SYSTEMS ANALYSIS AND MISSION SUPPORT (SAMS)

Solicitation No. 1-132-RB.0002

List of Respondees to Source Sought Synopsis

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Analytical Services & Materials, Inc.
107 Research Drive
Hampton, VA  23666

Jackson and Tull Chartered Engineers
7375 Executive Place, Suite 200
Seabrook, MD  20706

TYBRIN Corporation
1030 Titan Court
Fort Walton Beach, FL  32547

ADF Corporation
3003 Aerospace Parkway
Cleveland, OH 44142

Materials Sciences Corporation (MSC)
500 Office Center Drive, Suite 250
Fort Washington, PA  19034

Aero Systems Engineering(ASE), Inc.
358 East Fillmore Avenue
St. Paul, MN  55107

Metacomp Technologies, Inc.
650 Hampshire Road, #200
Westlake Village, CA  91361

SGT, Inc.
7701 Greenbelt Road, Suite 400
Greenbelt, MD  20770

Morgan Research Corporation
2707 Artie Street, Suite 17
Huntsville, AL  35805

Vigyan
30 Research Drive
Hampton, VA  23666

Midé Technology Corporation
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Cambridge, MA  02142

Federal Data Corporation
1700 Research Boulevard, Suite 400
Rockville, MD  20850

InDyne, Inc.
6862 Elm Street, Suite 700
McLean, VA  22101

SFA, Inc.
1401 McCormick Drive
Largo, MD  20774

Infocom Technology, Inc.
80 Ward Street, Suite 100
Paterson, NJ  07505

Rattheon Aerospace Corporation
555 Industrial Drive South
Madison, MI  39110

Noise Control Engineering, Inc.
799 Middlesex Turnpike
Billerica, MA  01821

Thermal & Flow Engineering, Inc.
2121 Eisenhower Avenue, Suite 2000
Alexandria, VA  22314
Proton Aerospace
880 Jupiter Park Drive, Suite 16
Jupiter, FL  33458

DynCorp Technical Services, Inc.
One Ridgmar Centre
6500 West Freeway, Suite 600
Fort Worth, TX  76116

Lockheed Martin Engineering & Sciences
Langley Program Office
c/o NASA Langley Research Center, MS 371
Hampton, VA  VA  23681

Aerospace Innovations, LLC
4822 George Washington Memorial Highway, Suite 200
Yorktown, VA  23692

Rannoch Corporation
1800 Diagonal Road, Suite 430
Alexandria, VA  22314

Quadrus Corporation
1015-116 Atlantic Boulevard
Atlantic Beach, FL  32233

Hamilton Beach/Procter Silex
1421 Waterfron Drive
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Dallas, TX  75261-3018

Cimarron
1830 NASA Road 1
Houston, TX  77058

Sverdrup Technology, Inc.
600 William Northern Boulevard
Tullahoma, TN  37388

Advanced Design Corporation (ADC)
8560 Cinder Bed Road, Suite 100
P. O. Box 8560
Newington, VA  22122

Wiltex, Inc.
2532 Las Corrales Court
Virginia Beach, VA  23456-4200

Kalman & Company, Inc.
#5 The Koger Center, Suite 216
Norfolk, VA  23502

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10 Basil Sawyer Drive
Hampton, VA  23666

Taitech Research and Engineering
1430 Oak court, Suite 301
Beavercreek OH  45430

Zel Technologies, LLC
55 West Queens Way, Suite 208
Hampton, VA  23669

Sparta, Inc.
244 E. Avenue, K-4
Lancaster, CA  93535

Micro Craft, Inc.
207 Big Springs Avenue
P. O. Box 370
Tullahoma, TN  37388

Honeywell, Inc.
P. O. Box 21111
Phoenix, AZ  85036

Syscom Development, Inc.
1110 Nasa Road, Suite 111
Houston, TX  77058

Aerophysics Research Corp.
11123 141st Place, NE
Kirkland, WA  98034

Science Applications International Corporation (SAIC)
One Enterprise Parkway, Suite 200
Hampton, VA  23666
Airborne Systems Competency
Areas of Expertise

- Flight Dynamics
- Guidance & Control
- Crew Station Design and Integration
- Electromagnetics
- Mission-critical Digital Avionics Systems (including software)
- Aircraft Operations
- Piloted Simulation
- Research Systems Development
ADVANCED ELECTROMAGNETIC TECHNOLOGY

- Computational Electromagnetic (CEM) Analysis
- High Intensity Radiated Fields (HIRF), EMI/EMC Testing
- Advanced Antenna Design
- Radar Cross Section (RCS) Measurements
- EM Material Characterization
AOE 6: CREW SYSTEMS

Situation Awareness Assessment

Synthetic Vision

Reduced Aircraft Spacing

Human-Centered Design

Tactical Weather Avoidance

Strategic Route Planning
AOE 4: FLIGHT DYNAMICS

Vehicle Stability and Control

Spin Characteristics

Control Power Requirements

Control Concepts

Design Criteria

Hazard Criteria

Synthetic jet port

Synthetic jet slot

Graph: Spin rate vs. angle of attack
Sensor Systems Research

Aero-Focused Development
- Windshear Radar
- HSR - XVS
- AvS
  - Turbulence
  - EWxR
  - EVS

Space Technology
- Advanced Imaging
- Radiometry
- Semiconductor Lasers for LIDAR
- Retinex
Electromagnetics Research & Testing Laboratories

- Scale Model of B-297 in Antenna Chamber
- Installation of 28 Ft. Reflector in Experimental Test Range
- Reverberation Chamber in the High Intensity Radiated Field Laboratory
- Almond Calibration Test Model in RCS Compact Range
- Gigahertz Transverse Electromagnetic Mode (GTEM) Test Cell
- Scale Model Automobile in Antenna Test Chamber
Develop and demonstrate methodologies for designing and verifying high integrity digital and electromagnetic systems in mission or life critical aerospace applications.

Vehicle Health Management Technologies
- Airframe Structure
- Flight Systems

- Prognostics & Required Corrective Actions to Flight Crew
- Fault & Failure Data to Manufacturer
- Fault & Failure Data to Control Upset Prevention & Recovery System

Flight Critical System Design and Validation Technologies
- Design Correctness
- Fault Tolerance
- Functional Integrity

Health Management & Flight Critical System Design Technologies

FCC in HiRF Test Chamber
Flight Simulation in Closed-Loop Sys. Lab

Methods to Assess EME Upset on Aviation Electronics

Requirements
Analysis
Design
Implementation
Formal Methods
- formal models
- mathematically verified implementation model

- proof
- design
- proof
- design
Research Aircraft and Research Simulators

B-757 ARIES
OV-10

Differential Motion Simulator (DMS)
Visual Motion Simulator (VMS)

Support Aircraft

Cockpit Motion Facility (CMF)
# SOLICITATION 1-132-RB.0002
## SAMS PRE-PROPOSAL CONFERENCE
### APRIL 25, 2000

<table>
<thead>
<tr>
<th>NAME</th>
<th>COMPANY AFFILIATION</th>
<th>PHONE #</th>
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<tbody>
<tr>
<td>Frank Allario</td>
<td>RTI</td>
<td>757-827-1160</td>
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<td>Bob Drosdzak</td>
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</tbody>
</table>
Aerodynamics, Aero thermodynamics, and Acoustics Competency

Areas of Expertise

- Development, assessment, and application of aerodynamic and component integration technologies to enable development of advanced subsonic, supersonic, and high performance aircraft
- Development, assessment, and application of acoustic technologies in the development of advanced aerospace systems and to meet environmental requirements
- Development, assessment, and application of aerothermodynamic technologies to enable development of hypersonic aircraft, launch vehicles, and planetary/earth entry systems
- Development, assessment, and application of hypersonic airbreathing propulsion technologies to enable development of hypersonic airbreathing vehicles
- Development, assessment, and application of testing technologies to enable aerospace research through testing and experimentation in ground facilities
- Management and operation of aerodynamic, aerothermodynamic, acoustic, and hypersonic propulsion facilities for testing on a broad class of aerospace vehicles
AA.AE.01 Aerodynamic and Component Integration Technologies
Develop, assess, and apply aerodynamic and component integration technologies to enable development of advanced subsonic, supersonic, and high performance aircraft

Products
- Vehicle performance, stability, and control
- Aerodynamic design tools and methodologies
- Advanced aerodynamic configurations for fixed wing, rotorcraft, and airbreathing propulsion concepts
- High lift and component integration aerodynamics
- Flow physics understanding and modeling
- Innovative flow control techniques
AA.AE.02  Aerothermodynamic Technologies

Develop, assess, and apply aerothermodynamic technologies to enable development of hypersonic aircraft, launch vehicles, and planetary earth entry systems

Products

- Concept screening for flyability/survivability
- Configuration optimization
- Flight environment definition (benchmarking)
- Design tools and methodologies

X-33  
X-34  
Hyper-X  
Planetary  
X-38
AA.AE.03 Acoustic Technologies
Develop, assess, and apply acoustic technologies in the development of advanced aerospace systems and to meet environmental requirements.

Products
- Computational methods for aeroacoustic design and analysis
- Airframe, fan, jet exhaust, and rotor noise control
- Active and passive aircraft interior noise control
- Advanced acoustic configurations for aerospace vehicles
- Sonic fatigue resistant aerospace structures
- Aeroacoustic measurements and flow diagnostics
- Community and passenger noise impact assessment
AA.AE.04 Hypersonic Airbreathing Propulsion Technologies

Develop, assess, and apply hypersonic airbreathing propulsion technologies to enable development of hypersonic airbreathing vehicles

Products

- Scramjet engine flowpath design and performance
- Design tools and methodologies
- Fundamental physics of mixing and combustion
- Advanced testing techniques for scramjets
- Scramjet test facility development

Small-scale parametric scramjet
AA.AE.05 Test Capabilities For Industry

Manage, operate, and provide aerodynamic, aerothermodynamic, acoustic, and aero- and hypersonic-propulsion test capabilities for industry research and development on a broad class of aerospace vehicles.

**Test Capabilities include:**
- Supersonic performance
- Transonic performance testing at Flight Reynolds Number
- Dynamic Stability testing
- Static & Dynamic Ground Effects Testing
- Propulsion/Airframe Integration
- Rotorcraft Testing
- High Lift System Performance
- Configuration Screening
- Phased Microphone Array for Noise Source Identification
- Aerothermal Loads Testing

Dynamic Stability testing of X33 model in UPWT

Damping-in-pitch,
\[ C_{m_d} + C_{m_\alpha} \]
Oscillatory longitudinal stability,
\[ C_{m_\alpha} - k_2 C_{n_\alpha} \]
Damping-in-yaw,
\[ C_{n_p} - C_\alpha \cos \alpha \]

• • •
AA.AE.06 Experimental Testing Technologies

Develop, assess, apply, and integrate experimental testing technologies including test articles, instrumentation, data systems and test techniques to enable aero-space research through testing and experimentation in ground facilities.
SOLICITATION 1-132-RB.0002
SYSTEMS ANALYSIS & MISSION SUPPORT

PREPROPOSAL CONFERENCE

AGENDA

- INTRODUCTION, SOURCE EVALUATION PROCESS, HEDGEPETH 9:00 - 9:30
  & PROJECTED SCHEDULE
- WORK AREA OVERVIEWS:
  - AERODYNAMICS, AEROTHERMODYNAMICS & ACOUSTICS COMPETENCY
    PAULSON 9:30 - 9:40
  - AIRBORNE SYSTEMS COMPETENCY
    PRICE 9:40 - 9:50
  - STRUCTURES & MATERIALS COMPETENCY
    SHUART 9:50 - 10:00
  - SYSTEMS ENGINEERING COMPETENCY
    TAYLOR 10:00 - 10:10
  - AEROSPACE SYSTEMS, CONCEPTS & ANALYSIS
    WEAVER 10:10 - 10:20
  - SPACE ACCESS AND EXPLORATION PROGRAM
    McCLINTON OFFICE 10:20 - 10:30
- BREAK 10:30 - 10:45
- QUESTION & ANSWERS WEIH 10:45 - 11:30
- LUNCH 11:30 - 1:00
- FACILITY TOURS 1:00 - 3:00
  (STRUCTURES LAB, COLTS, LANDING LOADS & 14X22 TUNNEL)
Solicitation 1-132-RB.0002
SYSTEMS ANALYSIS AND MISSION SUPPORT

INTRODUCTION

• ALMOST ALL OF THE FACILITIES AND ORGANIZATIONS AT LaRC RECEIVE SERVICES UNDER THIS PROCUREMENT.

• SKILLS REQUIRED RANGE FROM DOCUMENTARIAN TO SENIOR RESEARCH SCIENTISTS.

• RESULTING CONTRACT WILL BE EXPECTED TO FEATURE A HIGH DEGREE OF FLEXIBILITY AND RESPONSIVENESS.

• EFFORTS ARE DEEMED “ESSENTIAL” BY ALL LEVELS OF MANAGEMENT.
SOLICITATION 1 - 132 - RB.0002
SYSTEMS ANALYSIS & MISSION SUPPORT

GENERAL GUIDANCE

• COPIES OF VIEWGRAPHS AND AN ATTENDANCE LIST WILL BE PROVIDED WITH THE FINAL RFP.

• ALL REVISIONS TO THE RFP WILL BE IN WRITING; NOTHING SAID HERE TODAY SHOULD BE CONSTRUED AS REVISION UNLESS SUBSEQUENTLY CONFIRMED IN THE FINAL RFP OR BY WRITTEN AMENDMENT.

• PREVIOUSLY SUBMITTED QUESTIONS WILL BE ADDRESSED DURING THE Q&A PERIOD. WRITTEN QUESTIONS TO BE COLLECTED DURING THE BREAK WILL BE ADDRESSED AT FINAL RFP RELEASE.

• AFTER THE FINAL RFP IS RELEASED, ALL QUESTIONS MUST BE SUBMITTED TO MR. WEIH.
DIVISION OF EFFORT

- AIRBORNE SYSTEMS COMPETENCY 26%
- AAAC 18%
- S&M 17%
- S&E 13%
- SPACE ACCESS AND EXPLORATION OFFICE 10%
- AEROSPACE SYSTEMS, CONCEPTS & ANALYSIS 8%
- OTHERS 8%
<table>
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SOLICITATION 1-132-RB.0002  
SAMS PREPOSAL CONFERENCE - APRIL 25, 2000
Solicitation 1-132-RB.0002
SYSTEMS ANALYSIS AND MISSION SUPPORT

PROCUREMENT INFORMATION

• ANY COMMUNICATION IN REFERENCE TO THIS DRAFT RFP MUST BE DIRECTED TO TOM WEIH, OR IN HIS ABSENCE, ROSEMARY FROEHLICH - SEE SECTION L.11

• THE RESULTANT CONTRACT WILL BE A SMALL BUSINESS SET-ASIDE UNDER SIC CODE 8731 - 1,500 EMPLOYEES

• THIS FOLLOW-ON PROCUREMENT REPRESENTS A CONSOLIDATION OF TWO LARC CONTRACTS:
  – NAS1-96013 WITH FDC/NYMA FOR SYSTEMS ANALYSIS AND ENGINEERING RESEARCH SUPPORT (SAERS)
  – NAS1-96014 WITH LOCKHEED FOR AEROSPACE RESEARCH AND TECHNOLOGY SERVICES (ARTS)

• PROPOSALS RECEIVED IN RESPONSE TO THE FINAL RFP WILL BE EVALUATED BY A NASA SOURCE EVALUATION BOARD (SEB) IN ACCORDANCE WITH NASA FAR SUPPLEMENT 1815.3. NOTE: THE FINAL RFP WILL BE REVISED TO REFLECT THE CORRECT NASA FAR SUPPLEMENT REFERENCE.
Solicitation 1-132-RB.0002
SYSTEMS ANALYSIS AND MISSION SUPPORT

PROCUREMENT INFORMATION

• IT IS LANGLEY’S INTENTION IS TO AWARD THE CONTRACT WITHOUT DISCUSSIONS IN ACCORDANCE WITH SECTION L.3, INSTRUCTIONS TO OFFERORS - COMPETITIVE ACQUISITION (FAR 52.215-1).

• ALL REFERENCES SUBMITTED IN RESPONSE TO THE INSTRUCTIONS ON PAST PERFORMANCE MAY BE CONTACTED BY NASA. PLEASE INSURE THAT THIS INFORMATION IS COMPLETE AND ACCURATE.

• THIS SOLICITATION INCLUDES WAGE DETERMINATIONS APPLICABLE TO THE “SERVICE CONTRACT ACT”.

• COMPUTERIZED COST PROPOSAL - PLEASE READ THE INSTRUCTIONS CAREFULLY AND COMPLY WITH EACH REQUIREMENT (SECTION L.13 DRFP)

• INFORMATION REGARDING AN ELECTRONIC BIDDERS LIBRARY IS CONTAINED IN SECTION L.12. ALL OFFERORS ARE ENCOURAGED TO USE THE INFORMATION CONTAINED IN THE LIBRARY.
Solicitation 1-132-RB.0002
SYSTEMS ANALYSIS AND MISSION SUPPORT

RESPONSIBLE ORGANIZATIONS

Technical
Aerospace Systems, Concepts & Analysis Competency - William Gilbert
Aerodynamics, Aerothermodynamics, and Acoustics Competency - Ajay Kumar
Structures and Materials Competency - Mark Shuart
Airborne Systems Competency - Douglas Arbuckle
Systems Engineering Competency - Sammie Joplin
Other Program Offices and Organizations -

Procurement

Procurement Officer - Kimberly Stone
Contracting Officer - Rosemary Froehlich
Contract Specialist - Tom Weih
Solicitation 1-132-RB.0002
SYSTEMS ANALYSIS AND MISSION SUPPORT

SOURCE EVALUATION BOARD

• Voting Members:
  – Robert K. Hedgepeth (Chair), AAAC
  – Craig S. Cleckner, SEC
  – C. Tom Weih, Office of Procurement
  – Marilyn E. Ogburn, AirSC
  – Stan S. Smeltzer, SMC

• Recorder:
  – Jennifer D. McCardell, AAAC

• Price/Cost Analyst:
  – Jeanne D. Covington, Office of Procurement

• Office of Chief Counsel:
  – Kevin E. Love
SOLICITATION 1-132-RB.0002
SYSTEMS ANALYSIS & MISSION SUPPORT

TENTATIVE SCHEDULE

• COMMENTS DUE_MAY 5, 2000
• FINAL RFP RELEASE_MAY 19, 2000
• PROPOSALS DUE_JUNE 19, 2000
• CONTRACT AWARD_NOV. 1, 2000
• CONTRACT START_JAN. 1, 2001
Questions to the Draft RFP

1-132-RB.0002

Question 1. RFP L.13.B.1.(b) - Can a smaller font such as 8 point be used for graphics and tables?

Answer: 8-point font or higher is acceptable for graphics and tables provided that it is legible. This change will be reflected in the final RFP.

Question 2. Attachment 4 contains an Excel sheet entitled “Rate Chart.” This sheet contains no data. Please provide additional instructions for the purpose of the Rate Chart.

Answer: The sheet entitled “Rate Chart” is there to provide a single place to display all rates, factors, and assumptions that are used in the Cost Formulas. The use of the “Rate Chart” sheet is optional.

Question 3. Would the government provide the current ADP required seats by ODIN seat type?

Answer: ODIN information is currently unavailable. The nature and magnitude of ADP equipment and software that is currently being provided by the Government can be determined by reviewing the contracts and task orders contained in the Bidders Library.

Question 4. ADP Equipment (L.13.F.1.e) - For cost estimating purposes, please provide the quantities and types of ADP equipment and software (both CAD/analysis and PC workstation) that are currently being provided by the Government to the SAERS and ARTS contracts.

Answer: The nature and magnitude of ADP equipment and software that is currently being provided by the Government can be determined by reviewing the contracts and task orders contained in the Bidders Library.

Question 5. Can this equipment be utilized during contract phase-in to minimize work interruption?

Answer: The new Contractor will not perform Task Orders during the phase-in period. Consequently, no ADP equipment will be needed during this period.

Question 6. Should ODIN contractor support/equipment be delayed past November 1, 2000 into the contract effective date, can existing workstation equipment be utilized until ODIN support is available?

Answer: If the new Contractor clearly specifies the use of the ODIN contract to obtain ADP Equipment in their proposal, and if the ODIN contract is delayed beyond January 1, 2001, then existing ADP Equipment will be made available until the ODIN contract is
complete. In all other cases, existing workstation equipment will not be provided under the SAMS contract in accordance with FAR 45.302-1. Your attention is directed to Section L, L.13.F.1.e, which states that the Contractor shall supply and maintain automatic data processing (ADP) equipment and software for their use on this contract. Material, special test equipment, special tooling, or Agency peculiar property will be either charged direct to the contract or provided by the Government on a Task Order Basis.

Question 7. Can the required cost and staffing data for the Representative Task Orders be submitted in the Business Volume (Volume II), or are these data required in the Technical Proposal and subject to the 75 page limit?

Answer: The required cost and staffing data for the Representative Task Orders must be submitted with Technical Proposal – Volume I and will be subject to the 75 page limitation.

Question 8. Section G.1(f)(1) states that provisional fee payments will not be paid. Sections G.1(f)(2), (3), and (4) appear to describe how provisional fee will be handled. Which is correct?

Answer: Considering the award fee pool will not be finalized until the end of each 6-month evaluation period, provisional fee payments will not be made under this contract. However, any proposed methodologies on provisional fee payments submitted on or before May 5, 2000 will be considered by the Government.

Question 9. Section H.3 requires work performance (work hours/hours of work) to be consistent with the Government. Does this extend to Government holidays as well?

Answer: Offerors are referred to Section I, NASA FAR Supplement clause 1852.242-72, Observance of Legal Holidays – Alternate I for information regarding Government Holidays.

Question 10. Our interpretation of Section I.6 is that overtime is allowable under the specified circumstances, but that the Government must approve all overtime. Is this correct?

Answer: Overtime is permitted without Government approval in the circumstances stated in paragraph (a)1 through (a)4 of FAR 52.222-2, Payment of Overtime Premiums.

Question 11. Please elaborate on - Volume I, Subfactor 1 Section L instructions to correlate the offeror’s and subcontractor’s expertise to each of the broad functional areas in the SOW?

Answer: The instructions contained in Section L.13 of the RFP are provided in sufficient detail for offerors to provide an adequate response to the area in question.
Question 12. Please elaborate on (or better distinguish between) Volume I, Subfactor 2 Section L (3rd paragraph) instructions to describe the capabilities and depth of the offeror’s organization (including subcontractors) for efficiently and effectively performing the contract effort?

Answer: The instructions contained in Section L.13 of the RFP are provided in sufficient detail for offerors to provide an adequate response to the area in question.

Question 13. Please elaborate on (or better distinguish between) - Business Volume, Factor 3, Past Performance requirements relative to related performance on other Contracts?

Answer: The instructions contained in Section L.13 of the RFP are provided in sufficient detail for offerors to provide an adequate response to the area in question.

Question 14. Is the letter from the Offeror committing to an ISO-9001 compliance schedule included in the Volume I page limit?

Answer: The letter is not included in the Volume I page limitation. This change will be reflected in the final RFP.

Question 15. Section D of the Draft RFP appears to be missing. Was this section intentionally omitted?

Answer: Section D was intentionally omitted as there are no clauses from that Section applicable to this procurement.

Question 16. Under the two current contracts, on-site office space is made available for Program Management personnel. Does the government intend to make space available for SAMS Program Management?

Answer: The Government intends to make space available for the SAMS Program Management.

Question 17. Will the compensation plan required under Subfactor 2 be counted in the 75 page limitation?

Answer: The compensation plan will be counted in the 75 page limitation.

Question 18. Please consider including hub-zone requirements into the contract.

Answer: In accordance with FAR Part 19, hub-zone requirements are not applicable to procurements set-aside for small businesses.

Question 19. Is there a moratorium on contractor visits/discussion about SAMS? Will the blackout coincide with the RFP release?
Answer: There is not a moratorium on contractor visits/discussion about SAMS; however, considering that the evaluation criteria have been released, it is requested and highly recommended that you pose all visits/discussion to Tom Weih. The official blackout will coincide with the final RFP release.

Question 20. Are the aircraft maintenance requirements still a part of SAMS?

Answer: The aircraft maintenance requirements are not a part of SAMS. These requirements will be fulfilled via another contract vehicle.

Question 21. RFP B.3  Award Fee - We recommend that the Government specify the award fee percentage, within the range of 8-10%, for all offerors to propose rather than have each offeror set their own fee percentage. Since the award fee is the Government’s primary means of rewarding or encouraging improvements in performance we believe that it is in the Government’s best interest to make sure that the percentage is large enough to warrant substantial attention from the contractor. If an offeror proposes a low award fee percentage their interest in performing to meet award fee evaluation criteria and their corporate interest in the SAMS contract are likely to be less than a contractor whose potential earned award fee is more substantial. Allowing an offeror to propose a low award fee percentage could result in a cost discriminator which would in fact have a negative impact on performance after contract award and defeat the purpose of the source selection process- providing the best contract service possible to SAMS contract users.

Answer: The Government does not plan on specifying an award fee percentage for this competition.

Question 22. RFP Statement of Work 9.0, Electronic Task Order System  
a.) Is there an existing Electronic Task Order System which was funded by the Government for contractor use? If so, will information be provided regarding its capabilities, interfaces, and hardware/software platform requirements?  

b.) Will the Government provide information regarding the interfaces (hardware, software) with which the Electronic Task Order System must be compatible?

Answer: There is not an existing Electronic Task Order System. There are no existing hardware/software platform requirements. Expected interfaces will be PC, MAC, and UNIX based systems.
Question 24. RFP G.1(f)(1) - Provisional award fee payments are normally allowed under NASA contracts. Will the Government reconsider allowing provisional award fee payments under the SAMS contract? For small businesses it is very important to have regular cost and fee payments to meet fiscal obligations. Subparagraphs (2) through (4) which follow ensure that the Government’s interests are well protected.

Answer: Considering the award fee pool will not be finalized until the end of each 6-month evaluation period, provisional fee payments will not be made under this contract. However, any proposed methodologies on provisional fee payments submitted on or before May 5, 2000 will be considered by the Government.

Question 25. RFP G.14 - Are the labor rates provided in the tables to be direct labor rates, loaded through G&A, or loaded through award fee? L13.G. specifies direct labor rates and associated indirect rates.

Answer: The labor rates in G.14 are NOT to be loaded through G&A or award fee. The Indirect rates should be specified separately as shown on the chart.

Question 26. RFP G.14 - Please clarify the difference between Project Planner and Scheduler/Cost Analyst. It is our understanding that Project Planner and Scheduler are often synonymous with each other at Langley.

Answer: The definitions of these support personnel are provided in Exhibit G to the RFP.

Question 27. RFP I.1 .B - Are paragraphs (e) and (f) included in Clause 1852.242-72?

Answer: Paragraphs (e) and (f) are part of Alt II to NASA FAR Supplement Clause 1852.242-72, which deals with the Observance of Legal Holidays. LaRC is still considering the inclusion of Alternate II and the Final RFP will reflect our decision.

Question 28. RFP I.13, Security Classification Requirements (NASA 1852.204-75) (SEP 1989) Our company already possesses Top Secret facility and personal clearances. Will we be required to establish our own Top Secret facility clearance at Langley? If not, will the Government provide the Top Secret facility for storage and use of classified materials?

Answer: A Langley unique Top Secret facility clearance is not required. All storage and use of classified materials will be done by NASA Langley.

Question 29. RFP Exhibit A, DD 254 and Exhibit B, Contract Documentation Requirements. The DD 254 specifies Operations Security requirements, but the Exhibit B, the contract documentation requirements, does not specify an OPSEC Plan. Should an OPSEC Plan be added as a contract deliverable?

Answer: An OPSEC Plan is not required. The DD254 will be updated and included in the final RFP.
Question 30. RFP Exhibit B, Contract Documentation Requirements, and Exhibit E, Draft Award Fee Evaluation Plan Exhibit B specifies the Self Assessment Report be delivered 30 calendar days after completion of the evaluation period. Exhibit E specifies the Self Assessment Report be delivered 25 days after the end of the period. Which is correct?

**Answer:** The self assessment report shall be delivered 25 days after the end of each evaluation period. This change will be reflected in the final RFP.

Question 31. RFP Exhibit E, Draft Award Fee Plan Part III.C (Cost Analysis No. 1) This paragraph seems to have a wording problem. It is stated that if the percentage of tasks having Task Order Actual Costs that fall below 105% of the Task Order Planned Costs falls below 61% of tasks then the Award Fee score will be 0. It would appear that it is desirable for task costs to fall below 105% of the Task Order Planned Cost. Please clarify the wording and intent of this paragraph.

**Answer:** The last sentence under **Cost Analysis No. 1** which reads: “If the percentage of Tasks falls below 61 than the numerical score will be zero(0) for Cost Analysis 1,” will be deleted from the Award Fee plan.

Question 32. RFP L.13.E - Technical Proposal Volume I:
(a) The DRFP does not require resumes for proposed Key Personnel. Is this intentional? If resumes are desired are they to be included in the Volume I 75-page limitation? Will the Government specify the desired contents of the resumes?
(b) Will key personnel resumes be evaluated? If so, please provide the evaluation criteria in Section M of the final RFP.

**Answer:** The Government does not plan on evaluating resumes or key personnel as part of this procurement.

Question 33. RFP L.13.E.1.b, Subfactor 2 – Management and Staffing - The first paragraph states that contract award is 1 November 2000 and contract effective date is 1 January 2001. To clarify, does this mean a 60 day transition overlapping the incumbent contractors’ performance?

**Answer:** A 60-day transition period is planned; however, the actual work on Task Orders will not begin until January 1, 2000.

Question 34. RFP L.13.E.1.b Subfactor 2 – Management and Staffing - Since our Quality System Manual and associated procedures already address our approaches to contract and task management as well as other administrative functions, and they will be provided as attachments to Volume I, can they be incorporated by reference into our response to this subfactor?

**Answer:** No, an official response to this subfactor is required within the 75-page limitation.
Question 35. RFP L.13.F.1.3.e and G.12.C - These paragraphs state that offerors are to propose ADP equipment, general purpose equipment, machine tools and vehicles for the entire contract. We are concerned that the requirement to provide ADP and other equipment gives the incumbent contractors an unfair competitive advantage. Since they are allowed to purchase such equipment under their current contracts (as direct or indirect costs) they can reduce their proposed SAMS indirect costs by purchasing large numbers of computers now and then not proposing such costs in their SAMS offers. It is our understanding that at least one of the incumbents is in fact doing this. We strongly recommend the Government provide a fixed cost for all offerors to propose for ADP equipment, tools and other equipment to ensure that the incumbents do not have a competitive cost advantage.

Answer: Since the Government currently provides all equipment under the current contracts, it is unclear how the incumbents can have an unfair competitive advantage in this area. Therefore, the Government will not provide a fixed cost for all offerors to propose ADP equipment, tools and other equipment.

Question 36. Paragraph G.12.C states that contractor supplied ADP equipment and software shall be compatible with the Langley Organization supported. Please provide a list of current ADP equipment and software being used by SAERS and ARTS contractor personnel. We need specific information on types and quantities of computers, software packages and number of users (for costing site licenses), and any other special ADP hardware required. In order to cost the number of printers and other shared peripherals required we need to know how the staff are distributed across the Center (i.e., how many persons can reasonably share a printer or other peripheral device?)

Answer: The nature and magnitude of ADP equipment and software that is currently being provided by the Government can be determined by reviewing the contracts and task orders contained in the Bidders Library. Additional information regarding the distribution of staff to assist you in preparing cost proposals will be provided in the final RFP.

Question 37. RFP L.13.F.1 The second paragraph states that the SAMS contractor may use the Langley ODIN Contractor services for ADP equipment and software. Since the first paragraph states that we must “clearly identify where these costs are considered in their proposal”, please provide the Langley ODIN seat costs for equipment anticipated to be used by the SAMS successful offeror. The ODIN web site did not give sufficient information to meet pricing requirements. In the absence of ODIN cost data we suggest that the Government provide a fixed cost for all offerors to propose for ADP equipment and that appropriate revisions to the cost be allowed after the Code R ODIN award is made.

Answer: The LaRC ODIN seat costs are presently unavailable as a Contractor has not been selected. However, the seat costs from other NASA Centers are publically
available. The Government will not provide a fixed cost for all offerors to propose ADP equipment, tools and other equipment.

Question 38. RFP M.2.A.1 Subfactor 1 – Understanding the Requirements
This paragraph states that “The offeror’s correlation of his expertise and that of significant subcontractors or teaming partners in each of the broad functional areas of the Statement of Work will be evaluated.” Please clarify what is meant by “correlation of expertise”.

Answer: The instructions contained in Section L.13 of the RFP are provided in sufficient detail for offerors to provide an adequate response to the area in question.

Question 39. Rate Chart -The Rate Chart is void in Excel Workbook. Will it be identical to the one in G.14?

Answer: The sheet entitled “Rate Chart” is there to provide a single place to display all rates, factors, and assumptions that are used in the Cost Formulas. The use of the “Rate Chart” sheet is optional.

Question 40. Cost Form C - Since many companies hold their benefits costs as proprietary information, is a note referencing their disclosed cost proposal acceptable to comply with Note 1?

Answer: Reference RFP Section L, paragraph L.13.F.1.c, subcontractors may submit proprietary cost information directly to the Government. Cost Form C, Note 1, requires that subcontracted categories be annotated. Thus, subcontracted and prime costs would then be supported separately.

Question 41. It is not possible to provide fixed numbers for the costs associated with some components of the fringe portion of an overhead pool since there are many variable elements such as:

1. The company contribution to many 401(k) and “company pension plans” is a function of the employee’s contribution.
2. The amount of paid absence for all positions (Wage Determination included) is a function of service time.
3. Civic Duty (Military, Jury) time is an overhead component and highly variable.

Is it acceptable to use averages used to establish Forward Pricing Rates Agreements for such variable quantities?

Answer: These elements are a part of your Defense Contract Audit Agency (DCAA) approved indirect rates. They are not expected to be derived separately for each category, but applied to each as an average apportionment of the total rate.

Question 42. Are the formulas requested in Note 2 to be annotated as text on the spreadsheet as well as explained in the text of the Business Proposal?
Answer: Formulas in spreadsheets should be self explanatory when supported by rationale in the text of the Business Proposal.

Question 43. Is an overhead cost element sheet used for justification for a FPRA acceptable to Comply with Note 4 for the “Other” elements since that is a required element of the Business Proposal? Or, should columns be added that sum into the “Other” column?

Answer: An explanation of elements in “Other” is adequate. Additional columns are not a requirement.

Question 44. Should rows for each subcategory classification (I - V) be added so as to provide the detail of Year 1 Payroll Tax and Fringe Benefit costs for each direct labor position?

Answer: The Cost Forms should reflect the weighted composite hourly labor rates and total category hours. Your spreadsheet must show how each rate was derived. There must be sufficient detail for the Government to evaluate the subcategory I-V labor rates, and verify the hours to the RFP.

Question 45. Cost Form B - This format provides for one category level per direct labor classification. Should rows for each subcategory classification (I - V) be added so as to provide the detail of productive hours and direct labor cost for each category classification?

Answer: The Cost Forms should reflect the weighted composite hourly labor rates and total category hours. Your spreadsheet must show how each rate was derived. There must be sufficient detail for the Government to evaluate the subcategory I-V labor rates, and verify the hours to the RFP.

Question 46. RFP L.13.B.2 stipulates that the proposal shall use “not smaller than 12 point type.” It is easier to compose, read and evaluate figures and tables prepared using 9-point type. Please indicate the Government’s willingness to accept figures and tables prepared using 9-point type?

Answer: 8-point font or higher is acceptable for graphics and tables provided that it is legible. This change will be reflected in the final RFP.

Question 47. The Research Test Pilots referenced in Exhibit G, Direct Labor Classification Descriptions is not mentioned in the SOW.

Answer: The Research Test Pilots may be required in individual Task Orders. The nature of work is defined in Sections 4.3 and 7.0 of the Statement of Work.
Question 49. **Page 13, G.1, AWARD FEE FOR SERVICE CONTRACTS (FAR 1852.216-76) (MAR 1998), (f)(1) and (2) through (4):** Paragraph G.1(f)(1) states that provisional award fee payments will not be made under the contract. However, Paragraphs G.1(f)(2) through (4) describe the process by which provisional award fee payments will be made. Please clarify the Government’s intent as it relates to provisional award fee payments.

**Answer:** Considering the award fee pool will not be finalized until the end of each 6-month evaluation period, provisional fee payments will not be made under this contract. However, any proposed methodologies on provisional fee payments submitted on or before May 5, 2000 will be considered by the Government.

Question 50. **Pages 16, 19, & 89, deal with GFE, Contractor supplied ADP equipment and software, and ODIN possibilities,** but we would appreciate a statement of NASA’s expectations. In particular, what will be the status of GFE currently in the possession of the incumbent contractors?

**Answer:** GFE in the possession of the current Contractors will not be made available under the SAMS procurement unless the conditions stated in Question 6 hold true. The nature and magnitude of ADP equipment and software that is currently being provided by the Government can be determined by reviewing the contracts and task orders contained in the Bidders Library.

Question 51. **Exhibit E - Award Fee, Under Cost Analysis No. 1 there is the statement "If this percentage of tasks falls below 61 then the numerical score will be zero for Cost Analysis 1." Question:** Of the 25% allotted for cost evaluation how much is for Cost Analysis No 1 and how much is for Cost Analysis No 2?

**Answer:** Both Cost Analysis defined in the Award Fee Plan will be used as data points to assist the Award Fee Evaluation Board (AFEB) in the evaluation of the Cost Factor. The final score, however, will be determined by an subjective assessment of the Board. The statement in question will be deleted from the Award Fee Plan.
Systems Engineering Competency

Glenn R. Taylor
April 25, 2000
SEC Areas of Expertise

- Flight Aerospace Systems Development
- Information Technology
- Fabrication Technology Development
- Aeronautical and Space Research Facility Systems
Systems Engineering Competency
Program/Project Roles

• Technology Commercialization Program
• Earth & Space Sciences Program Office
  NAST-1
  CERES
  SAGE III
  EOS Algorithm Dev & Ops
  Reflected GPS
  GEOTRACE/GIFTS
  PICASSO CENA
  SOLVE
  EOSDIS DAAC
  Cross Enterprise Sp Tech
  Timed SABER

• Space Access & Exploration Program Office
  GEOLAB
  SEEP
  Hyper X
  RLV Focused Technology
  Mars Surveyor Adv Planning
Systems Engineering Competency
Program/Project Roles

• Aerospace Vehicle Systems Technology Program Office
  Aeronautics R&T Base
  Aerospace Vehicle Systems Technology

• Aviation Safety Program Office
  AFD Cockpit Development
  Aviation Safety Technology Program

• Intelligent Synthesis Environment Program Office

• Aero Performing Center Program Office
  Aviation System Capacity
  Blended Wing Body
  Integrated Information
  R/C Aerodynamics
  Ultra-Efficient Engine Technology
  HPCC Computational Aerospace Science

• Atmospheric Science
  Laser Research
  Advanced Sensors
  Software Development and Integration
Contract Role

• SAERS Supported SEC Through App. 64 Tasks

• Representative Engineering Efforts Included:
  – Mechanical Design
  – Electronic Design
  – Thermal Design & Analysis
  – Sensor System Design, Development & Operations
  – Software System Development & Test
  – Instrumentation Systems
  – Detector & Laser Development
Areas of Expertise

AoE 1. Develop advanced **materials and processing technologies** to enable the fabrication of low-cost and high-performance structural concepts for aerospace applications.

AoE 2. Conduct research and technology development that accurately and efficiently predict **behavior, durability and damage tolerance**, evaluates **concepts, and validates** performance of advanced materials and structures for aerospace structural applications.

AoE 3. Conduct research and technology development for advanced **sensors, intelligent systems, and ground operations** to ensure structural integrity, reliability, and safety for aerospace vehicles.

AoE 4. Conduct research and technology development to quantify and control **aeroelastic response, unsteady aerodynamic flow phenomena, and structural dynamics** behavior for aerospace vehicles.
Areas of Expertise (cont.)

AoE 5. Design and conduct innovative structures and materials experiments to identify unique phenomena, interrogate new theories, and quantify material and structural behavior using complex research facilities and equipment safely.

AoE 6. Lead, manage, and provide administrative support to the organization, facilities, and programs.
Structures & Materials Capabilities
From Materials Synthesis to Large Structures Testing

- Polymer Synthesis
- Materials Characterization
- Structural Concepts Tests
  - Optical Fiber Draw Tower
- Transonic Dynamics Tunnel
- Landing Dynamics Test
Aerospace Systems, Concepts and Analysis Competency

From the Runway to the Planets...

Improving Quality of Life and Enabling Exploration

- Technology Payoff
- Lower Cost
- Safety
- Environment
- Performance
Advancing the State-of-the Art for Survivable Systems

Research and Develop New Technologies (e.g. unmanned, high-g fighter aircraft)

Survivability Challenges (e.g. air-to-air superiority)

Evaluation of Technologies
Computational Aerosciences

Complex MDO Applications
- Crash Analysis
- RLV
- High Speed

Basic Research/System Software
- Visualization
- Metacenter Coral Cluster

Learning Technologies
- NASA Communicating Science
  Educational technology to develop future scientists and engineers skilled in high performance computing

Computational Frameworks
- FIDO Execution System

Advanced Methods
- "Compute as fast as engineers can think."
Multidisciplinary Design Optimization

Charter: develop MDO methods to increase design confidence and to cut development time.

Multidisciplinary Optimization
Integration Methods
Optimization Methods

- Geometry
- Weights
- Nonlinear Corrections
- Rigid Trim

- Polars
- Displacements
- Performance

- Loads Convergence
- Stress & Buckling
- Ground Scraper

Design-Oriented Analysis
Approximations
Sensitivity

$\frac{\partial C_M}{\partial z}$: Derivative of Pitching Moment with Respect to Surface Normal Displacement

High-Fidelity Applications
Aeronautics
Space
Advanced Civil Airplane & Transportation Systems Analysis

Aircraft Systems Analysis
- High Speed Research
- Military
- Subsonic Transport
- Advanced Concepts
- General Aviation

Transportation Systems Analysis
- Vehicle Synthesis
- Mission Performance
- Technology Sensitivity: △ Cost, △ Weight, △ Technology, △ etc.
- Environmental Impact
- Airport Capacity
- Safety Analysis

Aeronautics Systems Analysis Tools
- Aircraft Synthesis and Optimization (FLOPS)/(ACSYNT)
- Aviation System Analysis Capability (ASAC)
- Aircraft Life Cycle Cost Analysis (ALCCA)
- NASA Cost Benefit Analysis (NACBA) Tool
Vehicle Analysis

Space Transportation

- Crew Transfer Vehicle
- Hyper-X
- SSTO
- Bimese

Planetary Exploration

- Genesis Return
- Entry Analysis
- Landing Footprint Analysis
- MGS Aerobraking

Analysis Capability Development

- Automated TPS sizing on >1000 elements over complete vehicle
- Stardust CFD

- Define and assess advanced system concepts
- Assess technologies/identify technology requirements
- Design, validate, and assess flight systems
- Develop analysis tools and methods
HYPEROSONIC AIRBREATHING SYSTEMS

presented by
Charles R. McClinton
Technology Manager
Hyper-X Program Office

to the
Systems Analysis and Mission Support
(SAMS)
Pre-Proposal Conference
April 25, 2000
NASA Langley Research Center
HYPersonic Airbreathing Systems

Objective:
Develop world-class hypersonic technology

• Integrated hypersonic airbreathing systems analysis, design and evaluation
• Scramjet flowpath and engine analysis and design
• Method development and validation
• CFD applications
HYPersonic Airbreathing Systems

Focus

- **Hyper-X (LaRC)**
  - X-43 design
  - Flight test risk reduction
  - Methods validation
  - Follow on flight test vehicle design

- **Spaceliner (MSFC)**
  - Vision vehicle design
  - RBCC (Rocket based combined cycle) and TBCC (turbine based combined cycle) engine technology
  - Flight test vehicle(s) conceptual design
## VISION VEHICLE FIDELITY

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HYPER-X PROGRAM GOAL AND OBJECTIVES

Goal

– Demonstrate and validate the technology, experimental techniques, and computational methods and tools for design and performance predictions of a hypersonic aircraft with an airframe-integrated dual-mode scramjet

Objectives

– First ever free-flight demonstration of an airframe-integrated scramjet
– Verification of computational predictions, analysis and ground test methodologies
– Scaling of design concepts to future operational air-breathing hypersonic cruise and space access vehicles

Approach: Two-phase, flight-focused program

– Phase I: airframe-integrated, dual-mode scramjet
  • Three 12-foot, autonomous, expendable test vehicles
  • Two Mach-7 flights, one Mach-10 flight
– Phase II builds on Phase I results: a larger-scale, reusable X-plane
  • Airframe-integrated, combined-cycle propulsion
  • Flight envelope expansion from takeoff through hypersonic speeds
HYPER-X RESEARCH VEHICLE KEY MISSION EVENTS

- B-52 Captive Carry
- Pegasus Boost
- Stage Separation
- Scramjet Engine Operation
HYPER-X: Design\(^1\)
SAERS Contractor Deliverables

- Engine preliminary structural design
- Aerodynamic and aerothermal database
- Aero loads
- NASTRAN and PATRAN models
- Stage separation models
- Trajectories
- CFD analysis

\(^1\) Expect Mach 10 vehicle design completion in CY00
MACH 10 ADAPTER WEIGHT REDUCTION STUDY

Modifications to Mid and Aft Section Skins

- Corner beams remain 17-4 stainless
- Mid and aft skins changed to aluminum
- Ring frames and longitudinal beams remain 17-4 stainless

HXLV Bending Frequencies for Finite Element Models

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Model 1: system updates and geometry changes; no material changes (78 lb. weight reduction)

Model 2: system, geometry, and material changes (407 lb. weight reduction)
HYPER-X: Risk Reduction

• Wind tunnel data analysis/flight scaling
  Propulsion tests
  Aero/aerothermal tests
  Structural

• Structural analysis

• Trajectory (Monte Carlo) analysis

• Detailed CFD analysis
  3-D, finite rate chemical kinetics
  Internal and external flows

¹ Mach 7 and 10 risk reduction continuing in FY 01-02.
OVERALL PERFORMANCE AND FLOW DETAILS BY GASP FNS ANALYSIS

Hyper-X Mach 7 Powered CFD Solution

- Acceleration
- 3-D Inlet Effects
- PAI
- Instrumentation Locations
- Comparison with Design Tools
  - Calibrate Lift and Moments
- Local Flow Phenomena
  - Shock-Shock Interaction
  - Base Pressure, Drag, Heating
HYPER-X: Methods Validation with Flight Data$^1$

- Scramjet performance
- Structural and thermal
- Aerodynamic and aerothermal
- Aerodynamic loads
- Trajectory and stage separation simulation

$^1$ Methods validation continuing in FY 01-02.
HXFE / VFS IN THE 8-FT. HTT
DESIGN CODE VALIDATION TO HYPER-X MACH 7 ENGINE DATA

- Mach 7 high power condition

- Predicted forces validated
  - Thrust
  - Lift
  - Pitching moment
  (Yaw moments being developed)

- Predicted loads validated
  - Pressure
  - Heat transfer
HYPER-X: Follow on Flight Test Vehicle Design and Technology\(^1\)

- Efficient flight test vehicle design
- Hypervelocity scramjet technology
- Turbine-based combination engine design
- Alternate propulsion cycles
- Weakly ionized gas effects
- Improved design methods
- Etc.

\(^1\) Continuing in FY 01-02.
AFRL HyTech Program: H/C scramjets engines
(endothermic fuels, structures, systems)

Hyper-X, Phase 1

14'; M 7, H/C Fuel

AFRL HyTech Program: H/C scramjets engines
(endothermic fuels, structures, systems)

AFRL HyTech Program: H/C scramjets engines
(endothermic fuels, structures, systems)

45'; Reusable, M 0 - 7

Hyper-X, Phase 1a

Hyper-X, Phase 2

X-33 Gr/Epox
X-37 Gr/Poly
LaRC IMI

30'; Reusable, M 4 - 7

Generation 2

Revolutionary Turbine Based Engine (RTBE)
(GRC, LaRC, USN, MSFC, DFRC)

HyFLYTE RPV

Generation 3

Turboramjet Scramjet Combination Engine

50'; Piloted, M 0 - 4+

50'; Piloted, M 0 - 2.0

50'; Piloted, M 0 - 0.6

Hypervelocity scramjet, structures, WIG, boundary layer transition, etc.
(U.S. Army, NASA LaRC)
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| 1086067  | CAMERA, TELEVISION               | 2220300939 | L 96322C | 1209 | 1,882 |
|          | CANON USA INC                     | HIB    | I 91/06/07 | 809  | |
| 1881401  | COMPUTER, MICRO, PORTAB          | W0XRR  | L 9302  | 1212 | 2,912 |
|          | DELL COMPUTER CORP F-PC          | PPI    | 99/04/28 | 102  | |
| 1881476  | DISPLAY, COMPUTER, PRQJ          | 1295   | L 9453  | 1212 | 3,695 |
|          | POLAROID CORP                     | PV235  | 99/05/13 | 102  | |
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|          | GATEWAY 2000                      | NEW TOWER | 94/06/21 1210A | | |
| 849136   | PRINTER, ADP                      | 8008137 | 1-18054F 1224T | 569  | |
|          | EPSON AMERICA INC                 | FX85   | 89/10/23 | 9    | |
| 849138   | PLOTTER, GRAPHICS                | 2541A  36790 | 1-18054F 1224T | 1,395 | |
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|          | NANA-O-USA                        | MA1660 | 92/08/17 | 9    | |
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|          | GATEWAY 2000                      | 486    | 92/12/29 | 9    | |
| 1160237  | TERMINAL, DATA                   | 10330055 | L 28684D 1224T | 3,199 | |
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|          | HUMAN DESIGN SYSTEMS              | VIEWSTATION | 93/03/11 | 9    | |
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**Total**

- **Items:** 360
- **Value:** 1,772,731