Ministry of State
Science and Technology Canada

Ministère d'État
Sciences et Technologie Canada

CANADIAN SPACE PROGRAM

PROGRAMME SPATIAL CANADIEN

CSP PSC

European Space Opportunities

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Canada

EUROPEAN SPACE OPPORTUNITIES

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(aussi disponible en Français)

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I. EUROPEAN SPACE AGENCY

1. GENERAL INTRODUCTION

The European Space Agency replaced the former ELDO (launchers) and ESRO (satellites), grouping the complete range of civilian space activities in a single agency - ESA. The Convention creating ESA was signed on 30 May 1975 and ratified on 30 October 1980.

o Members and Associated States

- Member States

  Belgium
  Denmark
  France
  Ireland
  Italy
  Federal Republic of Germany
  Austria
  Netherlands
  Spain
  Sweden
  Switzerland
  United Kindgom
  Norway

- Associate Member

  Finland

- Agreement for Close Cooperation

  Canada

o Main Aims of ESA

- Provide for and promote, for exclusively peaceful purposes, cooperation among European states in space research, technology and applications;

- Elaborate and implement a long-term European Space policy;

- Elaborate and implement a European space program;

- Progressively "Europeanize" national space programs;

- Elaborate and implement an industrial policy.

2. ORGANIZATION

o Governing Bodies

- Council:

  ESA's policy-making body composed of representatives of Member States; may meet at delegate or at ministerial level; adopts programs, plans and budgets; (one state = one vote)

- Subordinate Bodies:

  Communications, Earth Observation, Columbus, Microgravity and Ariane Program Boards; Science Program Committee; Industrial Policy, Administrative and Finance and International Relations Advisory Committees

o Executive: Prof. Reimar Lust (FRG)
Director-General

- Directors:
  - Administration (G. Van Reeth)
  - Telecommunications Programs (G. Salvatori)
  - Earth Observation and Microgravity (P. Goldsmith)
  - COLUMBUS (F. Engstrom)
  - Spacecraft Operations (located at Darmstadt) (K. Heftman)
  - Scientific Programs (R. Bonnet)
  - Launcher Systems (M. Bignier)
  - Technical Directorate (located at Noordwijk) (M. Lefevre)

o Establishments:

- ESTEC (European Space Research and Technology Center) located at Noordwijk in the Netherlands is the largest facility. Responsible, with program directors, for the study, design, development and testing of

spacecraft in collaboration with industry and the scientific community. ESTEC is also responsible for applied research in space technology.

- ESOC (European Space Operations Center) is located at Darmstadt in Germany. Responsible for all satellite operations, corresponding ground facilities and communications networks.

- ESRIN (previously European Space Research Institute) is located in Frascati, near Rome, Italy. Responsible for operation of the most powerful automated documentation retrieval system (IRS) in Europe, with a file of 35 million references. Earthnet (see Section IV) operations are also located at ESRIN.

o Staff:

The total staff at headquarters in Paris, the establishments in Holland, Germany and Italy and smaller centers in French Guyana (Ariane Launch Site) and Toulouse (Meteosat Program Office), plus the NASA Liaison Office in Washington, is expected to number about 1800 in 1988.

o Finance:

ESA is financed by its Member States which contribute on the basis of a percentage of Gross National Product (GNP) to the General and Scientific Budgets and on an "à la carte" basis to optional programs.

- Budget 1988: 1.4 billion Accounting Units (AU);

- Budget is expected to rise to about 2.6 billion AU by 1994.

NOTE: at the time of writing, one AU equals approximately C$1.7. The exchange rate varies. Of interest to companies is the rate in force at the time a bid is submitted.

3. LONG TERM PLAN

In November 1987, the ESA Council met at Ministerial level and approved a long-term program which set the direction for European space policies and programs for the rest of the century. The program is ambitious. It is designed to expand Europe's autonomous capability and its competitiveness in all sectors of space activity. The ESA budget will have trebled between 1984 and 1994. The long-term program covers science, microgravity research, earth observation, telecommunications, technology, space transportation and in-orbit infrastructure.

4. MANDATORY PROGRAMS

The following programs are obligatory for Member States:

- Basic Activities: General Budget, General Studies, Technology Research, Earthnet...(See Section IV for details)

- Scientific Program: (Note: ten scientific spacecraft were launched under ESRO auspices between 1968 and 1975)

ESA Project	Launch date
- IUE (International Ultraviolet Explorer)	January 1978
- ISEE (International Sun-Earth Explorer)	October 1977
- EXOSAT (X-ray Observatory Satellite)	May 1983
- GIOTTO (Encounter with Halley's Comet)	July 1985 on Ariane
- SPACE TELESCOPE/GALILEO (Joint ESA/NASA project)	originally scheduled 1986 on Shuttle; NASA delay

ESA Project	Launch date
- ULYSSES (ex-ISPM, International Solar Polar Mission)	originally scheduled 1986 on Shuttle; NASA delay
- HIPPARCOS (measurement of star positions)	scheduled 1988 on Ariane
- ISO (Infrared Space Observatory)	scheduled 1992 on Ariane

New projects currently under study include Cluster, Soho and Lyman/QUASAT.

5. OPTIONAL PROGRAMS

A. Telecommunications

Project		Launch date
o OTS-1 (Orbital Test Satellite)		May 1978
o ECS (European Communications Satellite)	ECS-1	1982
	ECS-2	1984
	ECS-3	launch failure Sept. 1985
	ECS-4	May 1986
	ECS-5	May 1987
o MARECS (Maritime European Communications Satellite) Leased to INMARSAT		
	- MARECS A	1981
	- MARECS B	1982 launch failure
	- MARECS B2	1984
o OLYMPUS (L-SAT)		February 1989
Canada participates; see Section II		
o ARAMIS Aeromaritime Mobile System		1992

o	DRS (Data Relay Satellite)	1995
o	AOTS (Advanced Orbital Test Satellite)	1996

The last three projects are currently in the study phase and form part of Europe's long-term space plan. Mission studies, identification of requirements and system analysis are being pursued under preparatory and technology development programs i.e. PSDE (Payload and Spacecraft Development and Experimentation Program) in which Canada participates, and ASTP (Advanced Systems & Technology Program), in which Canada does not participate.

B. Earth Observation

o Meteorology

- Meteosat 1 & 2; launched 1977 and 1981

- Meteosat P2; launched in 1987 on Ariane

- Meteosat Operational
  Foresees the launch of 3 new satellites in period 1988-90. The EUMETSAT (European Meteorological Satellite Organization) Convention, signed in 1983, entered into force in 1986. Eumetsat now has the responsibility for establishing, maintaining and operating the Meteosat operational satellite system.

o Remote Sensing

- ERS-1: Canada participates; see Section II. Expected to be forerunner of a series of European remote sensing satellites to become operational in 1990s. Ocean and ice mission of both scientific and economic value. High-resolution images in all weather conditions due to Synthetic Aperture Radar (SAR) sensor. Launch early 1990.

- ERS-2: Same mission. Launch to be proposed for 1992 or 1993.

As part of the long-term plan, advanced meteorology, a solid earth mission and instrument development for future polar platforms are also under study within the Earth Observation Preparatory Program (EOPP) in which Canada participates. See Section II for details.

C. Ariane Launchers

o To provide Europe with its own launch capability, development leading to the Ariane series began in 1974. Twenty Ariane launches have taken place to date, with four failures since the system entered its operational phase. Starting with the ninth launch in May 1984, the enterprise has been carried out under the responsibility of the Arianespace Company on a purely commercial basis. This consortium of 36 shareholders funds, manufactures, markets and launches Ariane vehicles.

o Ariane I-IV

ESA States participating in the Ariane production program funded the development of a three-stage launcher (Ariane I) which can place 1825 kg in geostationary transfer orbit. Two uprated versions of this vehicle were developed in a follow-on program and Ariane III is currently being used for satellites with a mass of up to 2580 kg. Development of an even more powerful version, with a wide range of possible performances started in 1982. The first Ariane IV was launched in 1987. In addition to automonous launch capability, Europe has now acquired a substantial share of the large international satellite market. Arianespace recently announced orders for the future launch of 30 satellites, comprising a backlog of one billion dollars and a 50% share of the market.

o Ariane V

ESA's long term plan includes the development of Ariane V, a three-stage launcher powered by a single cryogenic engine. Ariane V design is

expected to permit simultaneous placing of 2 or even 3 satellites into geostationary transfer orbit with a mass of up to 8 tonnes. Ariane will also be man-rated for missions such as the Hermes spaceplane that may be expected towards the end of the century. The first Ariane V is being planned for launch in 1995.

D. In-Orbit Infrastructure

ESA entered the manned space field with the flight of Spacelab on the NASA Shuttle orbiter Columbia in 1983. Europe's long term goal is an automonous space station which will provide European scientists and industrialists in the next century with a permanent platform for research and materials processing. In preparation, ESA has designed a long-term program to include:

	Project	Date
o	Participation in NASA and International Spacelab missions as test-bed for technology and system development;	1983-1993
o	Eureca - unmanned, retrievable free-flyer with microgravity payload, earth observation & science applications;	1989 launch
o	COLUMBUS - ESA contribution to USA Space Station includes: pressurized module, polar and co-orbiting platforms. In addition, ESA is carrying out supporting technology and user development programs;	1996
o	Microgravity: development of Biorack (for life science experiments), upgrading of Fluid Physics module, space sled (study of vestibular functions), Anthrorack;	1982-1988

Project	Date

- o In-orbit Technology Demonstration: program will provide frequent in-orbit demonstration opportunities for European technologies prior to their incorporation in the development phases of new projects;

- o Hermes: French spaceplane initiative that became an ESA optional program in 1986. Canada participates in Phase B preparatory program. 1997-1998

6. EUROPEAN INDUSTRY

This brief overview of major ESA programs underlines the achievements of European space cooperation over the last decade and especially the ambitious new plans for the future. Thanks to ESA, the space industry in Europe has built up a considerable fund of expertise and is competing successfully for its share of the global market. The long-term program seeks to ensure the further progress of European industry by keeping it at the edge of future technology developments and new applications.

II. CANADA AND ESA

1. FRAMEWORK

Canada has had two Cooperative Agreements with ESA. The first was signed in 1978, the second in January 1984 for a five-year term. Canada is the only non-European state in close association with ESA.

Under the terms of the Agreement

- the Canadian government contributes to specified items of the General Budget - this contribution is essentially a "membership fee". (Contribution to the whole General Budget on a GNP basis is mandatory for full Member States of ESA).

- Canada can participate in optional programs of interest: the government's contribution to an optional program entitles Canadian industry to receive a proportional share of contracts.

- Canada has a voice in certain policy issues by participating in the boards and committees which oversee programs and policies.

- Canada is not obliged to contribute to all programs that are mandatory for Member States, notably the Science program.

- Canada is excluded from participating in ESA's Technology Research Program (mandatory for Member States).

The Canadian government is currently considering the terms and conditions for continuation of cooperation with ESA for the period after 1988 when the present Agreement expires. Negotiations in 1988 will set the framework for Canada/ESA relations over the next decade: are we going to be a more or a less committed partner? The involvement of Canadian industry in determining our future course with ESA is critical.

2. OBJECTIVES

Canada's objectives of association with ESA are:

- Industry-related: to enable industrial access to advanced European space technology, in particular to technology R&D, and to European markets.

- : to enhance possibilities for Canadian/European industry partnerships.

- Program-related : to participate in the decision-making process so that programs in which Canada participates are adapted to meet Canadian needs.

- : to have access to program benefits at significantly reduced cost, through cost-sharing program participation.

- Strategic : to reinforce our credibility as a significant space player by participating in an international high-technology arena.

- : to strengthen our economic and political ties with Europe in an advanced technology arena.

3. STATUS OF PARTICIPATION

A. Major Optional Programs

Canada participates in two major optional programs of ESA. For optional programs the government's level of contribution is discretionary and the industry then receives the equivalent percentage of contracts to implement the program.

Olympus (formerly called L-SAT)

- Large communications satellite. Heavy satellite designed to meet requirements of future missions that will be much more exacting in terms of transmission capacity and on-board power.

- Program was initiated in 1980; currently in Phase C/D; satellite due to be launched early in 1989.

- Canada's share of program is 11%. Contracts have been awarded to two Canadian companies for solar array subsystem, assembly integration and test support, payload amplifiers and microwave components for payload.

ERS-1

- European Earth Resources remote sensing satellite for coastal, ocean and ice applications.

- Canada has been involved since 1980 preparatory phase leading to program; currently in Phase C/D; satellite due to be launched early in 1990.

- Canada's share of development program is approximately 6.1% and of the operational phase 7.6%. Contracts in Phase C/D have been awarded to three Canadian companies for ground segment (prime contractor), data handling system and microwave components; these contracts represent full industrial return to Canada for Phase C/D.

B. Preparatory Programs

The Canadian Space Program includes participation in ESA preparatory and supporting technology programs in the telecommunications and earth observation sectors, and in the preparatory program for the Hermes spaceplane. These are also optional programs, and contracts to Canadian industry in proportion to the government's share of contribution are normally assured.

The Department of Communications manages the government's contribution to ESA's telecommunications programs; the Department of Energy, Mines and Resources manages the government's contribution to ESA's earth observation programs; the National Research Council manages Canadian participation in Hermes.

(See Section VI for the names of people to contact for further information.)

Communications:

Canada is participating in ESA's Payload and Spacecraft Development and Experimentation Program (PSDE). ESA views the PSDE as the backbone of its future activities in the field of telecommunications. It covers studies previously undertaken in ESA's Telecommunications Preparatory Program (TPP), spacecraft and payload development, and in-orbit experiments in order to prepare for communications related missions foreseen in the 1990s. Phase B candidate payload developments are underway and one payload may begin its development phase as early as March 1988. Canada is involved in Phases A + B, and looking at involvement in subsequent phases.

PSDE activities are as follows:

- mission, system and configuration studies
- coordination with and support activities to other disciplines and other organizations
- development of new payloads
- definition, development and launching of new pilot systems for in-orbit demonstration and testing
- experiments and demonstrations with existing satellites and systems
- improvement of competitiveness

These activities will be grouped into program slices with some slices being executed in phases. While all participating states must contribute to the Basic Support Line, states may elect only to participate in one or more of subsequent slices.

Slice I, the Basic Support Line (BSL), consists of studies, market surveys and economic analyses, identification of need for system and hardware development and in-orbit experimentation, definition of payload and spacecraft elements, etc. Anticipated total funding is 5 MAU p.a. with 50% being earmarked for industrial contracts.

Eleven candidate payloads comprise Slice II, Pre-Development/Development of Payloads (DOP) for a possible flight opportunity in the early 1990s. Examples are

- o aeronautical/maritime mobile payload (ARAMIS),
- o land mobile experimental payload, and
- o optical inter-orbit links (GEO/LEO orbits)

ESA envisages a budget of 122 MAU for this program slice spread over the four calendar years to the end of 1989.

Slice V, Phases C/D/E of the PSDE Program, encompasses manufacturing, launch and experimentation of the payloads, and is expected to begin in January 1989. The budget currently foreseen for Slice V is 480 MAU, to the end of 1996.

Earth Observation:

Canada is also participating in the Earth Observation Preparatory Program (EOPP). The EOPP will prepare the way for ESA's future earth observation programs: polar orbit for land, ocean, ice and atmosphere, second generation METEOSAT, and solid earth programs. In addition, the EOPP will prepare advanced instruments for development and provide flight opportunities for promising payloads. EOPP activities include: mission concept studies, instrument concept and feasibility studies, ground segment studies, measurement campaigns, technology pre-development, economic benefit studies, and phase A studies.

The work done within the EOPP is be generally of a phase A nature, sufficient to prepare a definition of each future program to the point where it can be spun off as an individual program, starting at Phase B.

The EOPP has a total budget of approximately $70 million Canadian and will run from 1986 to 1990. The Canadian share is six percent.

Hermes:

Canada is participating in the preparatory phase of the Hermes program - a spaceplane or mini-shuttle, intended to fly in 1998. Canadian involvement in the preparatory program is focussed on the Hermes Robotic Arm (HERA). The total Hermes program cost is currently estimated at 5.9 billion AU.

C. Activities Funded Through ESA's General Budget

Unlike contributions to optional programs where the government chooses how much it will contribute, Canada's contribution to certain components of the General Budget is fixed by the terms of the Canada/ESA Cooperative Agreement.

These components are: education, fixed common costs, Earthnet, investments, fixed support costs and general studies. Canadian industry is eligible to compete for contracts in these areas, but ESA is not obliged to guarantee a percentage return to industry commensurate with the government's contribution. The return to Canadian industry on General Budget contracts is strictly on the best efforts basis of the Agency. Canada's industrial return on activities funded by the General Budget has traditionally been low, but has recently improved.

See Section IV for a fuller description of General Budget activities and opportunities available to Canadian industry to take better advantage of Canada's contribution to these items.

4. CANADIAN SPACE COUNSELLOR

In order to serve the interests of the Canadian space community - government, industry and universities - in the European Space Agency, Canada has a full-time Space Counsellor assigned to the Canadian Embassy in Paris.

The Counsellor represents Canada on the various boards and committees of ESA which oversee the programs and policies of the Agency. The most important, for Canadian industry, is the Industrial Policy Committee, discussed in Section III.

It is essential that companies establish and maintain contact with the Space Counsellor so that Canadian industry interests can be promoted on a regular basis within the Agency. See Section VI for details.

5. PROGRAM FOR EXPORT MARKET DEVELOPMENT (PEMD)

Companies may be able to benefit from PEMD in seeking opportunities to do business with ESA. PEMD is a trade promotion program of the Department of External Affairs. PEMD offers assistance to Canadian businesses to participate in or undertake various types of export promotion activities. PEMD covers projects initiated by both government and industry, and is designed to assist companies regardless of size.

The Program's main objective is to stimulate economic growth in Canada by increasing export sales. PEMD accomplishes this by sharing with Canadian businesses the costs, and therefore the risk, of export marketing market activities that a business would not, or could not, normally undertake on its own. PEMD encourages Canadian businesses that have not previously been involved to become involved. PEMD also encourages existing Canadian exporters to enter new geographic and product markets. See Section VI for details on who to contact regarding PEMD.

III. ESA CONTRACTING OUT PROCESS

1. POTENTIAL TENDERERS - ESA BIDDERS LIST

ESA maintains a list of potential tenderers - including Canadian firms - to serve as a basis for inviting tenders. Potential tenderers must register by submitting information on their legal financial and professional status to the ESA contracts office in Paris (head: Mr. W. Thoma) before qualifying for inclusion on the list. The list is regularly updated and applications for inclusion can be submitted directly to ESA by potential Canadian tenderers. The forms are available from MOSST. Copies when completed should be sent to MOSST and to the Space Counsellor based at the Canadian Embassy in Paris.

2. ADVANCE INFORMATION ON TENDERS

ESA issues free of charge two lists of intended invitations to tender (ITTs) - one for open and restricted tenders, and one for directed tenders - to all potential tenderers registered on ESA's bidders list. The competitive tenders (open and restricted) cover contracts exceeding 50,000 Accounting Units (50 KAU). ESA issues between 100 and 150 ITTs per year.

The list of intended competitive ITTs is published annually and updated once or twice during the year. It outlines all the contracts for which ESA intends to invite tenders during the year and identifies the countries whose industries are eligible to bid.

NOTE: Companies must respond to the list of intended ITTs by notifying ESA of the specific ITTs they wish to receive. Having registered this interest the company will receive the ITTs when ESA issues them.

See Section V for a guide to ITTs.

3. INDUSTRIAL POLICY

The ESA Industrial Policy is designed to:

- meet the requirements of the European Space program in a cost-effective manner;

- o improve the world-wide competitiveness of European industry by developing space technology and by encouraging the development of an industrial structure appropriate to market requirements, making use of the industrial potential of all member states;

- o ensure that all member states receive an industrial return commensurate with their financial contribution to ESA programs;

- o exploit the advantages of free competitive bidding in all cases, except where this would be incompatible with other defined objectives of industrial policy.

Implementation of this policy means that the industries of ESA member states are normally given preference in the placing of contracts. The exception to this rule is in optional programs where participants are given preference over non-participating member states. As a consequence of an ESA ministerial-level decision, particular preference is now also being granted to the industries of those states whose overall return requires improvement. As noted in Section II, Canada has had an inadequate industrial return in respect of the General Budget but the situation is now improving. Although compensation to Canada has a lower priority than compensation to member states, Canadian firms will be entitled to participate in tender actions originating from programs to which the government does not contribute until the Canadian return reaches equity. In these cases, Canadian bid eligibility is normally stated on the invitation to tender.

4. INDUSTRIAL POLICY COMMITTEE (IPC)

The definition, implementation and monitoring of the Agency's industrial policy, the approval of procurement proposals and the authorisation of certain types of contracts are delegated by the ESA Council to the IPC. This committee is composed of representatives of the member states of the Agency.

Under the terms of the cooperative agreement with ESA, Canadian delegates also attend the IPC with the right to express views on all matters under discussion, and to vote on proposals funded by the general budget outputs and the optional programs to which Canada contributes. Canada's Space Counsellor participates in the IPC.

5. PROCUREMENT PROCEDURE

Prior to the issue of an ITT, the ESA executive must submit for IPC approval procurement proposals in the following cases:

- o general studies exceeding 100 KAU;
- o technological programs exceeding 200 KAU;
- o ground and facility investments (hardware and software) exceeding 500 KAU;
- o space segment procurements exceeding 500 KAU;
- o technical assistance, maintenance and operation, equipment rentals and use of outside facilities facilities exceeding 500 KAU;
- o other cases where the IPC has asked for a submission, or where the executive considers that a procurement will give rise to a possible conflict with the directives governing ESA industrial policy.

6. TENDER PROCEDURE

- o open competitive tender is the normal procedure for the placing of contracts;
- o restricted competitive tender may be applied:
  - for special supplies or services within the capability of only a few potential tenderers;
  - if IPC has decided that a procurement should be limited for industrial policy reasons.

- o Non-competitive tender may be applied:
  - if only one source exists;
  - where for scientific, technical or cost reasons, contracts for additional or supplementary supplies or services cannot be separated from a previous contract;
  - if IPC has decided that a tender should be issued on a non-competitive basis for industrial policy reasons;
  - if supplies or services required are the subject of intellectual property rights and thus can only be procured from one source;
  - if the expenditure involved does not exceed 50 KAU.

7. CONTRACT PROPOSALS

Prior to the award of a contract, the ESA executive must submit for approval of IPC contract proposals in any of the following cases:

- o where the outcome of the Tender Evaluation Board leads to a recommendation on the choice of a contractor or sub-contractor which is contrary to directives or guidelines issued by IPC;
- o where IPC has expressly asked for submission of a contract proposal;
- o where the intended contract involves expenditure exceeding 50 KAU in a non-member state not participating in the program;
- o where the contract value was initially estimated below the limits necessary for a procurement submission to IPC (see para 5 above), but a later estimate based on tenders received indicates that the limits will be exceeded.

8. TENDER AND CONTRACT DOCUMENTS

In addition to the list of Intended Invitations to Tender, two documents outlining conditions for the presentation and submission of tenders and for the execution of contracts are distributed to all potential tenderers registered with the Agency. These documents are entitled "General Conditions of Tender for ESA Contracts" and "General Clauses and Conditions for ESA Contracts." They detail general standards of presentation, formal conditions, commitments and undertakings, planning and costing requirements, conditions relating to intellectual property rights, subcontracts, communications, dispatch and receipt, general financial and legal provisions, special guarantees and the rules governing the execution of work. Both are available from MOSST.

The average number of submissions by industry for each contract awarded falls between three and four, but 10 or more offers for a particular topic are not uncommon.

IV. CANADA'S INDUSTRIAL OPPORTUNITIES

1. GENERAL BUDGET

As discussed in Section II, Canada contributes to certain outputs of the ESA General Budget as the entry fee for access to optional programs.

These General Budget items are:

- Education (budget code 63) - 20 external fellowships, tenable in universities or institutes are awarded each year, along with 30 internal fellowships tenable in ESA technical and operational establishments in the Netherlands (ESTEC), Italy (ESRIN) and Germany (ESOC). This output offers no contract opportunities, but does present Canadian post-graduate scientists or engineers (M.Sc. or Ph.D.) the chance to obtain a year's experience on a European space program of interest.

- Fixed Common Costs (budget code 90) - Administrative expenditure incurred in the day-to-day running of ESA H/Q and establishments. These costs include travel, public relations, hospitality, conferences, contributions to various federations, rental and external services, equipment maintenance and purchase. Examples of contracts let under Fixed Common Costs include distribution of ESA news and press releases and the setting up of an ESA pavilion at the Paris Air Show.

- Earthnet (budget code 65) - The main objective of the Earthnet program is the reception and preprocessing of remote sensing data from Landsat and the exploitation of data from such other missions as Nimbus, Seasat and HCMM. The Earthnet output will also cover studies and investments relating to the future reception of ERS-1 and proposed foreign missions.

- Investment (budget code 93) - This output covers all common purpose investments to extend or improve ESA's technical support capability. New test facilities or the expansion of a laboratory are examples of expenditures under this category.

- Fixed Support Costs (budget code 88) - This output is the expenditure required to maintain the support facilities in an operational condition, and the costs associated with maintenance of managerial and intellectual capacity to ensure future project support. Although a substantive portion of the fixed support output is related to personnel costs, a wide variety of studies, assessments, software developments and procedure evaluations are contracted out to industry. A glance at the 1987 list of ITTs offers the following example of procurements:

  - Ground network process control and communications system software development and support
  - Advanced monitor and control concepts
  - Feasibility of remotely-accessible satellite data base

- General Studies (budget code 60) - General Studies funding is used to support studies on future projects. Sixty percent of the budget supports the placing of contracts in industry. The remainder is used to hold colloquia and to call in consultants on ESA future programs and to deploy the personnel needed for internal studies as well as for the organization and monitoring of all future-oriented activities. Contracts are awarded for preliminary Phase A research in program areas of ESA interest: science, telecommunications, earth observation, microgravity, space transportation and in-orbit infrastructure. General Studies funding is used to prepare the foundation of new projects and, in some instances, to supplement the budgets of follow-on preparatory programs which may not yet be fully funded.

The IPC approves the bi-annual list of activities to be supported by the General Studies budget. In 1987, this list included the following examples:

- Study of communication network simulation techniques
- Long-term scenarios and mission models
- Study of a logistics module for servicing of the International Space Station

2. NEW OPTIONAL PROGRAMS

Canada is participating in telecommunications and earth observation preparatory programs. As noted in Section II, these programs present contract opportunities proportionate to the share of the government's contribution to these activities. As described in Section I, however, ESA is also embarking on a broad and ambitious ten-year program which will cover a whole range of space infrastructure, technology development and applications activities. Although Canada is not able to participate financially in all these new programs, there may be opportunities for Canadian industry to secure small sub-contracts as compensation for Canada's deficit industrial return. The variety of supplies and services needed by the growing programs of the Agency offer possibilities which should be exploited.

3. CONTRACT STRATEGIES

General:

Canada's industrial return in ESA's optional programs is satisfactory, since the contribution is geared to the amount of work contracted to Canadian industry. As noted earlier, however, our contributions to General Budget items are fixed by the terms of our Cooperative Agreement. In the past, Canada has had a low industrial return on the General Studies output and almost no return on other outputs of the General Budget. In the latter case, the deficit in return

from the investment and fixed support outputs may be partly geographical in basis. The distance separating Canada from Europe obviously impedes our ability to secure infrastructure, service and technical assistance contracts. On the other hand, procurements funded by the fixed support output suggest the possibility of studies that are well within Canadian competence. Our industrial return on General Budget contributions has recently shown a marked improvement; Canada's objective now is to sustain this healthier situation.

With regard to General Studies, since these contracts cover primarily mission analysis and system-type work, most of them tend to be allocated to prime contractors. A long-standing problem for ESA is ensuring the participation of firms from smaller European countries in system-level activities in order to keep them in touch with strategic developments that may have a vital impact on later work at subsystem or component level. In Canada's case, the problem of low return stems not from the absence of prime contractor capability, but rather from the narrow base of our involvement in the overall program of the Agency. General Studies contracts lay the groundwork for the science program and for most of ESA's optional programs in areas where Canada has shown little interest. Hence with no assurance of follow-on Canadian participation in European space transportation, microgravity, science, space infrastructure or data relay programs, ESA has not encouraged Canadian bids.

A concerted attempt by Canadian government and industry is required to overcome these disadvantages and to have ESA continue to award contracts to Canadian companies under General Budget outputs. Some strategies are suggested below. Basic conditions are that companies should become thoroughly familiar with ESA's programs and plans, and make their own areas of expertise and targeted interests known in ESA establishments. A focussed approach, matching specific capabilities with ESA interests, should yield results.

o Open Competitive Bids

- The list of intended invitations to tender (open and restricted) should, when issued at the beginning of each year, be combed through for opportunities funded by the programs to which Canada contributes and especially by the General Budget outputs which the government supports, i.e. Fixed Common Costs, Earthnet, Investment, Fixed Support Costs, and General Studies. Of these, General Studies is the output most likely to offer interesting possibilities, while Fixed Common Costs is the budget least likely to provide contract opportunities. Even though Canadian industry might never obtain an ESA prime contract in General Studies, it could pursue parallel contracts in mission analysis and system-level work to provide ESA with an alternative source of ideas.

- On programs where Canada does not contribute, experience shows that the most successful approach is via a teaming arrangement with European firms. Chances are improved if the subcontract is small (less than 50 KAU) and if a special competence is involved that is not readily duplicated by a firm in a contributing member state with a similarly low return. Following this strategy, a Canadian firm was awarded a small contract in the Technology Research Program (TRP) - an activity actually excluded from Canadian participation under the terms of the Cooperative Agreement. Although ESA has expressed willingness to help Canada sustain its improved return, negative political factors can intervene. In another case, a participating member state in a program to which Canada does not contribute insisted during the contract approval process in IPC that a small sub-contract be reallocated from a Canadian company to a firm in the participant country, despite the superiority of the Canadian bid.

In sum, contracts in programs where Canada is not involved are possible but disappointments sometimes occur. Patience and a measure of extra effort are required.

- In either of the above instances, it is essential that the Space Counsellor be informed of a company's intentions and be kept aware of the status of a bid. Through contacts with the ESA executive, interaction in the IPC and liaison with member states, the Space Counsellor is in the best position to evaluate a contract or program situation, to help solve problems and to offer guidance to industry.

o Restricted Competitive Bids

- As explained in Section III.6, ESA may initiate a restricted invitation to tender in cases where only a few contractors possess the required capability. More frequently, IPC accepts restriction of an ITT in order to improve the industrial return and/or technological capacity of smaller member states. Canadian firms might be able to benefit from this process by teaming up with a firm from one of these states, e.g. Belgium, Sweden, Spain, or the Netherlands. A teaming approach might also be successful on procurements which do not require IPC approval (see Section III.5). For example, the ESA executive might agree to a restricted tender for the sake of improving industrial return on a general studies contract not exceeding 100 KAU.

o Non-Competitive Bids

- Directed Tenders: the single best opportunity to secure new work for Canadian firms and hence to improve Canada's industrial return may be on contracts where the expenditure does not exceed 50 KAU. So long as the cost remains under this amount, non-competitive tender may be applied, and the contract need not go to IPC for approval even when Canada is not contributing to the

supporting budget. Small studies sometimes lead to conclusions that necessitate additional work - often at a cost that exceeds the initial undertaking. Thus directed tenders may also present an opportunity that could take the form of a rider or a separate contract. Non-competitive tender would again be applied if the additional work (exceeding 50 KAU) could not be separated from the previous contract for technical reasons. In this case, however, the contract would have to be submitted to IPC if Canada were not participating in the program.

ESA's list of directed ITTs serves essentially as a record of ESA's intention to issue directed contracts. Despite its name, it does not serve as an invitation to tender. Companies would benefit, however, by studying the list of directed tenders to get a flavour of the type of work undertaken using this approach.

Companies should identify their interests in specific ESA projects and advise government officials of perceived possibilities. By discussing these interests with MOSST and working closely with the Space Counsellor in Paris, firms may be able to benefit from opportunities to negotiate directed contracts.

Unsolicited Proposals: Any potential Canadian tenderer is entitled to submit an unsolicited proposal (UP) to ESA. The contracts office will pass an UP on to the appropriate directorate who, if interested, will propose a directed contract. A more effective approach would be to discuss the particular concept with staff from the appropriate directorate in advance. This could lead to ESA proposing a directed contract based on a combination of program needs and the company's particular capability. If such a contract exceeded 50 KAU, it would have to be submitted to IPC

although Canada's deficit return could be used as supportive justification for not proceeding to competitive tender. Chances of success with an UP would be improved through the process of teaming up with a complementary European company to offer a truly unique package.

- Single Sourcing: if a Canadian firm is the sole source of a particular supply or service, or if the firm holds a patent or a set of property rights on a particular product, an effort should be made to determine whether the service or product might be required by ESA. If there are no other sources for a particular need, and if the cost of developing a similar capability in European industry is too high or too detrimental to a program schedule, then a procurement could be initiated on a non-competitive basis. As in the case of directed tenders and UPs, the intended contract would have to be submitted for IPC approval if Canada did not contribute to the relevant budget and the amount exceeded 50 KAU.

V. GUIDE TO ESA'S INTENDED INVITATIONS TO TENDER (ITTs) (OPEN AND RESTRICTED)

1. INTRODUCTION

This section does not discuss the list of directed ITTs. The ESA list of Intended Invitations to Tender is issued in the first quarter of each year and is then revised on two or three occasions during the year. The list of ITTs is available from MOSST or direct from ESA. It is designed as a planning document for the information of companies and countries with an interest in ESA programs. In reality, it is often true that the listed contracts have been discussed among the delegations, ESA establishments and companies before the list is issued. While this does not mean that any decision has been made as to whom the contract will ultimately be awarded, it is fair to say that much discussion will have already taken place as to the general nature and detailed requirements of the contract. Therefore, it is essential that companies interested in working with ESA establish contact with program directorates, contract officers at headquarters and the ESTEC, ESOC and ESRIN establishments as well as the Space Counsellor in Paris to ensure the early awareness of upcoming contract possibilities.

It has been pointed out that the open and restricted ITTs by no means contain all contracts to be let by ESA. They do not contain:

1. contracts under 50 KAU, except in certain cases where the contract is of "a technically challenging nature";

2. directed (non-competitive) contracts (discussed in Section IV);

3. unsolicited proposals (Section IV); and

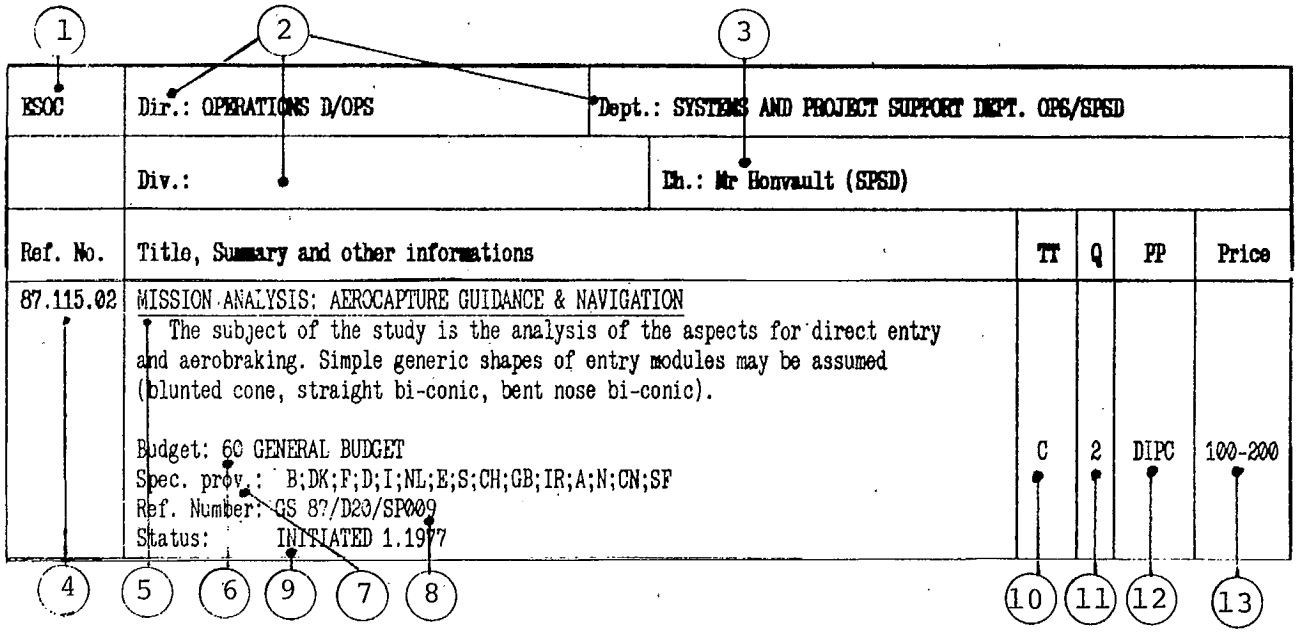
4. contracts of CNES (the French Space Agency) let on behalf of ESA concerning the Ariane program.

2. GUIDE

While the introduction to the ITTs contains a complete description of the codes used within the document it is

useful to present a sample entry with an explanation of those codes.

EXAMPLE



1. This indicates the location of the unit responsible for the proposed work.

2. These references identify the Directorate and sub-groups responsible for the contract.

3. This reference is the name of the responsible technical officer.

4. This seven-digit reference is simply a bookkeeping code.

   - o "87" refers to the year of the initial announcement

- o "1": the third digit will be one of
  - 1 - meaning open competitive tenders
  - 2 - meaning restricted tenders (see item 8)
  - 3 - meaning directed tenders; published in a separate list
- o "15" is a number allocated to the responsible technical officer
- o "02" is simply a sequential reference
- o "Nx" may be indicated, meaning that a new action has been introduced in revision x of this list

5. This section gives the title and brief description of the contract.

6. This line gives a two-digit number code for, and the name of, the ESA program involved; in this case "60" for the General Studies component of the General Budget.

The Canada/ESA Cooperative Agreement (and our subsequent joining of certain optional programs) means that Canadian firms are eligible to participate in the following programs:

Code Number	Program
60	General Budget - General Studies
65	- Earthnet
88	- Fixed Support Costs
90	- Fixed Common Costs
93	- Investments
46	OLYMPUS
73	ERS-1 Phase C/D
78	Earth Observation Preparatory Program (EOPP)
44	Payload and Spacecraft Development and Experimentation Program(PSDE)
491	Hermes Preparatory Program

ADDITIONAL NOTES:

- o Item 61 General Budget - Technological Research
  - as noted earlier, Canada pays into specified items of the General Budget; it does not, however, contribute to Technological Research. As noted in Section II, Canada is expressly excluded from this program by our Agreement.
- o IMPORTANT: even though Canada is technically excluded from the other programs, in certain circumstances a Canadian firm may be able to obtain a related contract. See Section IV for details.

7. This line sets out the restrictions on tendering. In the case of an open tender all countries which participate in the program will be listed. In the case of a restricted tender, those firms (with country identified) which are being considered will be identified.

8. This line indicates relevant ESA program documents which give complementary information: TRP is Technological Research Program, ASTP is Advanced Systems and Technology Program, GS is General Studies.

9. This section will indicate one of the following:

postponed:	delayed until next year;
initiated:	ready to be mailed; list of potential tenderers is complete;
issued:	ITTs sent out;
completed:	tenders received (the number reference which follows refer to the relevant IPC document);
cancelled:	withdrawn (after ITT sent out);
deleted:	withdrawn (before ITT sent out);
changed to:	after issue some changes have occurred.

10. This section states the type of tender:

- o "C" for open competitive tenders
- o "CR" for restricted competitive tenders
- o "DN" for direct negotiation tenders

11. This gives the quarter in which the ITT is planned to be issued.

12. This section will indicate one of the following:
    - YAC: the procurement proposal (PP) must be submitted to the Adjudication Committee (an internal ESA review process before submitting the proposal to the Industrial Policy Committee)
    - YIPC: the PP must be submitted to the Industrial Policy Committee (IPC)
    - NO: the PP need not be submitted to either the AC or the IPC
    - DAC: the PP has been submitted to the AC
    - DIPC: the PP has been submitted to the IPC

13. The price range is given in KAU. When two competitive contracts in parallel are contemplated, the price is per contract.

VI. SUMMARY

This document has introduced Canadian companies to the European Space Agency and to Canada's relationship with ESA in the industrial sphere.

It emphasizes that the Canadian government has effected an association with ESA largely to provide opportunities for Canadian industry to win contracts and promote links with European firms to improve access to the European market. The overall process is basically straightforward. The government contributes to ESA programs which are implemented through contracts with industry. The detailed contracting process can be somewhat arcane for the uninitiated; this document has attempted to assist companies in learning the basics of the process in order to develop effective marketing strategies and take advantage of new opportunities.

The government hopes that this document will be a useful starting point for companies to plan and carry out whatever strategy is best suited to their objectives. A focussed, targeted approach on a company's part to define its interests in ESA's programs, maintain contact with ESA personnel and the Canadian Space Counsellor, and submit strong, competitive bids in its areas of interest either alone or with European partners will be effective; the collective result should be an increased return to Canada from our cooperation with the Agency. In addition to the industry initiatives suggested in this document, the government is prepared to work closely with Canadian companies to advance their identified interests and strategies with the ESA executive, and to develop contract opportunities in areas of specialized Canadian expertise.

Contact points within the government for Canadian participation in various ESA programs are:

- For general information on ESA and Canada's association with the Agency contact:

  Janice Kostash
  Ministry of State for Science
  and Technology
  240 Sparks Street, 8th Floor West
  Ottawa, Ontario K1A 1A1

  Telephone: (613) 993-6003
  Telex: 053-4123
  Facsimile: (613) 990-7299

  or

  Diletta Toneatti (Mrs.)
  Telephone: (613) 991-5820
  Telex: 053-4123
  Facsimile: (613) 990-7299

- For information on telecommunications programs contact:

  Graham Booth
  Chief, Satellite Programs
  Department of Communications
  300 Slater Street
  7th Floor, Room 740
  Ottawa, Ontario
  K1A 0C8

  Telephone: (613) 990-4113
  Telex: 053-3342

- For information on remote sensing programs contact:

  Nigel Denyer
  ERS-1 Project Manager
  RADARSAT Project Office
  Department of Energy, Mines & Resources
  110 O'Connor Street
  Ottawa, Ontario
  K1P 5N9

  Telephone: (613) 993-5012
  Telex: 053-3777

- For information on the Hermes program contact:

  Garry Lindberg
  Executive Director
  Space Division
  National Research Council of Canada
  Building M-60
  Ottawa, Ontario K1A 0R6

  Telephone: (613) 990-6145
  Telex: 053-3145
  Facsimile: (613) 990-7299

- For all dealings with ESA maintain contact with the Canadian Space Counsellor located in the Embassy in Paris:

  Michel Giroux
  Space Counsellor
  Canadian Embassy
  35, avenue Montaigne
  75008 Paris VIII
  France

  Telephone: 33 1 4723-0101
  Telex: 280-806
  Facsimile: 33 1 4723-5628

- ESA Headquarters:

  European Space Agency
  8-10 rue Mario Nikis
  75738 - Paris Cedex 15
  France

  Telephone: 33 1 4273-7654
  Telex: 202-746
  Facsimile: 33 1 4273-7560/61/62/63

- For details on the Program for Export Market Development (PEMD):

  Advanced Technology Marketing Division
  (TTT)
  Department of External Affairs
  Lester B. Pearson Building
  125 Sussex Drive
  Ottawa, Ontario K1A 0G2

  Telephone: (613) 995-7558
  Telex: 053-3745
  Facsimile: (613) 996-9510