ORDER FOR SUPPLIES OR SERVICES

IMPORTANT: Mark all packages and papers with contract and/or order numbers.

1. DATE OF ORDER: NOV 25 1997
2. CONTRACT NO. (If any): NAS5-97251
3. ORDER NO.: 001
4. REQUISITION/REFERENCE NO.:
5. ISSUING OFFICE (Address correspondence to): NASA GSFC, Code 210, Greenbelt, MD 20771

6. SHIP TO:
a. NAME OF CONSIGNEE: NASA Goddard Space Flight Center
b. STREET ADDRESS: Rapid Spacecraft Development Office, Code 401.5
c. CITY: Greenbelt
d. STATE: MD
e. ZIP CODE: 20771
f. SHIP VIA:

7. TO: Mr. W. James Adams
a. NAME OF CONTRACTOR: Ball Aerospace and Technologies Corp.
b. COMPANY NAME:
c. STREET ADDRESS: 1600 Commerce Street
d. CITY: Boulder
e. STATE: CO
f. ZIP CODE: 80305-1062

8. TYPE OF ORDER
☐ a. PURCHASE
REF YOUR: _____
Please furnish the following on the terms and conditions specified on both sides of this order and on the attached sheet, if any, including delivery as indicated.

X b. DELIVERY -- Except for billing instructions on the reverse, this delivery order is subject to instructions contained on this side only of this form and is issued subject to the terms and conditions of the above-numbered contract.

9. ACCOUNTING AND APPROPRIATION DATA 401-52023A $100,000 B/NC:02
401-227-63-10-87 A701 40-2550 807/80110(97) Suffix A (JP)

10. REQUISITIONING OFFICE: Rapid Spacecraft Development Office

11. BUSINESS CLASSIFICATION (Check appropriate box(es))
☐ a. SMALL X b. OTHER THAN SMALL ☐ c. DISADVANTAGED ☐ d. WOMEN-OWNED

12. F.O.B. POINT: Destination
13. PLACE OF
a. INSPECTION:
b. ACCEPTANCE:
14. GOVERNMENT B/L NO.:
15. DELIVER TO F.O.B. POINT ON OR BEFORE (Date): See Statement Of Work
16. DISCOUNT TERMS:

17. SCHEDULE (See reverse for Rejections)

ITEM NO. (a)	SUPPLIES OR SERVICES (b)	QUANTITY ORDERED (c)	UNIT (d)	UNIT PRICE (e)	AMOUNT (f)	QUANTITY ACCEPTED (g)
5	Database/Catalog Set-up Non-Standard Services as required by Clause B.6, Statement of Work (SOW) 4.2 and Delivery Order SOW (Attachment A to this D.O.) Payment shall be made upon completion of all SOW tasks.	1	ea		(b) (4)	

18. SHIPPING POINT:
19. GROSS SHIPPING WEIGHT:
20. INVOICE NO.:

SEE BILLING INSTRUCTIONS ON REVERSE

21. MAIL INVOICE TO:
a. NAME: NASA Goddard Space Flight Center, Financial Management Division
b. STREET ADDRESS (or P.O. Box): Accounts Payable Section, Code 151.3A
c. CITY: Greenbelt
d. STATE: MD
e. ZIP CODE: 20771

17(h) TOTAL (Cont. pages): —

17(i) GRAND TOTAL: $77,486

22. UNITED STATES OF AMERICA BY (Signature): Sharon M. Colligan

23. NAME (Typed): Sharon M. Colligan
TITLE: CONTRACTING/ORDERING OFFICER

AUTHORIZED FOR LOCAL REPRODUCTION
Previous edition not usable

Computer Generated

OPTIONAL FORM 347 (REV. 6/95)
Prescribed by GSA/FAR 48 CFR 53.213(e)

Contractor's Agreement

The contractor agrees to furnish and deliver all items or perform all the services set forth or otherwise identified in this delivery order for the consideration stated herein. The rights and obligations of the parties to this delivery order shall be subject to and governed by the following documents: (a) this delivery order, (b) the basic contract, (c) the solicitation, if any, and (d) such provisions, representations, certifications and specifications, as are attached or incorporated by reference herein.

(The Contractor is required to sign this document and return five copies to the issuing office.)

Beth McGilvray, Manager of Contracts, Civil Space Systems
Name and Title of Signer (*Type or Print*)

CBMGilvray 24 Nov. 1997
Signature of Person Authorized to Sign Date

Attachment A

Statement of Work
Ball Aerospace to Perform
RSDO Database/Catalog Set-Up

Task 1. Publicly Releasable Data Sheet

The contractor shall deliver by December 15, 1997 a 2 page, publicly releasable specification sheet (per core system) to be used by NASA for promotional purposes. The vendor may include a corporate logo but the NASA logo must appear in the upper right corner of the 1st page not smaller than 1.25 inches. In addition, the following contact information must appear in a 2.5 inch high by 3.5 inch box on the second page in the lower right corner (12pt Times New Roman font):

For more information contact;
Rapid Spacecraft Development Office
NASA Goddard Space Flight Center
Mail Code 401.5
Greenbelt, MD 20771 USA

Phone: 301/286-1289
Web: http://rsdo.gsfc.nasa.gov

An approval draft shall be electronically submitted to the RSDO Web site no later than close of business December 1, 1997. NASA will respond within 1 week with redlines and/or approval. NASA reserves the unilateral right to release any info which it is not required to protect under ther terms of this contract.

The contractor shall incorporate NASA's changes and have 250 copies printed, double sided, to be delivered with a web postable version on or before the completion date stated above.

While technical content is up to the discretion of the individual vendor, the RSDO recommends providing enough information to aid Principal Investigators and mission planners in determining rough fit between mission and spacecraft. A minimum list of information to include is provided below:

Payload Mass, Power, and Volume Capabilities
Launch Vehicle and Orbit Compatibility
Attitude Control Architecture Type (eg Gravity Gradient, Spin Stabilized, etc)
Contract Baseline Delivery Schedule
General Description of Comm and Data Handling Subsystems
Graphics/Pictures of Flight and Launch Configurations

Task 2. Load Electronic Database

The contractor shall fill in the attached MS Excel spreadsheet and deliver via the RSDO web site one file per contract baseline core system. Complete instructions are contained in the appendix to this SOW.

Delivery of the completed spreadsheet(s) shall be completed by December 15, 1997

The contractor shall also attend an introductory briefing and overview of the Integrated Mission Design Center (IMDC) the week of January 20, 1998. At this time the contractor will be afforded the opportunity to confirm the accurate load of the submitted data.

Task 3. 1:15 Scale Static Display Model

The contractor shall prepare a static display model of the bus under contract to RSDO. The fidelity should be sufficient to allow a RSDO customer to visualize the accommodation of his payload. The 1:15 scale is a guideline, the preference is that the model not exceed 12 inches in any dimension. The model shall be shipped to RSDO in an appropriate container to prevent shipping damage. The contractor shall deliver the model to the RSDO by January 20, 1998.

Task 4. Electronic Solid Model and Interface Information

The contractor shall provide the IMDC with the information listed below by December 31st, 1997.

4A) Provide computer aided design (CAD) 3-dimensional geometric models of the Core System and Options in the following configurations:

- Launch
- On-orbit – Beginning-of-Life (BOL)
- On-orbit – Operational
- On-orbit – End-of-Life (EOL)

The models must be provided in one of the following formats (listed in order of preference):

- IDEAS Master Series Version 4 or 5 archive file
- STEP (Standard for the Exchange of Product Data) format file
- IGES (Initial Graphic Exchange Specification) format files

The models shall be geometrically accurate and contain all components in sufficient detail to be useful for evaluating conceptual instrument accommodation.

4B) Provide a 3-dimensional geometric model or 2-dimensional detailed drawings (with dimensions) defining the following:

- Core System - to - Payload mechanical interface
- Core System - to - Launch Vehicle mechanical interface
- Payload envelope
- Payload allowable Fields of View (FOV)
- Core System coordinate system and origin

Appendix

RSDO Database Instructions

Introduction
The attached data input forms (in MS Excel) feed the Rapid Spacecraft database. This database is to be used for advanced mission modeling, parametric studies and rough cost estimation in support of Rapid Spacecraft Development Office (RSDO) and Integrated Mission Design Center (IMDC) customers. No RSDO vendor will be precluded from making offers for NASA missions based on the data provided. The data will be used to promote competition among RSDO vendors by encouraging Principal Investigators and Mission Planners to formulate concepts which encompass a range of RSDO vendor interfaces and performance. All data will be treated as confidential and issued only to civil servants with a need to know and non-civil servants with appropriate non-disclosure agreements.

Reference Documentation
All technical data provided in this database is to be obtained or derived from the attachments to RSDO vendor's contracts.

Parametric Data
For parametric data observe the engineering units provided and convert appropriately.

Descriptive Information
For text descriptions provide the document name (e.g. Performance Specification, Mission Implementation Specification) and paragraph number.

Constituent Value/Cost Information
Estimate the constituent costs associated with each category using the contract NTE core system price as the basis. This data is provided for cost modeling purposes only, rough estimates and allocations are acceptable. For example, a single material entry may be made for a base core system ordered from another organization without subdividing by subsystem and labor. No estimates are required for priced options.

Instructions:

The RSDO Spacecraft Form is an Excel spreadsheet created on a Power Macintosh using Microsoft Excel version 5.0. It is expected to be fully compatible with the various PC versions of Excel.

The spreadsheet is an Excel Workbook consisting of five Worksheets. The vendor must complete a separate Workbook for each spacecraft. You do this by:

1) Duplicating the RSDOForm.xls file
2) Rename the new file.
3) Edit the new file.

If options are also offered, supply a workbook for each option as appropriate.

Each Workbook must be saved in individual files. The name given to each file should be descriptive of what spacecraft and options are included in the Workbook.

Data Entry

You can easily move from one field to the next by pressing the TAB key.

Most of the data fields are laid out in one or more vertical columns. Numeric values typically will have the appropriate units specified.

Much of the data you will provide consists of narrative text. Please try to keep the length of a text field entry to no more than 255 characters. Enter the text into the first cell comprising the value entry. After you enter the text string, the value will automatically span adjacent cells to the right as necessary to display the text. Please try to keep your descriptions short and concise. Think about using appropriate keywords in your text data. It is likely that users of the RSDO database will use keywords for searching text fields.

On all Worksheets, you can ignore the ID field. It will be used by our automated processing for data ingesting when we receive your responses.

The "Spec Para No.", (Specification Paragraph Number), fields can be edited by you. Their purpose is for you to specify references into your RSDO contract documentation to supply additional information about the data in the field.

It is NOT expected that you will be able to fill out every piece of data. However, it is to your benefit to provide as much data as possible.

Remember to "Save" so you don't loose all your good work.

Worksheet Protection

The Worksheets are protected, but not password protected. The objective was to minimize inadvertent editing of the Worksheet's structure. However, we realize that some vendors may wish to supply additional information not covered on a given worksheet. In that case, the vendor may unprotect the Worksheet.

(ToolsMenu->Protection->Unprotect Sheet)

Please do not change the existing rows or columns in the worksheet. Instead, append your additional information to the bottom of the existing worksheet rows.

We suggest you reprotect the Worksheet when you have finished adding your information.

(ToolsMenu->Protection->Protect Sheet...) answer YES to the dialog.

Specific Worksheets

As mentioned above, each Workbook consists of five worksheets. All five worksheets should be completed.

1) Spacecraft Characteristics

   This worksheet defines some very high level data pertaining to your spacecraft. Most of the fields are narrative text.

2) Payload Accommodations

   Specifies general payload accommodations. Please ensure that numeric data is entered in the units indicated in the heading above the field.

3) Core System Performance

   Details the core system parameters and are arranged by subsystem.

Two fields in particular need further explanation.

a) In the "Coordinate System Definition" under the "Structural & Mechanical Characteristics" heading, you specify your coordinate system which will be used to interpret the "Center of Mass Location" coordinates in the following field. The coordinate system can be a text description or the name of a file containing a graphical representation of the system.

Note: the "Payload CG" data on the Payload Accommodations page must also be using the same coordinate system.

b) The "Type/Architecture" field under the Attitude Control Subsystem, only needs the correct 1-4 value entered. The meaning of each value is described in the shaded box to the right of the field.

4) Subsystem Characteristics

This worksheet is intended to be a sparsely filled matrix of subsystem performance data. We do not expect every value to be filled in. For example, the Width, Height, Depth columns have no meaning for "ACS Software", therefore, those values should be blank.

Please ensure that numeric data is entered in the units indicated in the heading at the top of the Worksheet.

All numeric values with black backgrounds under Mass and Power are automatically calculated values. They are the sums of the Mass or Power calculated from the data values entered beneath them.

Maximum Payload and Maximum Propellant values should be entered by you.

5) Subsystem Costs

Costing information about each subsystem is detailed in this Worksheet. The "LOE" column stands for "Level of Effort". The "Narrative" column may contain any additional information you believe is important.

Rapid Spacecraft Development Office

Spacecraft Characteristics

Contractor:					
Spacecraft:					
Spec Para No.		NARRATIVE (alphanumeric)			
	OBSERVATORY-LEVEL PERFORMANCE				
	LAUNCH VEHICLE COMPATIBILITY				
		Vehicle #1	Vehicle #2	Vehicle #3	Vehicle #4
	Model & Configuration				
	Payload Attach Fitting				
	Fairing				
	REFERENCE ORBIT COMPATABILITY AND CONSTRAINTS				
	Maximum Altitude (Km)				
	Inclination (degrees)				
	Eccentricity				
	CLEANLINESS LEVELS ACHIEVED				
	Particulate				
	Molecular				
	DESIGN LIFETIME				
	Probability of Success (0 <= p <= 1.0)				
	Operational Lifetime (in years)				
	Areas of Redundancy				
	Expendables				
	MISCELLANEOUS SPECIFICATIONS				
	INTEGRATION & TEST (S/C & OBSERVATORY)				
	Description				
	Schedule Description				
	PERFORMANCE ASSURANCE				
	Description				
	Approach				
	GROUND SYS SUPPORT				
	Description				
	LAUNCH SYS INTERFACE				
	Description				
	LAUNCH/MISSION OPS				
	Description				
	ELECTROMAGNETIC PERFORMANCE				
	EMI/EMC Environment				
	Magnetic Performance				
	ESD Sensitivities				
	RADIATION TOLERANCE				
	Total Dose (kilorads)				
	Single Event Effects				