russian activities for a blend of Roubles and hard currency.

FLEET INDUSTRIES, A FLEET AEROSPACE COMPANY

1011 Gilmore Road
Fort Erie, Ontario
L2A 5N3

Contact: Brian Oakley, Manager Sales & Marketing
Tel: (416) 871-2100
Fax: (416) 871-2722

Product/Services: Fleet's space specialization is the fabrication of spacecraft structures and solar panel substrates. In 1978, Fleet fabricated all the bonded structures for three Anik C and two Anik D satellites and its first ultra-lightweight (28.6 kg) kevlar/graphite dual-cylinder panel substrates, which have now been provided for 34 of Hughes' HS-376 satellites. These include the UK's BSB direct broadcast satellites. Similar substrates of single-cylinder design were built for seven Hughes GOES and GMS meteorological satellites. The largest composite sandwich substrates - 4.27 m dia and propulsion cylinders were fabricated for five Hughes' HS-381 US Navy Laser communications satellites. Fleet also fabricated and assembled the complete bus structure for Spar's HS-383A Brasilsats. The company also manufactures satellite ground-handling and environmental test equipment, such as the Olympus infrared heater rig and spacecraft simulator.

Recent Successes: Fleet is currently involved as a key supplier on the Canadian Remote Sensing RADARSAT project.

Of Special Note: Fleet is interested in pursuing a joint venture relationship in the area of high volume satellite production. Also, in a joint R&D relationship with a Canadian university.

FRE COMPOSITES INC.

64 Rue Wales
St. André-est, Québec
J0V 1X0

Contact: Terrance W. Sutherland, President
Tel: (613) 745-4464
Fax: (613) 745-1598

Product/Service: Designers and fabricators of advanced polymer composite products utilizing automated processing technologies yielding cost effective high quality structural components for the aerospace industry.

Keywords:

Space Components: satellite trusses and structures, robotic arms, waveguides, and launch vehicle components.

Processes: filament winding, pultrusion, braiding, resin transfer moulding, autoclave bonding and moulding.

Materials: glass, aramid and carbon continuous fibres in thermoset and thermoplastic matrices.

Recent Successes and Contracts: Design and fabrication of thermoplastic composite armbooms for Space Station Freedom, design and fabrication of RADARSAT thermoset composite truss structure, R&D contract for development of protective coatings for space applications, R&D contract for one piece integral and thermoplastic composite satellite truss, National grand prize award for energy efficiency for high power density resistance curing system.

Of Special Note: Interested in technology transfers and other collaborative agreements to the mutual interest of all partners.

GLENAYRE ELECTRONICS LIMITED

1570 Kootenay Street
Vancouver, British Columbia
V5K 5B8
Tel: (604) 293-1611
Fax: (604) 293-4340

Contact in Canada: Norman Walker, Product Manager
Tel: (604) 293-4399 Ext 471
Fax: (604) 293-4340

Overseas Offices: Singapore, Mexico, England and the U.S.A.

Products/Services: Glenayre Electronics Ltd. is a world-class supplier of sophisticated voice and data communications systems, and is dedicated to being a leader in key sectors of the wireless communications business. In Canada, Glenayre designs, manufactures and markets products and systems worldwide for terrestrial Wide Area Radio Telephone Systems, Digital Radio Paging Systems, Mobile Data Products and Voice Processing Systems. A corporate objective calls for the manufacture of complete Mobile Earth Terminals (METs) for the North American MSAT and International, INMARSAT Standard-M, Mobile Satellite markets. Glenayre developed a first generation Voice and Data MET unit in 1989 and supplied prototypes to the Canadian Government, DOC/CRC, in February 1990. The Glenayre METs have been successfully tested over INMARSAT satellites in land mobile trials and are being installed for use in Canada in an application using INMARSAT airtime. The company is now engaged in developing and producing MSAT-Cellular Products for the Canadian, USA and Mexico markets to begin commercial service in 1994.

Keywords: MSAT, Mobile Satellite, Mobile Earth Terminal, MET, MT, Paging, Radio Telephone, Cellular, Mobile.

Recent Successes: The world's largest supplier of Digital Radio Paging Systems, Glenayre has recently provided nationwide networked paging systems in Thailand, New Zealand and Qatar, with several other large projects underway in Asia, the Middle East and Europe. In the past year, Glenayre has commissioned paging terminal equipment in South Korea with a capacity in excess of one million paging subscribers. Glenayre has also been active in the voice mail market, with recent major terminal sales in The Netherlands and Singapore. A Glenayre radiotelephone system for use in Shanxi Province, China, consisting of a networked array of terminals and a large quantity of advanced GL4000 series subscriber units, will be operational shortly.

GREGORY GEOSCIENCE LIMITED

1794 Courtwood Crescent
Ottawa, Ontario
K2C 2B5

Contact: Harold D. Moore, President
Tel: (613) 224-9565
Fax: (613) 226-5224

Product/Service: Gregory Geoscience Limited specializes in remote sensing, the detection and digital analysis of information on landuse change, resource mapping and environmental monitoring.

PROCOM SYSTEMS International is the marketing division of Gregory Geoscience Limited for PROCOM SYSTEMS. PROCOM SYSTEMS include the basic PROCOM-2 projection compositor and the Stereo/Change Detection Module, the Roll Film Module and the Digitizing Module.

Keywords: Remote sensing, G.I.S., database development, G.I.S. analysis, mapping, PROCOM SYSTEMS, environment, resource analysis and geology.

Recent Successes: Gregory Geoscience Limited has completed a large portion of the topographic map revision of Canada for Energy, Mines and Resources Canada. It has provided training courses for the topographic revision of Venezuela and Thailand. Gregory Geoscience Limited has provided the structural geological mapping of Jamaica and provided satellite interpretation training for local geologists. An ecological database for a Canadian national park has been developed.

International sales of PROCOM SYSTEMS have spread to twenty-seven countries. PROCOM SYSTEMS are being used as an integral input device of several remotely-sensed data sets into G.I.S. Systems.

Of Special Note: Gregory Geoscience Limited is a member of a working group of consultants for environmental land use mapping.

HARBOUR INDUSTRIES (CANADA) LIMITED

1365 Boulevard Industriel
Farnham, Québec
J2N 2X3

Contact: Mark D. Beauchamp, Vice President, Sales & Marketing
Tel: (514) 293-5304
Fax: (514) 293-2421

Harbour Industries (Canada) Ltd., products are high temperature wires and cables for commercial, industrial and military applications. These are insulated with Teflon (TFE & FEP), Tefzel, Halar, PFA, Kapton, Silicone rubber and 250°C and 450°C high temperature specialty cables, sizes 32 AWG thru 4/0 AWG. Also Peek, Kevlar as well as other Halogen-free materials.

The company has complete UL and CSA approvals on all popular Teflon, Silicone rubber, and high temperature glass braided construction for appliances, fixtures, motor leads, equipment wire etc... Custom services include designing and construction of specialty cables, sodium etching, special bonding, and custom marking and printing.

Major markets include aircraft, missile, communication appliances, transit, medical, electronics, chemical and petro-chemicals, utilities, paper, railroads, lighting, electrical machinery and steel industries. Our expertise also lies in design and supply of special cables for the high radiator sector of nuclear power. These are reached through OEM and distributor sales.

HAVLIK TECHNOLOGIES INC.

695 Bishop Street
Cambridge, Ontario
N3H 4V2

Contact: David M. Gee, President
Tel: (519) 653-5774
Fax: (519) 653-5774 EXT. 269

Product/Service: Machined flight components, ground support equipment, test rigs, shipping containers. Havlik Divisions provide integrated machining, fabrication, assembly, metal processing and N.D.T. capability.

Keywords: Flight hardware, Ground support equipment.

Recent Successes: Havlik produced the handling trolley and thermal vacuum test rigs for the Anik E program for Spar Aerospace. The engineering model for the Space Station robotic arm-joint was recently completed, and flight hardware programs are about to commence. The latter program involved production directly from electronic data.

HERMES ELECTRONICS LIMITED

40 Atlantic Street
P.O. Box 1005
Dartmouth, Nova Scotia
B2Y 4A1

Contact: Guy Jeffery, Director, Marketing
Tel: (902) 466-7491
Fax: (902) 463-6098

Products/Services: Develop/manufacture ASW Sonobuoys, ASW Bathythermograph Buoys, High Frequency (HF) Communications Loop Antennas, HF Ionospheric Sounding Systems, Argos Satellite Meteorological Buoys and Beacons.

Keywords: Acoustic and non-acoustic sensor systems, Advanced Engineering System Capabilities, Total Quality Management, AQAP-1 Certification.

Recent Successes: Sales for this past fiscal year - $37 million. Received development contracts for next generation sonobuoys - AN/SSQ-53E, AN/SSQ-36A, AN/SSQ-77B.

Through teaming arrangements with other companies, Hermes has gained access to those foreign markets that have a demand for acoustic and non-acoustic sensor systems.

HORLER INFORMATION INC.

116 Albert Street
Suite 704
Ottawa, Ontario
K1P 5G3

Contact: David N.H. Horler, President
Tel: (613) 594-5155
Fax: (613) 594-8679

Product/Service: Horler Information Inc. (HII) is a software and consulting company specializing in remote sensing and geographic information systems (GIS). HII develops and markets the HI-VIEW™ software system for generating digital elevation models and orthoimages from stereo satellite imagery. HII models and orthoimages from stereo satellite imagery. HII also provides image processing services, particularly in building faster databases for GIS. HII provides a wide range of consulting services in geographic information management. The company develops software systems for GIS and remote sensing applications. HII operates and markets the Remote Sensing On-line Retrieval System (RESORS) of the Canada Centre for Remote Sensing, the world's largest database devoted to remote sensing with over 82,000 references.

Keywords: Remote sensing, image processing, geographic information systems (GIS), digital elevation modelling (DEM), databases, consulting, environment, software development.

Recent Successes: HII recently delivered a Silicon Graphics UNIX workstation version of its HI-VIEW™ software to the Government of Newfoundland's Department of Forestry and Agriculture. Last October, HII announced the release of HI-VIEW on the IBM RS/6000 series of workstations. This development was the first result of a Complementary Marketing Agreement between IBM and HII.

Of Special Note: HII is currently seeking strategic alliances to promote HI-VIEW software in collaboration with GIS and image analysis system (IAS) vendors.

HUGHES AIRCRAFT OF CANADA LIMITED
WINNIPEG DIVISION

260 Saulteux Crescent
Winnipeg, Manitoba
R3J 3T2

Contact in Canada: Ron Guimond, General Manager
Tel: (204) 949-2407
Fax: (204) 889-1268

Regional Offices: Atlanta, GA; Littleton, CO; Scranton, PA

Following companies are international distributors for Hughes Aircraft of Canada Ltd.

Telemusica Ltd. - Givatayim, Israel
Bosch - Graz Austria
Siemens - Brussels, Belgium
Maganavox CATV Systems, U.K Ltd., Aylesbury Buckings, UK
Com-ing - Agde, France
Cero 7 Uno, Guadalajara, Jalisco
Cabletronics - Taipei, Taiwan
Lambda - Argentina

Product/Service: The Winnipeg Division specializes in the development and manufacturing of the Amplitude Modulated link (AML), which is microwave equipment and networks for the cable television industry. The Hughes AML complete product line offers both broadband and channelized multichannel microwave distribution equipment used to deliver channels of programming to CATV hubs. Equipment includes low, medium and high power microwave systems capable of transmitting 1 to 80 TV channels, FM modulated equipment for interties, and enhancement products for existing systems. Hughes also provides a full line of support services such as system design, field engineering assistance, applications engineering, product support (24 hour service telephone), and training seminars.

Recent Successes: Traditionally, Hughes has manufactured equipment operating in the CARS band (12.7 - 13.2 Ghz) for the franchised cable industry. In 1991, because of FCC regulation changes in the United States allowing the Private Club industry the use of 18GHz frequencies, Hughes developed and is now successfully selling its 18GHz broadband products in the U.S. and Europe.

HUGHES LEITZ OPTICAL TECHNOLOGIES LIMITED

328 Ellen Street
Midland, Ontario
L4R 2H2

Contact: John H. Klie, Manager, Fire Control
Tel: (705) 526-5401 ext. 510
Fax: (705) 526-5831

Product/Service: Electro-optical design and manufacture.

Keywords: electro-optical, optics, lasers, R & D, manufacture.

Recent Successes: Optical module for WINDI and WAMDI for Canadian Space Agency Programs.

Of Special Note: Potential optical module supplier for MOPITT as part of the Canadian Space Agency's program.

IMP GROUP LIMITED
AEROSPACE DIVISION

2651 Dutch Village Road
Halifax, Nova Scotia
B3L 4T1

Contact: Michael J. Garvey, Manager, Aerospace Marketing
Tel: (902) 873-2250
Fax: (902) 873-2249

Product/Services: Aerospace airframe and electronics repair overhaul and manufacture, Spacecraft wire harness design and manufacture, Spacecraft precision machined components.

Keywords: Spacecraft Wire Harness, Spacecraft Machined Parts.

Recent Successes: Subcontracts on MSS for the Manned Space Station, Subcontracts on RADARSAT.

Special Note: Seeking strategic alliances as partner or subcontractor.

INDAL TECHNOLOGIES INC.

3570 Hawkestone Road
Mississauga, Ontario
L5C 2V8

Contact: V. Lacey, Vice President, Marketing & Sales
Tel: (416) 275-5300
Fax: (416) 273-7004

Product/Service: Aerospace components for thermal, acoustic and personnel shielding applications; IR Photogrammetric vision systems.

Keywords: thermal, acoustic, shielding, IR Photogrammetry, vision systems.

Recent Successes: Application of vision system to helicopter and unmanned Air Vehicle Landing Systems.

INFOSAT TELECOM LIMITED

7725 Lougheed Highway
Burnaby, British Columbia
V5A 4V8

Contact in Canada: Ted Vermeulen, Director of Sales and Marketing
Tel: (604) 420-5322
Fax: (604) 420-0139

Overseas Offices: Darrell Halverson, Sales Manager, Scada Applications
Tel: (011) 622-51-326-327
Fax: (011) 622-51-326-327

Product/Services: Infosat's core products include:

- Transportable digital satellite terminals for voice and data.
- Satellite hub equipment with automated carrier monitoring options.
- Mobile broadcast systems using satellite with automatic satellite tracking system.
- Infra-red laser transceivers for short-haul data links.
- ST70-C-Band transceivers for 6/4 Ghz.
- SkyCom 2000 low data rate modems and earthstations for Scada applications.
- Commercial TVRO systems.
- Video Uplinks.
- Video Conferencing.
- 24 hour satellite network monitoring service.

Keywords: Infosat Telecom designs, develops, manufactures and integrates point to point or multi-point voice, facsimile, data and video communications systems using satellite technology.

Recent Successes: Infosat Telecom installed and maintains a large satellite network throughout Western Canada and Southeast Asia.

Infosat Telecom recently won 2 multimillion dollar contracts to provide video uplinks to the British Columbia legislature and the Open Learning Agency (Knowledge Network).

Infosat Telecom recently won a multimillion dollar contract to design, supply and install a large voice and data satellite communications network in Malaysia.

Of Special Note: Infosat is interested in joint venture partners for its international projects, particularly in Southeast Asia and the Pacific Rim.

INSTITUTE OF SPACE AND ATMOSPHERIC STUDIES

University of Saskatchewan
Saskatoon, Saskatchewan
S7N 0W0

Contact: Dr. A.H. Manson, Chairman
Tel: (306) 966-6449
Fax: (306) 966-6449

Product/Service: Research into the physics/chemistry of the middle atmosphere (20-100 km) and thermosphere/magnetosphere using radars, optical systems, rockets, and space vehicles.

Keywords: Planetary atmospheric composition, ozone, airglow-aurora, dynamics of the middle atmosphere, terrestrial-plasmas, magnetosphere, solar-terrestrial space, solar weather relations.

Recent Successes: The Institute of Space and Atmospheric Studies is involved with global research projects such as STEP (Solar Terrestrial Energy Program); European Space Agency (ESA), NASA, and the Canadian Space Agency; and the Canadian Centres of Excellence (Canadian Network for Space Research).

INTERA INFORMATION TECHNOLOGIES CORPORATION

#2500, 101 - 6th Avenue S.W.
Calgary, Alberta
T2P 3P4

Contact in Canada: Alain A. Kahil, Director, Corporate Marketing
Tel: (403) 266-0900
Fax: (403) 265-0499

Overseas Offices: Kit Jackman, Vice President
Highlands Farm, Greys Road
Henley-on-Thames, Oxfordshire
United Kingdom
RG9 4PS
Tel: 491 575 989
Fax: 491-576-557

Product/Service: Two principal business segments:

Mapping and Reconnaissance segment provides airborne radar collection and processing services, and Geographic Information System (GIS) specialized products and services including space-based image processing and analyses.

Petroleum and Resource Management segment provides consulting services, computer processing and interpretation services to the resource, petroleum and government sectors worldwide.

Recent Successes: Revenues	**1989**	**1990**	**1991**
Petroleum & Res. Man.	$23.9 M	$28.9 M	$47.5 M
Mapping & Recon.	$12.4 M	$23.4 M	$26.1 M
Total Revenues (Million)	$36.3	$52.3	$73.6

Of Special Note: A world leader in providing state-of-the-art spatial information solutions, INTERA maintains this position through a strong commitment to research and development. Currently exceeding 12 percent of annual gross revenue, Intera's investment in R&D is presently aimed at the acquisition and integration of faster data from both airborne and satellite platforms with a view toward expanding its use in digital mapping and other spatial applications.

INVENTRONICS LIMITED

3900 - 101 Street
Edmonton, Alberta
T6E 0A5

Contact: Gary Thompson, President
Tel: (403) 461-5010
Fax: (403) 450-0234

Company Founded: 1970

Products/Services: Inventronics manufactures precision quality metal products for the telecommunications and electronics industries. Utilizing the latest CAD systems to work with customers from the prototype stage to full scale customers from the prototype stage to full scale manufacturing, the company is certified up to and including MIL standards. Inventronics has implemented a total quality management program as well as ISO 9002 standards. The company also supplies racks, enclosures and piece parts to just-in-time (JIT) requirements on an OEM basis.

Marketing Activities: Products and services are marketed to telephone utilities and supplier to the telecom industry. A line of standard racks and enclosures is sold through distribution to the end market.

IOTEK INCORPORATED

1127 Barrington Street
Halifax, Nova Scotia
B3H 2P8

Contact: Jim Hanlon, Director of Marketing
Tel: (902) 420-1890
Fax: (902) 420-0674

Products: High Performance Signal Processors and Advanced Display Systems.

Keywords: Iotek currently manufactures the AN/UYS signal processor, a commercial grade vector signal processor capable of sustained throughput of 320 MFLOPS. The company also manufactures Advanced Display Systems which can display full motion imagery at 2048 x 2048 pixel resolution. Iotek develops specialized application software in support of both of these products.

Recent Successes: Iotek recently received a $921,000 contract to manufacture a Real Time Sonar System for the Royal Australian Navy.

Of Special Note: On February 19, 1992, Iotek announced the opening of its new lab facilities at Dalhousie University. Iotek is collaborating with Dalhousie on a photonics research project.

ITRES RESEARCH LIMITED

#110, 6815-8th Street N.E.
Calgary, Alberta
T2E 7H7

Contact: Dr. Clifford D. Anger, President or
Cathy Wrightson, Manager, casi Operations, ITRES Instruments Inc.
Tel: (403) 274-7440
Fax: (403) 295-3570

Product/Service: ITRES Research Limited is a private corporation which has been developing high quality electro-optical instruments for the scientific and remote sensing communities for 12 years. The fully Canadian owned company is at the forefront of electro-optics technology. ITRES conducts research and development in applications of charge coupled devices for cameras and imaging systems which operate in visible light, ultraviolet or near infrared ranges. ITRES has special expertise in digital electronic camera systems and charge coupled device (CCD) technology. Applications include remote sensing, x-ray detection, ultraviolet, infrared and low light level imaging and bioluminescence studies. The casi (Compact Airborne Spectrographic Imager) is the company's feature product, with applications ranging from agriculture, forestry and land use, to oceanographic, laboratory and environmental impact studies.

Keywords: Remote sensing, spectral, imaging, multispectral, imaging spectrometer, imaging spectrograph, pushbroom imager, CCD.

Recent Successes: The first casi prototype was ready for flight in 1989. Since that time, the casi has been further upgraded and refined. Nine commercial instruments have now been sold or leased worldwide and are being used in a variety of applications including assessing fish stocks off the coast of Canada and examining industrial development impacts upon Alaska's fragile North Slope.

In 1990, ITRES Instruments, a wholly owned subsidiary of ITRES Research, was formed to handle the production, marketing and applications development of the casi. Employing a staff of five, and the production, marketing and applications development of the casi. Employing a staff of five, and technically supported by the parent company, ITRES Instruments offers the casi for purchase, lease and short-term rental and engages in proof-of-concept casi missions using its own twin-engine Cessna or customer-supplied aircraft. During its first season, the casi was used in over thirty projects in three different countries. Most recently, casi sales have been completed in Germany and the United States.

J.D. MOLLARD AND ASSOCIATES LIMITED

810 Avord Tower
2002 Victoria Avenue
Regina, Saskatchewan
S4P 0R7

Contact: J.D. Mollard, Ph.D., P. Eng., P. Geol., President
Tel: (306) 352-8811 or 352-8855 **Fax:** (306) 352-8820

Product/Service:

Route Location and Terrain Analysis: (Over 450 studies 100,000 km of route mapped and analyzed) - Highways, Access Roads, Pipelines, Power Transmission Lines, Railways, Waterways.

Aggregate Location and Quantity and Quality Appraisal: (Over 700 studies; 65,000 sand and gravel prospects mapped) - Gravel, Clay, Boulders, Rock Quarries, Blender Sand, Filter Sand, Filler Material, Railway Ballast.

Natural Hazard Mapping and Analysis: (Over 80 studies) - Landslides, Snow Avalanches, Rockfalls, Faults, Earthquakes, Piping Failures, Solution and Collapse, Land Subsidence, Accelerated Erosion, Flooding, Highly Expansive Soils, Permafrost, Muskeg, Damage Analysis.

Mine, Mineral, and Petroleum Exploration and Development: (Over 90,000 km^2 mapped and analyzed in studies) - Photogeological Surveys, Structural Mapping, Fracture Trace and Lineament Mapping, Boulder Tracing Studies, Searches for Base Metals, Diamonds, Gold, Uranium, Coal, Marl, Bentonite, Silica Sand, Remote Sensing Studies for the Development of Oilsand, Base Metals, Asbestos, Potash, and Uranium Mines.

Site Selection and Terrain Assessment: (Over 350 studies) - Dams, Reservoirs, Bridges, Tunnels, Airfields, Harbours, Marinas, New Townsites, Subdivisions, Industrial Sties, Communication Tower Sites.

Land Use and Environmental Studies: (Over 350,000 km^2 mapped and analyzed) - Monitoring Land Use and Land Cover Changes, Biophysical Inventory Maps, Park and Recreation Studies, Rural and Urban Planning, Terrain Data Base Mapping for Land Use Suitability and Regional Planning, Terrain Analyses for Environmental Assessment.

Water Resource Studies: (Over 550 studies) - Irrigation Studies, Canal Seepage, Groundwater Location and Development, Delta and River Morphology, Coastal and Shoreline Studies, Snow and Ice Reconnaissance Mapping, Drainage Mapping, Wetland Mapping, Soil Moisture Mapping, Salinity Mapping.

K & S TOOL AND DIE LIMITED

45 Sylvan Way
Winnipeg, Manitoba
R2R 2B9

Contact: Peter Klein, President
Tel: (204) 697-2951
Fax: (204) 697-4125

Product/Service: K & S Tool and Die Ltd. is a privately-owned Canadian company which was founded in 1975. The highly skilled staff consists of 12 tool and die makers. The company performs work for a wide range of industries including aerospace, electronics, food and agriculture. K & S Tool and Die Ltd. has performed work for Northern Telecom Ltd., Otto Bock Orthopaedics of Canada, Can Car Rail Inc. and Spar Aerospace.

Keywords: The company specializes in precision work involving Progressive Dies, Compound Dies, Fine Blanking Dies, Jigs and Fixtures, Injection Molds, Vacuum and Blow Molds, Precision Machining, EDM, Designing and Engineering. We have performed special project engineering workmanship which has included the design and manufacture of dedicated specialized machines for various industries. Quality Standards: AQAP-4 Standards (U.S. MIL-Q-9858A) Materials include: Aluminum, Stainless Steel, Incoloy, Titanium, Beryllium and Copper.

Recent Successes: The manufacture of electromagnets for TRIUMF, University of British Columbia, and HERA of Germany in conjunction with our affiliate company, CanMag, Canadian Electromagnetics Ltd. Currently working on a project for Spar Aerospace Ltd. manufacturing a test rig for the Canada Space arm.

Of Special Note: Joint ventures/enquiries/arrangements will be considered.

LAPP-HANCOCK ASSOCIATES LIMITED

280 Albert Street
Suite 904
Ottawa, Ontario
K1P 5G8

Contact: Kenneth E. Hancock, President or John A. Gilbert, Vice President
Tel: (613) 238-2483
Fax: (613) 238-1734

Keywords: Consulting Services; Satellite Communications; Remote Sensing; Telecommunications; Systems Engineering.

Product: Lapp-Hancock Associates Limited provides all forms of consulting services relating to satellite communications, remote sensing from space, and space science. In particular the range of consulting services can generally be categorized under the following headings: planning and policy services, systems engineering, network design, research and development studies, market studies, feasibility studies.

Recent Successes: A Study of Future Satellite Networking. This major project, carried out for the European Space Agency (ESA) involved the development of plans for satellite networking in Europe for the decade commencing 1997.

A Long-Term Satellite Communications Strategy Study. This major study, sponsored by the Canadian Department of Communications, the Canadian Space Agency, SPAR Aerospace, and Telesat Canada, involved the development of suitable strategies for Canadian satellite communications markets and technologies over the next 20 years.

The Development of Satellite Network Requirements for the Philippines. This work carried out for Capital Wireless of Manila as part of a CIDA aid program covered a detailed feasibility study for all aspects of a satellite network, and concluded with the initial systems engineering requirements.

Microwave Instrumentation for Remote Sensing Satellites: Requirements and Canadian Capabilities for the timeframe 1997 to 2002. This work, carried out for the Canadian Space Agency, involved a detailed analysis of worldwide requirements for remote sensing instrumentation over the next ten years. Subsequent to developing functional specifications for such instrumentation, a detailed analysis of the Canadian capability of providing such instrumentation was carried out.

THE LASER INSTITUTE

9924 - 45 Avenue
Edmonton, Alberta
T6E 5J1

Contact: Dr. Don C.D. McKen, President
Tel: (403) 436-9750
Fax: (403) 437-1240

Product/Service: Contract research, development and engineering involving laser applications particularly in materials processing, laser and fiber optic-based sensors, robotics and machine vision. Laser cutting, welding heat treating and cladding.

Keywords: Lasers, laser applications, fiber optics, opto-electronics, materials processing, sensing, machine vision, robotics.

Recent Successes:

- Laser welding in micro-gravity and vacuum. (Contract Research supported under the User Development Program of the Canadian Space Agency).
- Laser Assisted Metal Arc Welding (supported by DREA).
- Laser Glazing of Bronze Alloys (supported by DREA).
- Parametric Study of ArXe Laser (supported by DREV).
- Distributed Fiberoptic Strain Sensor (supported by industry).
- Laser Scanning System (supported by industry).
- Laser Autobody Alignment System (supported by industry).
- Many smaller R&D contracts and/or feasibility studies involving lasers and related technologies and a large number of laser materials processing projects particularly precision laser cutting of a wide variety of materials.

Of Special Note: TLI is interested in participating in joint projects involving laser applications particularly materials processing, sensing and robotics.

MACDONALD DETTWILER & ASSOCIATES

13800 Commerce Parkway
Richmond, British Columbia
V6V 2J3

Contact in Canada: Richard Swann, Business Area Director, Space & Defence Systems
Tel: (604) 278-2411
Fax: (604) 278-1285

Overseas Offices: Ottawa, U.K., Australia, Malaysia, and U.S.

Product/Service: MacDonald Dettwiler is an international leader in advanced systems development for the aerospace, defence and electronics manufacturing industries. We are the world's largest supplier of turnkey remote sensing satellite ground stations, as well as air traffic control and flight data management systems, weather information processing and distribution systems, surveillance systems, and systems for the acquisition and processing of optical, radar and sonar images from spaceborne, airborne and shipborne sensors.

Keywords: Remote Sensing Satellite Ground Stations, Image Mapping Systems, Weather Systems, Canadian Space Station Program, Acquisition Surveillance, Aerospace Surveillance, Command and Control Systems, Air Traffic Control, and Research.

Recent Successes:

- Awarded Earth Environment Space Initiative Program Definition Contract.
- Major subcontractor to SPAR on the Canadian Space Station Program.
- Awarded the Space-Based Radar contract by the Canadian Department of National Defence.
- Subcontractor to Fenco on the Marine Coastal Defence Vessel Contract.
- Subcontractors to Hughes on the Canadian Automated Air Traffic System.

MANITOBA REMOTE SENSING CENTRE
SURVEYS AND MAPPING BRANCH
MANITOBA NATURAL RESOURCES

1007 Century Street
Winnipeg, Manitoba
R3H 0W4

Contact: Hartley T. Pokrant, Chief
Tel: (204) 945-6597 **Fax:** (204) 945-1365

Major Products and Services: The Manitoba Remote Sensing Centre (MRSC) conducts digital image processing of satellite data for resource studies, inventorying, and environmental monitoring. The Centre is also responsible for the operation of the Canadian World Crop Monitoring Program through which daily satellite imagery is processed in order to determine crop quality, vigor and yield forecasts. Other services and products include: consulting, research and development, education, technology transfer, provision of satellite imagery, thematic land cover maps, joint venture opportunities, and rental of equipment.

Desired Alliance With Other Firms: The MRSC is interested in the growth and fostering of remote sensing and related aerospace industries in Manitoba. In this regard, the Centre makes equipment available and provides joint venture opportunities for industry and academic institutions who wish to work in this field. Co-operative project work is undertaken and brokerage services are provided for those wishing linkages with the Centre for mutual benefit.

Technology Expertise: The MRSC has a highly skilled staff with expertise in digital image processing, consulting, project management, aerial photography, and most other types of specialized mapping aspects. Staff of the Centre bring over 20 years of operational production related experience to tasks at hand. Coupled with strong and varied educational backgrounds in geography, forestry, cartography, remote sensing and business, the staff of the Centre are able to combine all their past experience to assist in providing remote sensing solutions to many resource and environmental issues.

Products Developed: Weekly NOAA satellite image composites for crop assessment purposes, colour land use/land cover maps for Manitoba, forest cover maps of Canada, and a wide assortment of other thematic maps and inventories conducted over the years.

Products in Development: Currently, the Centre is working in the field of Radar Data Development for purposes of assessing its use in land and resource inventories, and to acquire and provide for the necessary expertise when Canada launches its own RADARSAT satellite. Ongoing research is conducted in advanced digital image processing with the Canada Centre for Remote Sensing.

MARTEC LIMITED

1888 Brunswick Street
Suite 400
Halifax, Nova Scotia
B3J 3J8

Contact: Dr. James L. Warner, President
Tel: (902) 425-5101
Fax: (902) 421-1923

Product/Service: Martec Limited is a consulting engineering firm that carries out contract research and development. Martec specializes in the development of advanced computational methods and software for application in (a) structural engineering, (b) aerospace structures, (c) computational mechanics, and (d) ocean engineering.

Keywords: Numerical Analysis; Structural Analysis; Finite Element Analysis; Structural Reliability; Random Vibrations; Fracture and Fatigue; Structural Noise; Composite Materials; Advanced Industrial Materials; Underwater Acoustics; Hydrodynamics; Wind Wave Modelling; Sediment Transport.

Recent Successes: Recent contracts relevant to space:

- Nondestructive and Computational Evaluation of Coatings of Mobile Service System.
- Effect of Microgravity on the Residual Stress of Slip Cast Ceramics.
- Enhancement of Software Suite for Analysis of Bonded or Bolted Joints for Repair of Damaged Composite Panels.
- Development of Random Vibration Analysis Software.

Of Special Note: Interested in collaboration with other contractors in the areas of advanced materials and advanced computational analysis.

MAYA HEAT TRANSFER TECHNOLOGIES LIMITED

43 Thornhill
Westmount, Québec
H3Y 2E3

Contact in Canada: Kevin Duffy, Vice President, Engineering Services
Tel: (514) 939-7164 **Fax:** (514) 939-0439

Overseas Offices: MAYA is represented worldwide by Structural Dynamics Research Corp (SDRC). Please contact our Montreal office for more information.

Product/Services: TMG - Thermal Analysis Software, Engineering Services

TMG is a comprehensive thermal modelling and analysis package which can solve complex, non-linear and transient heat transfer problems using a geometry-based finite difference modelling approach. The program incorporates facilities to model heat transfer by conduction, radiation, convection, fluid flow, and phase change, as well as special features for the analysis of spacecraft. MAYA also offers an interface to the SDRC I-DEAs Finite Element Modelling System. I-DEAs TMG has been successfully applied in a wide range of industries including space and aerospace, electronics, hydroelectric and nuclear power, metals, and several others.

MAYA also offers **Engineering services** in the field of thermal engineering. These include consulting, training, thermal design and analysis, the development of specialized software products. In particular, MAYA offers comprehensive capabilities in the area of spacecraft thermal engineering.

Keywords: Thermal Modelling, Thermal Analysis, Radiative Heat Transfer, Orbital Heating Analysis, Thermal Engineering.

Recent Successes: **TMG** is currently installed at over 200 sites, with significant success in export markets. Many clients are leading aerospace and defence firms including Rockwell, Lockheed, Hughes Aircraft, General Electric, TRW, NASA, BAE, SEP, Mitsubishi, Thomson, Matsushita and several others.

Engineering Services contracts have included an LSS Test Technology Study for SBR program, thermal analysis R&D for the Canadian Space Agency, and consulting on the Canadian RADARSAT and Space Station Programs. MAYA has also provided thermal analysis training for a large number of firms in Canada, the U.S. and Europe.

Of Special Note: MAYA has a very active R&D program and would be interested in collaborative development projects.

MPB TECHNOLOGIES INC.

1725 North Service Road
Dorval, Québec
H9P 1J1

Contact: Dr. A.K. Ghosh, Director, Space & Photonics Division, 151 Hymus Blvd., Pointe Claire, Québec, H9R 1E9
Tel: (514) 694-8751 **Fax:** (514) 695-7492

Products/Services: Federally incorporated in 1976, MPB Technologies Inc. specializes in high technology systems and products, and in contract research and development. The company is divided into six technologically oriented divisions: Communications; Electromagnetics; Electronic Systems; Fusion Technology; Laser & Electro-Optics; and Space and Photonics. The following are some of the space-related activities undertaken by MPB Technologies Inc.

Flight Qualified Payloads for Space
Configurable Hardware for Multidisciplinary Projects in Space (CHAMPS): Get-away special controlled environmental generic chamber for multidisciplinary microgravity projects, CHAMPS enables investigators to specify their own experimental configuration while providing them with generic peripherals such as support structure, power supply, thermal insulation, control and data acquisition electronics, ground support equipment and user-friendly software. The first experiment to be flown will involve the study of Liquid Phase Electro-Epitaxial (LPEE) crystal growth of GaAs under microgravity conditions.

Laser Materials Processing System for Microgravity Projects (LAMPS): Designed for KC-135 flights, LAMPS is a research facility to conduct laser material processing (welding, drilling etc.) under microgravity conditions. It consists of a 100 Watt CO_2 laser, a material processing station with computer controls and data acquisition systems, and a real-time interferometric holography system for diagnostics.

Aquatic Research Facility (ARF): Designed to study the effects of microgravity on the behaviour of aquatic invertebrates and microorganisms, it is a mid-deck experiment for the Space Shuttle.

Telerobotics: MPB Technologies is currently involved in developing three advanced telerobotic prototypes: a macro robot, a micro robot and a research robot. Almost all aspects of robotic technology are involved in these systems, including materials and sensors (e.g. force, vision, tactile).

Intersatellite Communication Link Program (ISL): A test bed has been developed to study optical technologies for intersatellite communication. The program has included the use of laser diodes and heterodyne receivers to simulate data transmission rates up to 1 Gbit/s.

MPR TELTECH LIMITED

8999 Nelson Way
Burnaby, British Columbia
V5A 4B5

Contact: Alistair W. Taylor, Director, Business Development
Tel: (604) 294-1471 **Fax:** (604) 293-5787

Product/Service: MPR Teltech offers the aerospace industry a wide range of design and fabrication services. These include components such as application-specific integrated circuits (ASIC), thick-film hybrids, hybrid and monolithic microwave integrated circuits; complex subsystems such as transmitters and receivers; and complete systems, including large software systems for communications network management.

MPR Teltech is currently active in microwave landing systems (both ground and airborne segments), civilian and military EHF satellite communications, space based radar, and search and rescue satellite beacons. Other areas of expertise include commercial and military airborne radar, air-to-ground communications, navigation, and EW systems.

As Canada's largest design house for satellite earth station engineering, MPR Teltech is a recognized leader in advanced microwave modem, and associated signal-processing technologies.

Keywords: Communications Consultants; Communications Systems; Digital Communications; Digital Signal Processing; EHF Satellite Communications; Emergency Locator Beacons; Expert Systems; Hybrid Circuits; MHMICs; MMICs; Microelectronics; Microwave Subsystems; Millimeter Wave Subsystems; RF Communications; Satellite Communications; Software Development; Storage of Digital Imagery; VLSL.

Recent Successes: A $9 million technology transfer and joint development contract with South Korea's Electronics and Telecommunications Research Institute (ETRI). The collaborative project will develop a new VSAT (Very Small Aperture Terminal) satellite communications system for two-way low speed data communications.

MPR Teltech was selected as prime contractor for Canada's $28 million "FASSET" military R&D project, involving the design and integration of an advanced development model of an EHF SATCOM system for evaluation and test. Consisting of two ground terminals and a ground-based payload model, the system incorporates advanced processing techniques to achieve secure, survivable communications links in an ECM environment.

MPR Teltech was responsible for the system design, terminal design and development of the satellite communications system which provides the transmission backbone for the $268 million Canadian government NWS contact awarded in 1986.

M.R. BYRNE & ASSOCIATES LIMITED

480 Guelph Line
Burlington, Ontario
L7R 3M1

Contact: R.D. Swift, President
Tel: (416) 632-8044
Fax: (416) 632-2854

Product/Service: Provide professional consulting engineering services for industry and government, specializing in the development and design of special purpose equipment, structures, product, machinery and equipment, manufacturing facilities, materials handling systems and automation.

Keywords: Consulting engineering, design, development, specialized equipment, materials/handling, automation.

Recent Successes: Development/design of mechanical and electrical ground support test equipment for the L-Sat solar array systems for Spar Aerospace. Provided manufacturing technical support and prepared operating and maintenance handbooks.

Of Special Note: Have joint-ventured with several consulting engineering firms and are interested in developing alliances with overseas firms.

NATIONAL COATING TECHNOLOGIES INC.

1975 Logan Avenue
Winnipeg, Manitoba
R2R 0H8

Contact in Canada: John Read, Vice President & General Manager
Tel: (204) 632-5585
Fax: (204) 649-3282

Product/Service: Flame and plasma spraying of metallic and ceramic coatings on aircraft engine components.

Keywords: Plasma spraying, Flame spraying, Thermal spraying, Metallizing, Thermal barrier coatings, Abradable coatings, Metallic coatings, Wear Resistant coatings, Corrosion resistant coatings.

Recent Successes: Primary supplier of coating services to Bristol Aerospace. Sub-contractor to Standard Aero.

NORDION INTERNATIONAL INC.

447 March Road
P.O. Box 13500
Kanata, Ontario
K2K 1X8

Contact in Canada: Dan Aitkenhead, Market Research Analyst
Tel: (613) 592-2790
Fax: (613) 592-6937

Overseas Offices:

Nordion Europe S.A.
Zoning industriel
Avenue de l'Esperance
B-6220 Fleurus, Belgium

Jiri Kotler, Managing Director
Tel: 32 (0) 71-829211
Fax: 32 (0) 71-829221

Asia-Pacific Office
237 Lockhart Street
Wanchai, Hong Kong

Ken Badham, Director
Tel: (852) 828-9328
Fax: (852) 828-9376

Product/Service: Nordion manufactures and markets the Gammacell 220, a self-shielded, cobalt 60 research irradiator designed to qualify electronic components to MIL SPEC 883C.

Keywords: Gammacell 220, radiation hardness test equipment, MIL SPEC 883C, cobalt 60 research irradiator.

Recent Successes: Over 50 Gammacell 200's installed worldwide for testing of electronic components for military and space applications.

Of Special Note: Working to develop a large chamber, low dose research irradiator specifically for the space electronics testing market. Looking for industry feedback.

PHILIP A. LAPP LIMITED

128 Elgin Street
Thornhill, Ontario
L3T 1W6

Contact: Dr. Philip A. Lapp, President
Tel: (416) 731-6717
Fax: (416) 731-8279

Product/Service: Space policy and economics, remote sensing.

Keywords: Policy, Economics, Remote Sensing, Surveillance.

Recent Successes: RADARSAT International, International Space University (1990), Long Term Space Plan for Canada - Infrastructure.

Of Special Note: Seeking alliances with similar firms and interests in ESA countries and Pacific rim.

QRL ANALYSIS CORPORATION

77 Auriga Drive
Unit 6
Nepean, Ontario
K2E 7Z7

Contact: Dr. R.F. Haythornthwaite, President
Tel: (613) 226-1885
Fax: (613) 226-1886

Product/Service: Electronic and Electrical Component Reliability, Failure Analysis, Destructive Physical Analysis, Scanning electron Microscopy, Materials Analysis, MIL-STD-883 Testing. Procurement Consultation.

Keywords: Reliability, Testing Analysis, Components.

Recent Successes: Approved for FA and DPA on Canadian Space Station Program, FA and DPA on all Canadian Space Satellite Programs since 1979, Consultation for procurement of ultra high reliability components for TAT-9 Undersea Cable.

Of Special Note: Joint Reliability Testing/Analysis Activities with MPB Technologies, Seeking R & D contracts to study Failure Mechanism of electronic components.

QUANTUM INSPECTION AND TESTING LIMITED

916 Gateway
Burlington, Ontario
L7L 5K7

Contact: Michael H. Dudley, President
Tel: (416) 632-5869
Fax: (416) 847-1634

Scott Brown, Manager, Marketing
Tel: (416) 827-6861
Fax: (416) 847-1634

Wholly owned subsidiary of Westinghouse Canada Inc. Services Division.

Product/Service: Third party inspection, testing, measurement and calibration services. Services include visual surveillance, non-destructive testing, XYZ co-ordinate measurement, reverse engineering CAD station. Calibration and certification of mechanical and electronic/electrical test and measurement equipment.

Keywords: Non-destructive test centre, calibration mechanical and electrical measurement and test equipment, reverse engineering.

Recent Successes: Canadian Department of National Defence recognized calibration facility. Standards Council of Canada approved inspection and calibration centre. NASA/Rockwell International approved test facility for fracture critical components (Canada's only approved source).

Of Special Note: We would welcome interested parties seeking strategic alliances that could use our inspection, testing and measurement strengths.

RADARSAT INTERNATIONAL INC.

Headquarters
275 Slater Street
Suite 1203
Ottawa, Ontario
K1P 5H9
Tel: (613) 238-5424
Fax: (613) 238-5425

RSI Data Centre
13800 Commerce Parkway
Richmond, British Columbia
V6V 2J3
Tel: (604) 244-0400
Fax: (604) 244-0404

Contact: Mr. Robert E. Tack, President & CEO
Tel: (613) 238-6262
Fax: (613) 238-5425

Product/Service: RADARSAT, due to be launched in 1994, will be the first Canadian remote sensing satellite and will be the world's first operational radar satellite. RADARSAT International (RSI) is a company established by a consortium of Canadian companies involved in space and remote sensing technologies. RSI has been established to process and distribute the RADARSAT data after launch of the satellite. RSI has exclusive commercial rights to distribute all RADARSAT data outside of Canadian government requirements and commitments to provincial and U.S. government partners.

RSI's current operations include the processing, distribution and sale of LANDSAT and SPOT data products in Canada and ERS-1 data in North America. RSI intends to maximize potential sales of data products and services worldwide through private sector entrepreneurship and to develop commercial applications in cooperation with established firms in the value-added business in both the domestic and export markets. With the launch of RADARSAT, RSI will provide a broad range of radar image products for distribution worldwide.

Keywords: Remote Sensing Data, LANDSAT, SPOT, ERS-1, RADARSAT.

Radarsat International has formed alliances for Remote Sensing Educational and Applications Development purposes. RSI is interested in forming similar agreements with other interested organizations. RSI will also be establishing a worldwide distribution network for the distribution of data from the RADARSAT satellite.

SATELLITE INFORMATION SERVICES (SIS)

1601 Telesat Court
Gloucester, Ontario
K1B 5P4

Contact in Canada: Barrie C. Kirk, Vice President
Tel: (613) 748-8785
Fax: (613) 748-8712

Contact Overseas: Technology Appraisals (U.K.) - Brian Payne, Seminar Director
Tel: 44-81-744-1155
Fax: 44-81-744-1149

Products/Services: Satellite Information Services (SIS), a division of Telesat Enterprises Inc., provides information and educational services to a wide range of clients in Canada and overseas. These services - all of which focus on satellite communications - include public and private seminars, a reference book, an industry newsletter, and consulting services. All of the information provided by SIS is supplier-neutral.

Keywords: Seminars, publications, consulting, satellite communications, and telecommunications.

Recent Successes: Satellite Information Services is well-established as Canada's leading provider of information on satellite communications. In 1991, SIS expanded its successful seminar business to Europe, with seminars offered in London and Geneva. In the private seminar area, SIS has also experienced tremendous growth.

Of Special Note: SIS is seeking a strategic alliance in the area of satellite seminars or would be willing to sell its seminar package and adapt the material for interested parties. SIS consulting services focus on satellite data networks, including requirements definition, system and network design, economic studies, trade-off analysis, and specification preparation.

SATLANTIC INC.

Richmond Terminal, Pier 9
3295 Barrington Street
Halifax, Nova Scotia
B3K 5X8

Contact: Dr. Marlon Lewis, President
Tel: (902) 492-4780 **Fax:** (902) 492-4781

Satlantic Inc. is a new company incorporated in Nova Scotia, Canada. The company was established by the principal, Dr. Marlon Lewis, in 1991, and currently employs a staff of 7. Satlantic is located on the Halifax waterfront, leasing 2,500 square feet of office/ manufacturing space. Facilities include a Tempest-class walk-in Faraday cage, optical calibration and characterization equipment, CAD systems, a Silicon Graphics visualization computer, image analysis software, satellite reception antennas, and a range of microwave, optical and computer test equipment.

Product/Service: Satlantic is involved in research, product development and manufacturing in the defence, space and telecommunications fields. Current clients include the U.S. Navy, NASA, the Canadian Space Agency, Orbital Sciences Corp. and GTE/Telos.

Array Antennas: A new family of flat plate, electronically steered, array antennas is under development. Applications include military and civilian telecommunications and remote sensing on both fixed and mobile platforms. Advantages of flat plate antennas include the lack of mechanical steering, a greater aesthetic, covert and aerodynamic profile, and potentially lower manufacturing costs.

Optical Sensors: An optical sensing head for air-deployed oceanographic buoys has been developed for a variety of operational uses, including ground truthing of satellite sensors.

Satellite Earth Stations: Low cost PC-based satellite earth receiving stations for NOAA geostationary and polar-orbiting weather satellites are currently manufactured.

Earth Observation Satellites: Satlantic is involved with a number of earth observing missions, in planning, implementation and data analysis. Work on ocean observing satellite sensors and missions is taking place with U.S., European, and Japanese agencies and corporations, and includes both space and ground segments.

Communications Satellites: Planning and development of several satellite communications systems is underway, ranging form low data rate UHF systems to Gigabit per second applications at Ka band.

Keywords: Array Antennas, Optical Sensors, Satellite Earth Stations, Earth Observation, Satellite Communications.

SCIENTIFIC INSTRUMENTATION LIMITED (SIL)

2233 Hanselman Avenue
Saskatoon, Saskatchewan
S7L 6A7

Contact: Dale Sommerfeldt, Vice President
Tel: (306) 244-0881
Fax: (306) 665-6263

Products: Chemical Agent Detection System, Computerized Data/Command System for Balloons, Nitric Acid Radiometer, Computer Automated Theodolite.

Services: Instrument and Software Development, Atmospheric Research (Arctic), High Altitude Balloon Launch Support.

Keywords: Research, Instrumentation, Balloons, Software, Atmospheric, Theodolite, Radiometer, Nitric Acid, Chemical/Gas Detection.

Recent Successes: Developed a Chemical Agent Detector System for the U.S. Department of Defense (Prototype system was successfully displayed in the 1991 Gulf War). Successfully flew an automatic ballasting balloon system in the Arctic Vortex for 48 hours (ARGOS data collection).

Joint Venture Interest: Arctic atmospheric research using balloon, long duration transglobal balloon systems.

SCINTREX LIMITED

222 Sindercroft Road
Concord, Ontario
L4K 1B5

Contact: Abe Rolnick, President
Tel: (416) 669-2280
Fax: (416) 669-5132

Product/Service: Earth Sciences - Instrumentation; Analytical; Geophysical.

Keywords: Radiometrics, gravity, magnetometers, airborne pollution, seismics, etc.

Recent Successes: Feasibility of use of CG-3 Related Gravity Meter on Mars Land Rover.

Of Special Note: Looking for alliances with other key sensor manufacturers.

SCI-TEC INSTRUMENTS INC.

1526 Fletcher Road
Saskatoon, Saskatchewan
S7M 5M1

Contact: Ken Lamb, Vice President, Science Division
Tel: (306) 934-0101 **Fax:** (306) 978-2339

Products: SCI-TEC has four principal products. The BREWER OZONE SPECTROPHOTOMETER (Brewer) is an automated state-of-the-art ground-based remote sensing system used by researchers world-wide to measure ozone and nitrogen dioxide in the upper atmosphere and sulphur dioxide closer to earth. As a result of the increasing environmental concern over the deteriorating ozone layer, the product sales are increasing annually. This all-weather instrument is microprocessor controlled with precision optical components, and is fully automated for year-round operation using the sun, sky or moon as its light source. There are more than 70 Brewers now in use in 21 countries.

The COSMOS TRACKER is an all-weather positioning pedestal used to point specialized instruments at celestial and terrestrial objects. The primary application of this technology has been as the azimuth (single axis) tracker for the Brewer. A smaller version is under development.

The second major project is PETROTAG, the most accurate fluid measurement gauge in the petrochemical industry. As a result of increased petroleum cost and environmental concerns to prevent or diagnose a spill early, the market for this product is growing annually.

The HILDA (High Line Data Acquisition) system monitors and analyzes power line vibrations for electrical distribution companies. The product consists of a sensitive probe mounted on the power line and communicates by radio to an advanced data collection computer on the ground.

Keywords: instruments, remote sensing, atmospheric, ozone, liquid level sensing, positioning/pointing system, vibration measurement, pollution monitoring, safety.

Recent Successes: Sales of environmental instruments into 20 countries. 60 percent of the $3M sales volume were exported. Three of the senior staff members have many years of experience with Canadian space program projects. Presently SCI-TEC is an active participant in Canada's Networks of Centres of Excellence space research (CNSR) project. SCI-TEC is developing enhanced versions of the Brewer and will be doing some research in the Arctic and Europe.

Of Special Note: SCI-TEC is seeking strategic allegiances in Europe and Russia.

SED SYSTEMS INC.

18 Innovation Boulevard
P.O. Box 1464
Saskatoon, Saskatchewan
S7K 3P7

Contact: Kent McKerlie, Director, Business Development
Tel: (306) 933-1445
Fax: (306) 933-1486

Product/Service: SED is a space and communications company. SED's main export products are satellite in-orbit test equipment, communication satellite monitoring systems and coast/land earth stations for the INMARSAT B/M Global Satellite Network.

Keywords: Satellite Test and Control Systems, Satellite Earth Stations.

Recent Successes: SED has recently been awarded a contract from British Telecom International to provide the Goonhilly Earth Station with an Inmarsat B/M ACSE System. SED is currently under contract to INTELSAT to provide satellite in-orbit test systems in Beijing, China and Clarksburg, Maryland.

SEGITEL INC.

666 Sherbrooke West
Suite 1400
Montréal, Québec
H3A 1E7

Contact in Canada: Maurille G. Seguin
Tel: (514) 845-7151
Fax: (514) 848-0745

Overseas Offices: Senegal - Dakar, Regis D'Astous
Tel: 221 234140
Fax: 221 234137

Tanzania - Dar-Es-Salaam, Rhys Griffiths
Tel: 255 51 37580
Fax: 255 51 37583

Product/Service: Consulting engineers and other professionals in telecommunications, electronics, informatics and project management.

Keywords: Studies and consultation; systems engineering; detail design; procurement specifications; bid evaluation; contract negotiation; construction management; commissioning; cost and schedule control; technical assistance; maintenance planning; technology transfer.

Recent Successes: Panaftel telecommunications network in West Africa; institutional support to National Telcos in five African countries; earth station project in Mozambique; railways telecom rehabilitation in Tanzania.

Of Special Note: 50/50 joint venture with Bell Canada International (SEGIBEL Canada International Inc.); 60/40 joint venture with SaskTel International (SESATEL Inc.), formerly know as Douserv Inc.

SPAR AEROSPACE LIMITED

222 Queen Street
Suite 402
Ottawa, Ontario
K1P 5V9

Contact: Ken MacKay, Director Government Relations
Tel: (613) 563-0230 **Fax:** (613) 563-4284

SPAR Aerospace Limited is engaged in the design, development, manufacture and servicing of systems for the space, robotics, communications, remote sensing, electro-optics and aviation markets. The company employs over 2,700 people, including approximately 1,000 engineers and technicians, one of the largest technological groups in the private sector in Canada. SPAR corporate revenues will exceed $400 M in 1991.

Since its inception in 1968, SPAR has gained international recognition as an advanced technology company with approximately 50 percent of sales destined for the export market. SPAR devotes 20 percent of its engineering activities to research and development, including cooperative programs with numerous Canadian universities.

SPAR, representing about one-half of the Canadian space industry (employment and sales) was selected as the prime contractor for Canada's contribution to NASA's Space Station Freedom program providing the Mobile Servicing System (an advanced Canadarm), as well as the remote sensing satellite RADARSAT, and the mobile communications satellite MSAT, to be acquired by TELESAT Mobile Inc.

SPAR's main products and services include the following: end-to-end satellite systems for communications and remote sensing, satellite earth stations, electro-optic surveillance systems, remote manipulator systems, Time Division Multiple Access/Digital Speech Interpolation (TDMA/DSI), end-to-end communications networks, aircraft component repair and overhaul, specialized precision gear manufacturing for aircraft transmissions, communications and navigation systems for shipborne and land-based applications, stores management systems and crash position indicators for aircraft. The products and services provided are ideally suited for commercial and military markets. Markets also include derivatives of space communications and sensor systems, remote manipulators, sensors and controls, and aviation repair and overhaul services.

SPAR has competitively won over $290 M in export contracts in 1990 and 1991.

The company is comprised of the following major groups: Satellite Communications Systems Group - Ste. Anne de Bellevue, Quebec; Advanced Technology Systems Group - Brampton, Ontario; Aviation Systems Group - Mississauga, Ontario; Applied Systems Group - Kanata, Ontario.

SYNOPTECH VISUAL CONCEPTS INC.

5611 Clanranald
Montréal, Québec
H3X 2S9

Contact: Bernard Guénette, President
Tel: (514) 739-1546
Fax: (514) 738-1625

Product/Service: Visualization of complex 3D environments using computer animation. End-products can be on slides, video film (35mm, IMAX), videodisc, laserdisc, 8mm cassette, etc.

Keywords: Computer Graphics, Visualization, (complex) 3D Scenes, Software Development.

Recent Successes: Participation in a number of R&D projects, one of which totals $55M.

TECHWEST DATA SYSTEMS LIMITED

7680 River Road
Suite 200
Richmond, British Columbia
V6X 1X6

Contact in Canada: Jeff Payne, General Manager
Tel: (604) 273-6336
Fax: (604) 273-4430

Contact Overseas: Alan McLeod, Managing Director
Aberdeen, Scotland
Tel: 0224-725133
Fax: 0224-724962

Product/Service: Stabilized platform for marine satellite communications. Supply and integration of line-of-sight and satellite communication systems for marine and terrestrial applications.

Keywords: Techwest manufactures a stabilized antenna platform which when combined with OEM radio equipment comprises the essential elements of a ship earth station (SES). The system provides an economic solution to the problem of marine satellite communications by using less expensive domestic satellites.

Techwest is also agent for our Scottish affiliate who is a supplier and integrator of all types of satellite and terrestrial communication equipment and systems.

Recent Successes: Techwest is currently the sole supplier of stabilized, satellite communications certified to meet Eutelsat Standard 3 specifications. This certification is required on all vessels operating in European waters which utilize Ku band satellite communications.

Techwest has successfully demonstrated live satellite video teleconferencing during the recent "Jason" archaeological exploration project. This was the first successful, live, two-way teleconferencing from a floating vessel.

Of Special Note: Techwest is currently extending its capability to offer stabilization of larger antennas at sea for use with Ku or C band satellites. This capability will allow inexpensive satellite communications in areas previously only serviced by more expensive alternatives.

TEE-COMM ELECTRONICS INC.

775 Main Street East
Milton, Ontario
L9T 3Z3

Contact in Canada: Al Bahnman, President
Tel: (416) 878-8181
Fax: (416) 878-2472

Overseas Offices: Art Goldstein, Director of Operations, Asia Pacific
TEE-COMM Electronics Inc.
315 Outram Road
#15-05 Tan Boon Liat Building
Singapore 0316
Tel: 65-22-77-335
Fax: 65-22-77-335

Product/Service: Satellite receiving systems, pay fax terminals, ceiling fans and lighting.

Recent Successes: TEE-COMM Electronics Inc. is a $50 million public company and is the largest distributor of satellite receiving systems in Canada. TEE-COMM has recently introduced a new rental program providing satellite television to non-cabled communities in Canada.

Of Special Note: We are interested in customers and/or joint venture possibilities for satellite T.V. equipment distributors.

TELESAT CANADA

1601 Telesat Court
Gloucester, Ontario
K1B 5P4

Contact: W.L. Jurgens, Manager, International Business Development
Tel: (613) 748-0123
Fax: (613) 748-8784

Services: Telesat provides communications satellite consulting services, training and software packages.

Keywords: Satellite strategic planning and business planning frequency coordination, spacecraft program management, contract monitoring services, satellite control systems including (TT & C), satellite operations, earth stations engineering, vast business development and engineering thin route studies, audio and video broadcast services (analog, digital), mobile communications (L-band), telecommunications systems integration, high definition television (HDTV), personal communications services, integrated satellite/terrestrial network design.

Recent Successes:

- Telecom Mexico (contract monitoring)
- Orion Satellite Corporation (program management)
- Asiasat (Hong Kong) (program management)
- Satellite Japan Corporation (spacecraft and launch vehicle proposal evaluation)
- Telesat Mobile Inc. (program management)

TELESPACE LIMITED

174 Ava Road
Toronto, Ontario
M6C 1W5

Contact: Uriel Domb, P.Eng., President
Tel: (416) 781-8002
Fax: (416) 785-0490

Keywords: Satellite communications consulting and engineering services.

Product: Satellite communications consulting and engineering services. Specializing in procurement, monitoring, and testing of new satellite systems, ground control facilities, and launch services. Company's capabilities include all spacecraft subsystems, communications payload, communications ground segment, satellite control and TT&C facilities, launcher interface, and overall launch campaign and on-station operations.

TELESPACE has a highly qualified team of over 25 consultants.

Recent Successes: Overall technical consultant for Thailand's new satellite system.

Consultant for space and ground segment of new generation of INMARSAT satellites, INMARSAT-3.

Consultant for ground segment of INMARSAT-2 and EUTELSAT-2, and launch campaign.

Consultant for procurement of EUROPESAT broadcast satellite.

Consultant for BRAZILSAT, ASTRA, INPE (Brazil), GE AMERICOM, BSB, EUMETSAT, TADIRAN, and IAI (Israel).

Of Special Note: Interested in strategic alliances with companies in South East Asia.

THOMPSON-HICKLING AVIATION INC. (THA)

255 Albert Street
Suite 601
Ottawa, Ontario
K1P 6A9

Contact: J.M. Belcher, President
Tel: (613) 563-3849
Fax: (613) 563-4272

Product/Services: Air Traffic Control and Air Navigation Services company specializing in Engineering, Operations and Management Consulting.

Keywords: Systems Engineering, Air Traffic Control Services, Economic and Financial Evaluation, Project Management, Information Technology, Training, Financial Planning, Reliability/Maintainability Analysis, Weather Forecasting/Observation Operations.

Recent Successes: Air Traffic Control Services for the Canadian Department of National Defence; Transport Canada - Life Cycle Engineering Support in Surveillance, Automation and Navigation; Aviation Strategic Planning for Transport Canada; Systems Engineering Design for Transport Canada; Airspace/Procedural Design for Transport Canada and the Canadian Department of National Defence.

Other: Our specialized skills in systems engineering, air traffic control/air navigation operations and management consulting provide a total integrated systems approach to problems encountered by the aviation community.

THOMSON & NIELSEN LIMITED

1050 Baxter Road
Ottawa, Ontario
K2C 3P1

Contact: J. Paul Lamar, New Business Development
Tel: (613) 596-4563
Fax: (613) 596-5243

Product/Service: Custom design, development, fabrication and test of ionizing radiation detection/dosimeter systems and sub-systems for space applications.

Keywords: Real-time ionizing radiation dosimeters, ionizing radiation effects monitoring systems, radiobiological life science research instrumentation, cosmic rays.

Recent Successes: Recent Canadian Space Agency contracts for radiobiologic life science research and preliminary development of dosimeter instruments for European Space Agency Scientific Technology Research Vehicle (STRV) program.

Of Special Note: Open to any strategic alliances or joint R & D with compatible companies.

TYCOR INTERNATIONAL INC.

6107 - 6th Street S.E.
Calgary, Alberta
T2H 1L9

Contact: Wilfred Frey, President
Tel: (403) 259-3200
Fax: (403) 253-0663

Manufacturer of power conditioning equipment.

Tycor International Inc. is a wholly Canadian-owned company rapidly gaining international recognition as the leader in power protection equipment. Since 1979, our company has been active in providing innovative solutions to power quality problems by taking a system approach to power conditioning. Our customer base consists of industrial, commercial, agricultural, military, medical, telecommunication and residential users of electrical and electronic equipment.

At Tycor, our employees are committed to deliver excellence in quality and service. Tycor complies with the AQAP-1 Quality Assurance Program to ensure that our products are both functionally and cost effective. Through our evaluative service, we address individual application problems, providing informed, qualified recommendations and solutions.

A leader in power conditioning technologies, we combine on-going research and development with field expertise in the manufacture of equipment used to provide computer-grade incorporate finely tuned circuitry which removes Normal and Common Mode Noise as well as preventing electromagnetic transients and massive surges, the conditions caused by brownouts and blackouts, and the very damaging effects of harmonics. Typical applications include computer systems, CAD/CAM, robotics, telecommunication systems, medical and process instrumentation, industrial controls, and security systems.

Our products are marketed throughout Canada and the United States with several export clients including Australia, New Zealand, Hong Kong, Singapore, Chile, Malaysia and various countries throughout Europe.

UMA ENGINEERING LIMITED

1479 Buffalo Place
Winnipeg, Manitoba
R3T 1L7

Contact in Canada: R. Petri, M.Sc., P.Eng., Vice President & Manager
Tel: (204) 284-0580
Fax: (204) 475-3646

Overseas Offices: UMA Engineering (Middle East) Ltd., R. Petri, M.Sc., P.Eng., Chairman
Tel: (204) 284-0580
Fax: (204) 453-9167

Product/Service: Consulting Engineering

Keywords: Industrial; Agri-industrial; Commercial; Institutional; Recreational; Water Supply; Wastewater; Environmental; Solid Waste; Structural; Mechanical; Electrical; Civil; Transportation; Geotechnical.

Recent Successes: $143 Million in Fees in 1991.

Of Special Note: UMA Engineering (Middle East) Ltd. with offices in Cairo, Egypt.

UNIVERSITY OF MANITOBA

Institute for Technological Development
University of Manitoba
Winnipeg, Manitoba
R3T 2N2

Contact: Ray Hoemsen, P.Eng., Director
Tel: (204) 474-6200 **Fax:** (204) 261-3475

Capabilities: The University of Manitoba has several research centres involved in space-related research and development, and actively seeks industrial collaboration.

The **Geophysical Imaging Laboratory** has the capability of developing software and processing a variety of airborne and satellite-borne geophysical and remote sensing data. The lab also has complete processing and imaging capability for conventional and high resolution seismic data for earth subsurface tomography, with applications in non-renewable resource exploration and studies of cold regions and potential nuclear waste disposal sites. Researchers are also developing new spatial artificial intelligence/expert systems for integration/imaging of large volume spatial information, such as global satellite data.

The Department of **Mechanical and Industrial Engineering** has expertise in the areas of aerospace materials, microgravitational processes and mechanisms (kinematics, robotics, manipulator systems). Materials research focuses on material testing and evaluation, failure analysis, fault detection process design, and special heat treating methods. Research into microgravitational processes includes investigations into material processes, heat transfer, fluid flow and microelectronic system cooling.

The Department of **Electrical and Computer Engineering**, has a major research focus on telecommunication, specifically antennas and electromagnetics. Research investigates electromagnetic/material interaction in space, electromagnetic theory, transient analysis of electromagnetics and inverse problems in electromagnetics. It also performs research and development relating to ultra large scale integrated circuits (ULSI).

The **Institute of Industrial Mathematical Sciences** on experts in applied mathematics, astronomy, and statistics to offer research and consulting services to the aerospace industry.

Keywords: Antenna, electromagnetic, Materials, Microgravity, Remote Sensing, Robotics, Solar Wind, Telecommunication, ULSI.

Major Clients: Government of Canada, Government of Manitoba, Swedish State Power Board, Atomic Energy of Canada Limited, Radarsat Project Office (CCRS), NSERC.

VADEKO INTERNATIONAL INC.

2600 Argentia Road
Mississauga, Ontario
L5N 5V4

Contact in Canada: Graham D. Whitehead, Chairman and CEO
Tel: (416) 821-3222
Fax: (416) 821-2232

Contact in U.S.A.: William B. Bishop, Sales, Eastern USA
Tel: (813) 922-5979
Fax: (813) 922-5979

Product/Service:

a) custom designed, manufactured and installed, large-scale robotics utilizing off-line programming and remote control for coating, stripping and cleaning in aerospace and hazardous environments.

b) thin film, high vacuum deposition technology for coatings, manufacture of barrier films and optical security materials.

Keywords:

a) robotics, automation, aerospace, coating, stripping.
b) deposition, thin film, barrier film, coating, optically variable.

Recent Successes:

Under contract for seven vertical cells and three 7 storey high robots for case preparation for the Advanced Solid Rocket Motors Manufacturing facility for NASA.

Several R & D projects for Canadian Space Station projects relating to autonomous robotics and robotic vision.

Design, development, manufacture and application of optical security device for the $50 and $100 bill for Canadian currency.

VANSCO ELECTRONICS LIMITED

1305 Clarence Avenue
Winnipeg, Manitoba
R3T 1T4

Contact: Ed Van Humbeck, President
Tel: (204) 452-6776
Fax: (204) 452-7156

Product/Services: Build to Print - Vansco performs "build to print" work for Original Equipment Manufacturers (OEM's) - building electronics components and products to their blueprints and specifications. Some of our major customers include Ford New Holland, Atomic Energy of Canada, Manitoba Hydro, and Manitoba Telephone System.

Product Development/Electronics Engineering - Vansco's expertise is in developing custom instrumentation and controls. This can include single products or whole systems.

Ford Q101 Quality Rating - Vansco has a Ford Q101 quality rating. This is comparable to the international standard ISO 9002. Statistical Process Control (SPC) is utilized at all stages, from product conception, through to production. Every Vansco employee has been trained in SPC procedures.

Surface Mount Technology - Vansco modern production facility employs the latest in automated SMT equipment providing for faster production times and lower product costs.

Vansco Products - Vansco manufactures and markets many agricultural equipment products, industry standard computers, DTMF microphones for Specialized Mobile Radio applications, powerline disturbance recorders for electrical utilities, and specialized test equipment for Space Station related product support.

Keywords: Build to Print, Surface Mount Technology, Product Development, Instrumentation and Control, Electronics Engineering.

Recent Successes: In the past 12 months, Vansco has Designed and/or manufactured three test rigs which are part of the ground support test facility required for testing components to be deployed on the Space Station.

Of Special Note: Vansco is presently seeking agents and distributors for its foreign markets. Interested parties should contact Mr. Ed Van Humbeck at the address indicated above.

VARIAN CANADA MICROWAVE PRODUCTS

45 River Drive
Georgetown, Ontario
L7G 2J4

Contact in Canada: Andrew E. Tafler, Marketing Manager
Tel: (416) 877-0161 extension 254
Fax: (416) 877-5327

Overseas Offices: Mr. Franco Sibille, Director - European Operations
Tel: 011 41 42 448 844
Fax: 011 41 42 413 446

or

Mr. Dan Tyson, Far East Sales Manager
Tel: 011 81 3 3588 9730
Fax: 011 81 3 3588 9925

Product/Services: Varian Canada Microwave Products manufactures and markets worldwide microwave and millimeter frequency tubes and subsystems as well as specialized high voltage power systems. A specialty of the Division is high power extended interaction klystrons (EIK's), both oscillators and amplifiers, for cw and pulsed applications from 30 to 280 Ghz. Varian Canada integrates these EIK's in millimeter wave transmitters for ground based, airborne and shipboard radar and communications systems as well as scientific systems. The specialized high voltage power systems (to 100 Kw an 150 kV) utilize state-of-the-art switching techniques applicable to microwave tube, x-ray equipment and semiconductor processing equipment applications. Other tubes and equipment manufactured by Varian Canada include microwave line-of-sight, travelling wave tubes (TWT) and TWT amplifiers from 2 to 14 Ghz and up to 25W cw; power klystrons for military and commercial Satcom and Tropo communications systems from 2 to 14 Ghz and up to 3.5 Kw cw; reflex and millimeter reflex klystrons from and to 300 Ghz.

Varian Canada's customers worldwide include major communication common carriers, scientific agencies and universities around the world, major radar and communications OEM's, the governments of most NATO countries and many commercial and industrial OEM's. The vast majority of Varian Canada's products are exported, mainly to the U.S. with significant and growing markets in Europe and the Far East.

Keywords: microwave, millimeter wave, power supplies, transmitters, radars, klystron, TWT, amplifiers, oscillators, modulator.

WARDROP ENGINEERING INC.

600 - 6725 Airport Road
Mississauga, Ontario
L4V 1V2

Contact: E.C. Card, Vice President, General Manager
Tel: (416) 673-3788
Fax: (416) 673-8007

Keywords: Ground support equipment, mechanical flight hardware, engineering services, design services, finite element analysis, integration and test, test planning, quality assurance, failure, and modes and effects analysis.

Product/Service: Design and supply of custom ground support equipment for space applications, design and supply of space qualified mechanical flight hardware, design and analysis of custom mechanisms for space applications, integration and test equipment, systems and planning, quality assurance and quality control for space flight hardware.

Recent Successes: Wardrop Engineering was recently selected to provide the mechanical ground support equipment, as well as the space-qualified grapple fixtures for the Canadian mobile servicing system, Canada's contribution to NASA's Space Station Freedom.

Of Special Note: Wardrop Engineering Inc. is a multi-disciplined Canadian engineering company with specialized expertise in space systems engineering, aerospace ground support equipment, as well as other high technology industries such as nuclear power, industrial automation, and process engineering.