CANADIAN SPACE AGENCY

SPACE SCIENCE BRANCH

IMPLEMENTATION PLAN

FOR THE

SMALL PAYLOADS PROGRAM

VERSION 01

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1.0 INTRODUCTION

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The Space Science Program (SSP) has been providing a limited number of smalllaunch opportunities for the space physics, astronomy and aeronomy disciplinesover the past several years. A program plan has recently been prepared toformalize this activity. It has been called the Small Payloads Program (SPP).The document describing the plan called "Background Document for a SmallPayloads Program" has recently been finalized. A workshop was held inMontreal, January 22/23, 1996, involving interested parties from investigatororganizations, industry and government to review the plan. It was concluded atthe workshop that the Small Payloads Program should be implemented. Commentsfrom the workshop as well as written submissions were included in the finalversion of the Background Document.

The Small Payloads Program (SPP) will provide support for a series ofscientific missions of limited size and cost on platforms that includesounding rockets, balloons and microsatellites. Missions will be selectedbased on a regular series of competitions involving combinedresearch/university/industry teams. The primary focus for the program isscientific excellence.

The SPP is part of a four point Space Science Program strategy, in thedisciplines of solar-terrestrial physics, atmospheric studies and astronomy.The first element is a new initiative to provide support for concept studiesrelated to the development of hardware for future flight. The second elementis the SPP. The third element is the proposed SciSat Program and the fourthelement is the continuing international-class program which provides majorCanadian instruments on international missions. All elements of the four pointstrategy contribute to meeting the objectives of the SSP and of the sciencecommunity.

2.0 APPLICABLE DOCUMENTS

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Detailed descriptions of topics raised in this document are given in the"Background Document for a Small Payloads Program", July 10, 1996, CSA, SpaceScience Program.

3.0 DEFINITIONS

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For purposes of the Small Payloads Program, the following definitions will beapplicable:

Platform:
The mode of doing small payload science in space. The three primary modes are: balloons, sounding rockets and microsatellites. This list is not exclusive. Other modes will be considered if sufficient justification is given.

Instrument:
Scientific apparatus including sensor(s) and optionally, internal power and control.

Bus:
Structure, fairings/bays, support systems such as power, telemetry, data acquisition, sequencing and control, subsystems such as attitude control, attitude determination, position determination and booms.

Payload:
Bus and instruments. This definition is traditional in sounding rocket and balloon projects and will

be used in the SPP. Note that payload design refers to the design of the bus plus design of accommodations for the instruments, but not design of the instruments themselves.

Microsat:

A microsat will be considered to comprise the bus and instruments. Although the term payload is synonomous with satellite or microsat, by SPP definition, it will be avoided where possible, when discussing microsats, due to the possible confusion arising from the different definition of payload normally used in satellite projects.

4.0 PURPOSE

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Whereas the Background Document provided a rationale and description of the program, this document will detail the implementation strategy and methodology for the program.

The plan describes the scope of the science program, the objectives and strategies that will be employed to implement it, the organizational infrastructure, the workplan, the resources, and the evaluation mechanism.

This document is seen as an evolving document, which will change as we get more experience with small payload projects.

5.0 PROGRAM OBJECTIVES

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The following are the guiding objectives of the Small Payloads Program of theCSA Space Science Program:

- Provide low cost, regular and rapid access to space for Canadian space scientists for cutting edge scientific experiments (primary objective)
- Provide training opportunities for students in the areas of system design, instrument fabrication and test, and software development by encouraging research institutes to develop and maintain an in-house capability to design and fabricate space-qualified instruments (secondary objective)
- Provide a level of activity sufficient to maintain an industrial capability to support the manufacture and launch of sounding rockets, balloons and other small payloads in Canada (secondary objective)
- Create a forum for increased synergy among university disciplines and between universities and industry (tertiary objective)
- Develop an expertise in microsat and smallsat technologies in Canadian universities and industry (tertiary objective)
- Support innovation in emerging technologies and transfer of that technology between universities and industry (tertiary objective)
- Advance intra-agency cooperation consistent with the new vision for the agency as represented by its new organization and mandate (tertiary objective)
- Provide opportunities to communicate the excitement and benefits of space science to the

Canadian public (tertiary objective)

- Increase involvement with the international community (tertiary objective).

6.0 STRATEGIES

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Following the closure of the Churchill Rocket Range (CRR) and the balloon facility at Gimli, Manitoba, small payloads projects were carried out on an ad hoc basis. Each project was selected on its scientific merits without consideration of a specific set of program objectives, such as those written for the SPP. The SPP Background Document examined the weaknesses in this approach to small payloads and suggested a methodology to optimize the benefits from a small payloads program. The primary strategies that will be followed in implementing the SPP are discussed below.

6.1 Program Content

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The SPP cannot be expected to satisfy all the requirements of every Canadian researcher, however, it is hoped that in conjunction with the other elements of the SSP, most of the top rated Canadian space science will be supported. Material Sciences and Life Sciences are supported in other areas of the SSP. Orbiting science instruments which require high pointing accuracy, high power, low temperatures, and extensive ground operations that are generally higher cost are supported in SciSat and the International Program.

6.1.1 Science Disciplines

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The SPP will support projects in the disciplines of solar-terrestrial physics, atmospheric studies and astronomy.

The former two disciplines were discussed at a meeting in Magog, Quebec in 1994. The science community and CSA representatives discussed and assigned priorities to research topics believed to be of prime importance in the fields of solar-terrestrial physics and atmospheres and produced a document called the "Magog Manifesto" which gives guidelines for future research in Canada. It identifies space weather and understanding atmospheric change as the general foci.

The priorities of the astronomy community are more general. A "Space Astronomy Plan" has been prepared by the Joint Subcommittee for Space Astronomy (JSSA).

6.1.2 Platforms Supported

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The program will provide launch opportunities on the following primary platforms: sounding rockets, balloons, and microsats although other small payload opportunities will not be excluded. Detailed platform descriptions are attached as Appendices A, B, and C. In order to meet the objectives of low cost, and regular and rapid access to space, simplicity is stressed. Complex projects can result in large development teams, unique system developments, extensive test requirements, long schedules and high costs. With a fixed Program budget, project costs must be kept low to permit the maximum number of

projects and frequent launch opportunities.

6.2 Community Development

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As scientists retire it is necessary to have a mechanism for renewal of the science community. The SPP will provide research opportunities for students and recent graduates. By deploying a portion (approximately 20%) of the funding in the universities and requiring Investigator Organizations to accept responsibility for instrument development, training opportunities will be maximized. Development of instrument ideas is best suited for a research atmosphere such as that of a university since instrument concepts normally are spawned there and implementation of such ideas can be best carried out in that environment.

SPP projects will often, though not always, be at an earlier stage of maturity than those of the SciSat and International Programs. They will be of shorter duration and thus more compatible with graduate student program schedules. SPP projects will provide experience for researchers who wish to advance to larger projects within the SSP. Many instruments evolving from these projects are expected to form the basis of space experiments for the future.

Organizations are encouraged to form teaming arrangements and to propose a development team which is capable and cost effective. Centres of excellence will form naturally from existing and acquired capabilities, possibly including nearby SMEs.

The space science community is considered the client of the SSP, and as such the SSP must be cognizant of its needs and wellbeing. This approach is consistent with the newly established Mission Statement of the CSA which is "The Canadian Space Agency Is Committed To Leading The Development And Application Of Space Knowledge For The Benefit Of Canadians And Humanity".

6.3 Intra-agency Cooperation

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The re-organization of the CSA will provide opportunities for greater cooperation. CSA/Engineering has an interest in the development of some of the technologies and systems which will be required to carry out SPP missions. Their involvement in the management of many of the technical aspects of SPP missions will be important. The establishment of the Operations Branch is timely. Operations help will be needed in the design, testing and operations phases of SPP missions. A closer relationship between the CSA groups will enhance the program and allow a more economical use of financial, personnel and technical resources.

6.4 Industrial Capability

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Development and maintenance of an industrial capability to support small payload missions is an important aspect of the SPP. The program will not be able to support interested industries on its own, however, it is intended that the SPP will provide opportunities to develop technologies and capabilities of commercial value which could be promoted to help sustain the industry.

6.5 International Cooperation

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International partnership has played an important role in past small payloads projects and will continue to do so in the SPP. Opportunities to fly foreign instruments have been provided, in return for launch support. Both parties have benefitted by increased cost effectiveness and augmentation of the flight data through the joining of instrument capabilities.

7.0 PROGRAM DEVELOPMENT

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The development of the SPP will be an on-going process, but in the initial stages a supporting infrastructure has to be established. The first element is the Program Management structure. It is discussed in detail in the next section. Other elements include the university and industrial facilities needed for the development of flight hardware, and program documentation providing program descriptions, procedures, and limitations. The need for a low cost approach will be reflected in the program documentation. A method is needed to inform SPP participants and to get feedback. Workshops are one method to be utilized. It is expected that the development of the program will be evolutionary.

7.1 Facility Survey

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The development of university and industrial facilities is the responsibility of the respective organizations, however, it is important to establish a baseline capability at the start of the program. From this baseline it will be possible to define initial AOs and to evaluate results of the program.

Since the intention is to have instruments built under the control of the PI, with support from industry, early discussions with interested institutions will permit an initial assessment of their capability and determine whether university management has an interest and resources to augment that capability.

Primary industries which will be involved in the SPP will be canvassed to determine their capabilities. A list of companies and their capabilities will be available to program participants.

Site visits to university and industrial facilities will be carried out as opportunities arise.

7.2 Program Documentation

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A series of documents will be written to provide Investigator Organizations (IOs) and industry with program descriptions and guidelines to help in the writing of proposals. The first Applicable Document in the SPP is the Background Document, dated July 10, 1996. The Implementation Plan for the Small Payloads Program will include Appendices detailing each platform type.

The CSA/SSP will provide documents to instrumenters to guide them in the development of their flight hardware. They will be in the form of User Handbooks and Performance Assurance Requirements and will be written for each platform type. In the initial stages of the Program, before these documents become available, proposers will be able to obtain guideline information from the CSA and from industry. It is expected that these documents will be available by mid 1997.

It is expected that AOs will be publicized every two years. The Appendices to the Implementation Plan,

which is an applicable document to the AO, will provide limits on available platform capabilities, including mass, trajectories, typical power, telemetry, and command and control. The appendices will also discuss payload subsystems supported by the program, available launch vehicles and launch ranges. Platform environment, testing implications, required PA, and mission restrictions will be given.

In concert with the desire to keep mission costs low, standards will be established for the platform systems, subsystems and interfaces. The establishment of standards will require some research and therefore will evolve over a period of time. They will not be available for the first AO. Proposers will be expected to make use of industries' experience in payload development and utilize conventions which are in common usage. Bristol Aerospace Ltd. has been contracted to do a review of the current sounding rocket practices, and as part of that study, standards will be reviewed and recommended.

7.3 Infrastructure Study by Bristol Aerospace Ltd.

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Bristol will be conducting a study, in FY 96/97, concentrating on sounding rocket project practices to determine whether there are ways to reduce rocket project costs. The study will look at current rocket project management practices within Bristol and elsewhere. It will also look at standard systems and interfaces and make recommendations for the establishment of standards. Follow-on work will be proposed where hardware development is required. Applicability to other platforms will be addressed.

7.4 Non-CSA Funding Sources

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The IO will be expected to find funding sources for those aspects of projects not supported by the SPP, eg. ground based studies, data analysis and publications. NSERC is a possible source of such funding. IOs will also require adequate and stable funding of their laboratories.

7.5 Workshops

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Workshops will be an important tool to provide SPP information and to solicit feedback from IOs and industry. The first workshop was held in January 1996 to discuss comments on the draft Background Document. Representatives from the science community, industry and government presented their thoughts on the SPP. It was concluded that the workshop was a useful technique and that there were no major concerns which would preclude proceeding with the SPP. Workshops will be held in the future to present technical guidelines as they are developed or revised.

8.0 PROGRAM MANAGEMENT

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The Small Payloads Program will be managed as an element of the Space Science Program of the Canadian Space Agency.

The key to the success of the SPP will be small, cohesive teams, with good communication, as opposed to large hierarchical structures. Minimizing team size while maximizing the breadth of knowledge of individual team members will yield the most efficient result.

8.1 Program Participants

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The head of Program Development, in consultation with the appropriate advisory committees and the respective Program Scientists, will oversee project selection through regular competitive AOs. Final approval rests with the DG. Project implementation is the responsibility of the Manager, Sub-orbital Group. This group will be supported by two project managers. Engineering and Operations will be requested to provide assistance, consistent with their interests and abilities, and the needs of the SPP.

Investigator Organizations will be the lead on most aspects of their projects and will be required to develop a Management Plan for the project involving the IO, Industry, Universities, International scientists and government. This plan will be reviewed as part of the proposal.

8.2 Responsibilities

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CSA/SSP:

i) Identify, select and implement community driven research projects and update plans as required following regular program evaluations.

ii) Develop flight and payload GSE hardware. Provide funds to IOs for instrument development. Provide funds to industry for payload and related GSE development.

iii) Provide funding to investigators for the development of new instrument concepts through the Concept Studies Program. Some of these concepts will be directly applicable to the SPP.

iv) Support flight operations. The level of support required will depend on the platform. Balloon payload operations are normally performed by the IO. The SSP Project Manager acts as Mission Manager for sounding rocket launches. Flight operations of microsats will be coordinated with CSA Operations and the IO.

v) Participate in discussions with our international partners to identify launch opportunities and cooperative cost sharing arrangements.

vi) Promote the Space Science Program and exploit its accomplishments.

vii) Promote equitable regional distribution of funds consistent with government guidelines..

CSA/Engineering:

i) Assist in project selection by providing input on technical feasibility during proposal evaluation.

ii) Provide technical management of specific technical developments, in cooperation with the SSP Project Manger.

iii) Provide technical oversight for SPP projects.

iv) Assist in project and program evaluation.

v) Coordinate GSE for integration, test and operations of SPP projects.

vi) Coordinate spin-off of technology developed through SPP projects.

CSA/Operations:

i) Provide operations input during design phase.

ii) Provide design input for the project GSE.

iii) Provide certain GSE hardware as available for project launch and flight operations.

iv) Provide operations support for certain missions, eg. microsats; in conjunction with IO.

v) Provide environmental testing of flight hardware at DFL.

Investigator Organizations:

i) Submit mission proposals on applicable science disciplines, addressing all objectives of the SPP. The IO will be required to identify the launch vehicle required for the mission. The CSA/SSP will negotiate provision of the launch.

ii) Provide a Management Plan in the proposal which addresses the roles of the IO, industry, students and the government.

iii) Provide input on project cost and schedule control measures.

iv) Manage contracts with the CSA for instrument development.

v) Manage subcontracts to industry during certain phases of a project.

vi) Carry out science and ground based activities with support from sources other than the SPP.

vii) Provide support for students.

viii) Provide instrument GSE.

ix) Support payload flight operations.

x) Promote the SPP by actively pursuing publication, in the media, of relevant aspects of the science and payload.

Industry:

i) Provide a small but broadly experienced team, capable of carrying out small payload projects.

ii) Provide the bus, including structure, systems and subsystems needed to meet the scientific requirements. Industry will not be responsible for the bus for all projects. Even in this case SMEs are expected to be subcontracted to carry out significant parts of the development.

iii) Provide support for launch and flight operations for sounding rocket projects and possibly balloon and

microsat projects, depending on the capabilities of the IO, and on mission complexity.

iv) Promote the SPP and industrial achievements through media publication.

9.0 IMPLEMENTATION METHODOLOGY

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Procedures for SPP projects are described in this section.

9.1 Announcement of Opportunity

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The Program Development group of the SSP will publish AOs for small payload missions every two years. The AO will require proposers to address all the objectives of the SPP. In addition they will be required to provide a management plan, estimated mission cost, and cost control measures. There will be no restrictions on the selection of platforms, i.e., no quotas. Selection will be based on the best science for the dollars spent. This document along with it's appendices, giving the capabilities and restrictions for each platform type, will be applicable to the AO.

9.2 Selection Process

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Each proposal will be reviewed internally by the CSA to ensure that it meets the requirements of the Annoucement of Opportunity and the guide lines of the Background Document and the Implementation Plan. Those proposals that meet these requirements will be externally reviewed for scientific merits, and internally reviewed with respect to the engineering, cost, schedule and technical risk. A review commitee will be struck comprising of both external and internal members of the CSA who will provide a set of recommendations to CSA/SSP Program Development indicating those proposals that should be supported. The CSA will make the final selecti on of proposals to be supported.

9.3 Procurement Philosophy

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Projects will be carried out through a series of technical contracts, issued by PWGSC. A generalized scheme for contract responsibility is given below, however, proposers can modify it to match their capabilities and to achieve greater efficiencies.

A Phase A contract will be issued to the IO who will subcontract to industry to fully detail all elements of the mission to a sufficient level that confidence can be placed on the schedule, management, cost and risk issues. Small and simple missions which have well developed concepts may be selected for implementation without this initial phase.

Phase B is Instrument Design, Manufacture, Integration and Test. The IO will again be prime in this phase. Flight qualified instruments will be developed in this phase. Normally this phase will precede payload development depending on the maturity of the instruments.

Phase C is Payload Design, Manufacture, Integration and Test. Normally industry will be prime in this phase. Multiple contracts may be necessary.

Phase D is Launch Support. Industry and the IO will be contracted to provide required support.

Phase E is Mission Operations. Industry and the IO will be contracted to provide required support.

Note that for contractual purposes, phases may be either divided or combined to optimize the management of the work.

9.4 Project Management

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Formal review meetings will be held to mark specific milestones. In addition, frequent technical interchange meetings (TIMs) will be encouraged to settle specific technical problems. The Project Review Committee, described in the Background Document, will meet to review projects and to consider requested changes to costs and/or schedules outside the authority of the project manager.

A Requirements Review will be held in mid Phase A and a Phase A Final Review will be held at the end of Phase A to confirm the project go-ahead. The total mission cost, defined at the end of Phase A, cannot be more than 20% higher than the original proposal. The PI must be able to provide sufficient evidence in the Phase A Report and Review to support the cost estimate. The Project Manager will hold an additional 10% contingency to the end of the project. Increases in mission costs over this contingency level will require a formal review by the Project Review Committee.

A Phase B CDR will be held for the primary instrument(s). Phase B CDRs for supporting instruments will not be formal project review meetings, however, those instrumenters will be required to hold their own CDRs and ensure that necessary personnel are present.

The Phase C CDR is an important review, and will be held after the completion of all the instrument, bus and GSE designs. It will be attended by all project participants. The final design will be approved at this meeting and will mark the start of bus fabrication. No further design changes will be permitted after this point without a formal request to the Project Manager. Note that the Phase C CDR may be divided to permit the highest workload efficiency, in which case more than one Phase C CDR may be necessary.

The MRR at the end of Phase C will signal the completion of all integration and testing. All action items should be closed before shipment to the launch range. The Mission Operations Plan will be reviewed and approved at this meeting. A FRR will be held during Phase D prior to launch.

9.5 Evaluation

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Each project will be evaluated at the completion of the project. It will be assessed against the stated SPP objectives. This process is part of the regular SSP procedures.

The SPP will be evaluated every two years prior to release of a new AO. Program participants will be invited to provide input to the program evaluation. Accepted changes will be reflected in the program documentation and the AO. The program must be able to demonstrate creation of new knowledge, training of new scientists and engineers, new technology development and technology transfer to industry.

10.0 PUBLICITY

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Through the publication of project and program achievements, the public will be alerted to the benefits of space science research. In addition, publication of newly developed technologies could create new spin-off opportunities by informing potential users. Publication of SPP activities as part of the SSP home page on the World Wide Web will be pursued and will greatly enhance public know ledge of program objectives and achievements.

All parties in the program must accept responsibility for publicizing the program and its achievements , and cooperating to maximize every opportunity. All attempts must be made to ensure that the relevance of the research to the public is highlighted.

11.0 RESOURCES

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The CSA/SSP will provide resources for the SPP at a propose d annual level of $2.5M until the year 2004. This will permit the SPP to plan and manage its cash flow and to support a continuing program.

This level of funding will not permit a large number of concurrent projects. Creative approaches are needed to maximize the program output. It will be advantageous for proposers to make use of all funding sources at their disposal. Cost sharing with partners should be explored, such as other government agencies, centres of excellence, etc. Teaming with commercial enterprises for the development of a new technology in exchange for funding support is another possibility that should be pursued. International sharing arrangements offer another method of off-setting costs.

Cooperative agreements internal to the CSA, with Engineering and Operations could result in further funding efficiencies, in areas such as common technology developments, resource sharing of operations equipment and personnel support for flight operations.

The program will be supported by 2.5 FTEs from SSP.

12.0 WORK BREAKDOWN STRUCTURE

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The following Work Breakdown Structure details the implementation activities of the SPP.

1.0 Preparation

1.1 Documentation

1.2 Capability Review

1.3 Infrastructure

1.4 Workshops

2.0 Project Selection and Implementation

2.1 Announcement of Opportunity

2.2 Selection

2.3 Implementation

3.0 Evaluation

3.1 Project Evaluation

3.2 Program Evaluation

WBS NUMBER: 1.0; 1.1, 1.2, 1.3, 1.4

TASK TITLE: Preparation

12/1.0 Preparation

A workshop was held January 22 and 23, 1996 to review the Background Document for a Small Payloads Program. It was concluded from the discussions that there were no impediments to proceed ing with a Small Payloads Program. Subsequently, the Background Document was updated with comments received from science, industry and government organizations. Several activities will be undertaken to support small payload missions. They include:

- document preparation

- IO and industry capabilities review

- infrastructure assessment and development

- workshops

These activities are described in the following sections.

12/1.1 Documentation

The following documents will be provided to SPP participants. Availability dates are given:

Background Document for a Small Payloads Program July 1996

Implementation Plan for the Small Payloads Program July 1996

CSA Sounding Rocket User's Handbook March 1997

CSA Microsatellite User's Handbook June 1997

Standards for the CSA Small Payloads Program June 1997

12/1.2 Capability Review

University and industry facilities will be surveyed early in the first AO process. The survey will take the form of a paper solicitation. The purpose is to establish a baseline capability which would be made available to proposers to help in developing constructive teaming arrangements for their proposals. The facility capability information will also be used during proposal assessment and later in the evaluation of the program.

As opportunities arise site visits will be carried out. Discussions with university administrators would permit a chance to determine their interest in the program and potentially encourage additional university resources to be made available to the program.

12/1.3 Infrastructure

Infrastructure refers to the processes, procedures, standards, flight proven support systems and subsystems which are needed to permit the most efficient implementation of small payload missions. Infrastructure currently exists for balloon launches but not for the building of balloon payloads. That has normally been the responsibility of the Investigator Organization. The CSA has, however required environmental testing and analysis to be performed prior to flight.

Sounding rocket projects, on the other hand, have been carried out through a fairly well defined set of processes and procedures. This infrastructure has evolved over the past thirty years and resides primarily in Bristol Aerospace Ltd. Considerable experience has been gained from the sounding rocket projects. The lessons learned from that experience are detailed in the Background Document. As a result of this experience and the formalization of the Small Payloads Program with its well defined objectives, Bristol has been contracted to perform a comprehensive review of the current sounding rocket project implementation approach and provide potential measures for improvement. The contract is entitled "Suborbital Rocket Infrastructure Development Plan" and will start in June 1996 and be completed by October 31, 1996. The major activities include:

- Review of past processes and procedures

- Identification of cost drivers

- Preliminary review of alternate approaches

- Evaluation of new program elements

- Generation of an Implementation Plan

Follow-on work will provide for the implementation of the new approaches. Although this work is aimed primarily at sounding rocket projects, it is expected that there will be considerable applicability to balloon and microsat projects. No microsat projects have been carried out in the past in the CSA/SSP, however, it is expected that much of the sounding rocket infrastructure will be applicable. It is felt that a similar approach will have to be taken in the development of microsats, to enable them to be a viable platform for the Small Payloads Program. Specific microsat infrastructure studies will be carried out, beginning in 1997.

A contract with Bristol Aerospace Ltd. will be put in place in June 1996 to study Attitude Control System (ACS) options for the SPP.

12/1.4 Workshops

Workshops will be held for the purposes of providing information on the Small Payloads Program and soliciting information from program participants. They will be held whenever a workshop forum is the most effective method of providing or obtaining information. Participation in the workshops will vary from a size similar to that of the January 22/23, 1996 workshop to very small groups to discuss specialized technical topics. The following is a tentative list of workshops which are foreseen at this time.

1. Platform Workshop. This workshop will present information for proposers on each platform type, ie, balloons, sounding rockets and microsatellites. It will discuss capabilities, restrictions, environmental testing requirements, design practices, standards, acceptable project scope, and project management. It is intended to supplement the AO Appendices and provide enough information that proposers will be able to prepare comprehensive proposals which can be accurately costed and which will be technically feasible, given the restricted resources available.

It is envisaged that such a workshop would take place a month or two after publication of the first SPP AO, ie, in about September 1996.

2. Sounding Rocket Standards Workshop. This workshop would follow completion of sounding rocket infrastructure activities. The planning of those activities will be done by Bristol in their current infrastructure contract which ends October 31, 1996. Standards which could be part of the plan include; interface standards, support system and subsystem standards, fabrication standards, test standards, and documentation standards. The development of standard flight hardware will be an on-going process and will require periodic workshops to provide program participants with up-to-date capabilities.

It is expected that the first sounding rocket standards workshop would be held in mid 1997.

3. Microsatellite Standards Workshop. Since the CSA has limited experience with microsatellites at this time, the development of standards applicable to them will require considerably more time. In the meantime this part of the program will operate with guidelines only. Those guidelines will be provided in the AO Appendix on microsats and will be discussed during the Platform Workshop. With experience and study results it will be possible to develop standards similar to those of the sounding rocket projects.

It is envisioned that a microsat standards workshop would take place by theend of 1997.

4. Program Evaluation Workshop. The purpose of this workshop will be to reviewthe performance of the SPP and to formulate proposed changes to the program.

The first program evaluation workshop will take place prior to the second SPP AO to allow time to incorportate changes in the Program documentation.

WBS NUMBER: 2.0; 2.1, 2.2, 2.3

TASK TITLE: Project Selection and Implementation

12/2.0 Project Selection and Implementation

The AO, selection and implementation processes are described in the following paragraphs.

12/2.1 Announcement of Opportunity

The first SPP AO for new missions will be written by the CSA/SSP with input from cooperating branches of the CSA. The expected publication date is mid 1996.

Proposers will have five months to submit proposals.

12/2.2 Selection

The three step selection process of science peer review, technical and cost assessment, and final selection will take approximately two months. It is therefore expected that successful proposers of the first AO will be notified in early 1997.

12/2.3 Implementation

After proposal selection is complete, a contract will be initiated with the IO for Phase A. In the case of balloon missions, since the project costs are relatively small, all Phases will be combined in one contract. In the past Phase A sounding rocket study contracts have been issued to the industry contractor directly. Unless the IO does not have the capability of handling government contracts, the preferred method for SPP Phase A contracts is to contract directly with the IO and have the IO subcontract with industry for their support. This will have the effect of giving the IO more responsibility to ensure that the tradeoffs between technology and science are made to meet the available funds and satisfy the science requirements. This method will be followed only if it is clear that contracting to the university will not increase costs substantially and that the university has the capability of managing the contract effectively.

As part of the initial proposal the IO will be required to provide sufficient detail for a Phase A study contract. Input from industry will form a large part of the proposal. The contract start date will depend on the length of contract negotia tions, but by including the Phase A proposal in the initial proposal, the time to contract start will be minimized.

Whether or not follow-on contracts will be held directly by the IO, the IO in conjunction with the Project Manager will be responsible for maintaining project costs within budget. The IO will be required to make trade-off decisions related to science requirements to meet project cost allocations.

Implementation details for balloons, sounding rockets and microsate llites are given in Appendices A, B and C, respectively.

WBS NUMBER: 3.0; 3.1, 3.2

TASK TITLE: Evaluation

12/3.0 Evaluation

Evaluation will take place both at the project level and at the program level. In each case evaluations will be done with reference to the stated program objectives.

12/3.1 Project Evaluation

At the end of each project, the Project Manager is required to complete a project evaluation. It will follow the evaluation format currently in use in the SSP.

12/3.2 Program Evaluation

A program evaluation will be carried out every two years to assess progress against overall program objectives and to make any needed modifications to the program. Workshops will be held during some evaluations to solicit external input. Results of the workshops will be used to revise program plans.

13.0 SCHEDULE

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A nominal schedule of activities related to the implementation of the Small Payloads Program is shown in Figure 1. Note that launch dates will depend on the missions selected. Missions requiring the development of new instruments will require more time than those using existing instruments. Possible early missions, which have existing instruments include GEMINI, BAM and HiRES. GEMINI and HiRES could be reflown in less than two years while BAM could be reflown in less than a year.

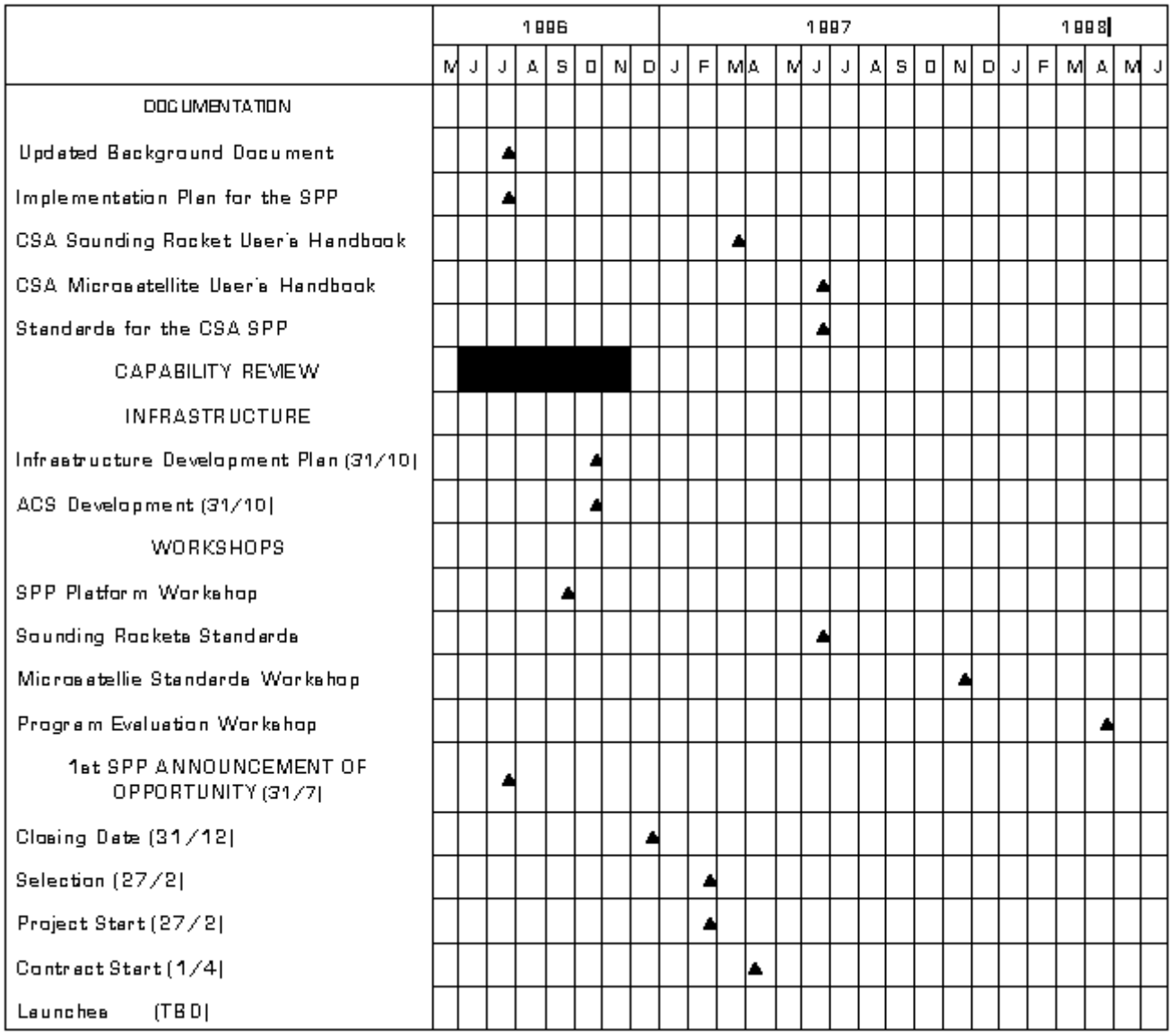

Figure 1 SPP Implementation Schedule

14.0 BUDGET (K$)

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The following is the proposed yearly budget for the SPP.

96/97	97/98	98/99	99/00	00/01	01/02	02/03
0	$2.5	$2.5	$2.5	$2.5	$2.5	$2.5

15.0 CONCLUSIONS

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This document presents the methodology to be used in the implementation of the Small Payloads Program. The plan outlines a strategy which will enable the Canadian space science community to carry

out new and exciting science and to train a new generation of scientists and engineers to enable the community to flourish. The development and spin-off of new technologies will be possible by the creation of new and creative linkages. By making optimum use of the resources available it guarantees that SPP goals will be achieved.

ACRONYMS

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AO Announcement of Opportunity

CRR Churchill Rocket Range

CDR Critical Design Review

DFL David Florida Laboratory

FTE Full Time Equivalent

FRR Flight Readiness Review

FY Fiscal Year

GSE Ground Support Equipment

IDD Interface Definition Document

IO Investigator Organization

MRR Mission Readiness Review

NSBF National Scientific Balloon Facility

NSERC National Scientific and Engineering Research Council

PA Product Assurance

PI Principal Investigator

PDF Post Doctoral Fellow

PDR Preliminary Design Review

PWGSC Public Works and Government Services Canada

RA Research Assistant

RR Requirements Review

SIL Scientific Instrumentation Limited

SME Small to Medium Enterprises

SOrb Sub-Orbital (program)

SPP Small Payloads Program

SSP Space Science Program

TIM Technical Interchange Meeting

WBS Work Breakdown Structure

Whether or not follow-on contracts will be held directly by the IO, the IO in conjunction with the Project Manager will be responsible for maintaining project costs within budget. The IO will be required to make trade-off decisions related to science requirements to meet project cost allocations.

Implementation details for balloons, sounding rockets and microsate llites are given in Appendices A, B and C, respectively.

WBS NUMBER: 3.0; 3.1, 3.2

TASK TITLE: Evaluation

12/3.0 Evaluation

Evaluation will take place both at the project level and at the program level. In each case evaluations will be