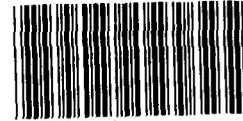


April 1990

NASA ADP PROCUREMENT

Contracting and Market Share Information



141287

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54860

**Information Management and
Technology Division**

B-238835

April 20, 1990

The Honorable John Conyers, Jr.
Chairman, Committee on Government Operations
House of Representatives

The Honorable Frank Horton
Ranking Minority Member, Committee
on Government Operations
House of Representatives

This report responds to your February 1989 requests for a comprehensive review of federal agencies' compatible computer procurements.¹ In your initial requests and in subsequent discussions with your offices, we were asked to answer several specific questions about agencies' procurements of mainframe computers and mainframe peripheral equipment. Your questions focused on identifying the extent to which agencies' procurements of mainframe computers and mainframe peripherals required compatibility with International Business Machines (IBM) or any other computer manufacturer. You were also interested in knowing details such as the identification of manufacturers whose equipment was acquired by each agency and the procurement methods used to obtain equipment.

In addition to this report on the National Aeronautics and Space Administration (NASA), we previously reported similar information on the Navy (including the Marine Corps),² the Army,³ and the Air Force.⁴ Information on the remaining 30 agencies we included in our work will be reported after we have fully analyzed procurement data we collected from them.

¹A compatible procurement requires hardware or software that functions like specified or existing hardware or software, with little or no modification. Competition in such procurements may occur between manufacturers and marketers—such as system developers and system integrators—to supply equipment that meets the compatible requirements. Since there is the potential for competition between manufacturers and marketers, a compatible procurement does not necessarily result in the award of a sole source contract.

²NAVY ADP PROCUREMENT: Contracting and Market Share Information (GAO/IMTEC-89-66FS, Sept. 15, 1989).

³ARMY ADP PROCUREMENT: Contracting and Market Share Information (GAO/IMTEC-90-28FS, Mar. 1, 1990).

⁴AIR FORCE ADP PROCUREMENT: Contracting and Market Share Information (GAO/IMTEC-90-35FS, Apr. 9, 1990).

Results in Brief

The information we obtained from NASA shows that during the 3 1/2 fiscal years ending in March 1989, 68 percent of NASA's procurements for mainframes and mainframe peripherals required some type of compatibility. NASA required IBM compatibility in 96 of its 127 compatible procurements (76 percent). Of the 31 remaining compatible procurements, NASA required that 13 have Control Data Corporation compatibility, 11 have Honeywell Bull compatibility, and 7 have Unisys compatibility.⁵ When NASA's procurements required IBM compatibility, IBM equipment was supplied in 68 of those 96 IBM-compatible procurements (71 percent). Overall, IBM equipment was supplied for more NASA mainframe and mainframe peripheral equipment procurements than any other manufacturer's equipment, including both compatible and other procurements where no compatibility was required. When we used dollars for comparison—as opposed to the number of procurements—we found that NASA obligated more dollars to (1) IBM-compatible procurements than to any other type of compatible procurement and (2) purchases of IBM equipment than to any other manufacturer's equipment.

As requested in discussions with your offices, we also obtained information from NASA on the procurement methods it uses, including NASA's use of contractors that participate in the Small Business Administration's program for small disadvantaged businesses—known as 8(a) contractors. Further, we received information from NASA on its operating system software procurements. The detailed questions you asked and our answers are summarized in appendix I. Appendix II contains tables with detailed statistics that are the basis for our answers to your questions.

We are reporting information for the 3 1/2 fiscal years from October 1, 1985, through March 31, 1989. All the information is based on NASA's response to a questionnaire we devised and distributed to 35 agencies. We did not independently validate the information, which NASA supplied in August 1989, nor did we evaluate any documentation related to individual NASA procurements. However, we checked NASA's information for consistency with the instructions for our questionnaire and made appropriate revisions. At your request, we did not solicit or obtain comments

⁵Since several companies manufacture and market IBM-compatible equipment, competition in IBM-compatible procurements may occur among a variety of manufacturers and marketers. However, there are few if any companies that manufacture equipment compatible with Control Data Corporation, Honeywell Bull, or Unisys. As a result, competition in procurements requiring Control Data Corporation, Honeywell Bull, or Unisys compatibility generally occurs only between the manufacturer of the required equipment and companies marketing that manufacturer's equipment.

from NASA on this report. Appendix III contains additional details on the objective, scope, and methodology of our work.

As arranged with your offices, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days after the date of this letter. We will then send copies to NASA, and will also make copies available to others upon request.

This information was compiled under the direction of Jack L. Brock, Jr., Director, Government Information and Financial Management, who can be contacted at (202) 275-3195, should you require additional information. Other major contributors to this report are listed in appendix IV.



Ralph V. Carlone
Assistant Comptroller General

Contents

Letter	1
Appendix I Questions and Answers About NASA Procurements	6
Appendix II Detailed Statistics on NASA Procurements	19
Appendix III Objective, Scope, and Methodology	22
Appendix IV Major Contributors to This Report	25
Tables	
Table II.1: NASA Mainframe and Mainframe Peripheral Procurements	19
Table II.2: NASA Compatible Procurements According to Type of Compatibility	19
Table II.3: NASA IBM-Compatible Procurements According to Manufacturer of Equipment	19
Table II.4: NASA Compatible Procurements According to Procurement Method	20
Table II.5: NASA IBM-Compatible Procurements According to Procurement Method	20
Table II.6: NASA Mainframe and Mainframe Peripheral Procurements According to Manufacturer of Equipment	21
Table II.7: NASA Operating System Software Contracts According to Type of Mainframe	21

Figures

Figure I.1: Number of NASA Mainframe and Mainframe Peripheral Procurements	7
Figure I.2: Dollars for NASA Mainframe and Mainframe Peripheral Procurements	7
Figure I.3: Number of NASA Compatible Procurements According to Type of Compatibility	9
Figure I.4: Dollars for NASA Compatible Procurements According to Type of Compatibility	9
Figure I.5: Number of NASA IBM-Compatible Procurements According to Manufacturer of Equipment	11
Figure I.6: Dollars for NASA IBM-Compatible Procurements According to Manufacturer of Equipment	11
Figure I.7: Number of NASA Compatible Procurements According to Procurement Method	13
Figure I.8: Dollars for NASA Compatible Procurements According to Procurement Method	13
Figure I.9: Number of NASA IBM-Compatible Procurements According to Procurement Method	15
Figure I.10: Dollars for NASA IBM-Compatible Procurements According to Procurement Method	15
Figure I.11: Number of NASA Mainframe and Mainframe Peripheral Procurements According to Manufacturer of Equipment	17
Figure I.12: Dollars for NASA Mainframe and Mainframe Peripheral Procurements According to Manufacturer of Equipment	17

Abbreviations

ADP	automated data processing
GAO	General Accounting Office
GSA	General Services Administration
IBM	International Business Machines
IMTEC	Information Management and Technology Division
NASA	National Aeronautics and Space Administration

Questions and Answers About NASA Procurements

What are the numbers and dollar amounts of NASA's mainframe and mainframe peripheral procurements requiring compatibility and is there any trend toward the increased use of compatible procurements?

NASA had a total of 187 procurements and obligated a total of \$104.4 million for mainframe computers and mainframe peripherals during the 3 1/2 fiscal years ending in March 1989. According to NASA statistics, compatible procurements comprised 127 of NASA's 187 total procurements and represented \$69.4 million of the \$104.4 million obligated. In each of the 3 1/2 fiscal years—using NASA's number of procurements as a measure—the percentage of compatible procurements versus other procurements was 56 percent or higher. During the same time period, the percentage of dollars obligated to compatible procurements versus other procurements was 58 percent or higher in each year. There was decreased use of compatible procurements over the 3 1/2 years when the percentage of compatible procurements is measured in number of procurements. However, when NASA's percentage of compatible procurements is measured in dollar obligations, there was increased use of compatible procurements over the 3 1/2 year period.

Appendix I
 Questions and Answers About
 NASA Procurements

Figure I.1: Number of NASA Mainframe and Mainframe Peripheral Procurements

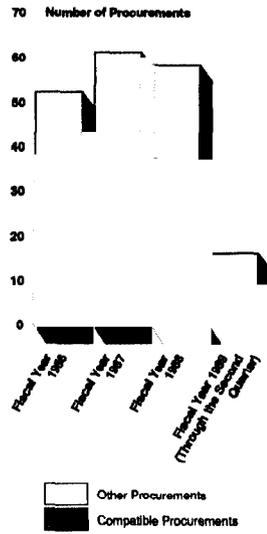
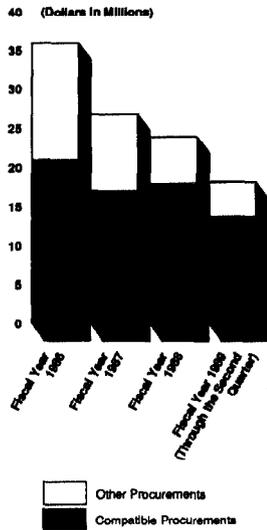


Figure I.2: Dollars for NASA Mainframe and Mainframe Peripheral Procurements



What is the distribution of NASA's compatible mainframe and mainframe peripheral procurements according to type of compatibility?

Those procurements that NASA identified as having a compatible requirement were for either Control Data Corporation, Honeywell Bull, IBM, or Unisys compatibility. Specifically, 96 of the 127 procurements were to satisfy IBM-compatible requirements representing \$47.2 million of \$69.4 million obligated for all compatible procurements. Also, Control Data Corporation-compatible requirements accounted for 13 procurements and \$6.7 million while Honeywell Bull-compatible requirements represented 11 procurements and \$9.2 million. Unisys-compatible requirements represented 7 of the 127 procurements and \$6.3 million of the \$69.4 million in obligations.

**Appendix I
Questions and Answers About
NASA Procurements**

Figure I.3: Number of NASA Compatible Procurements According to Type of Compatibility

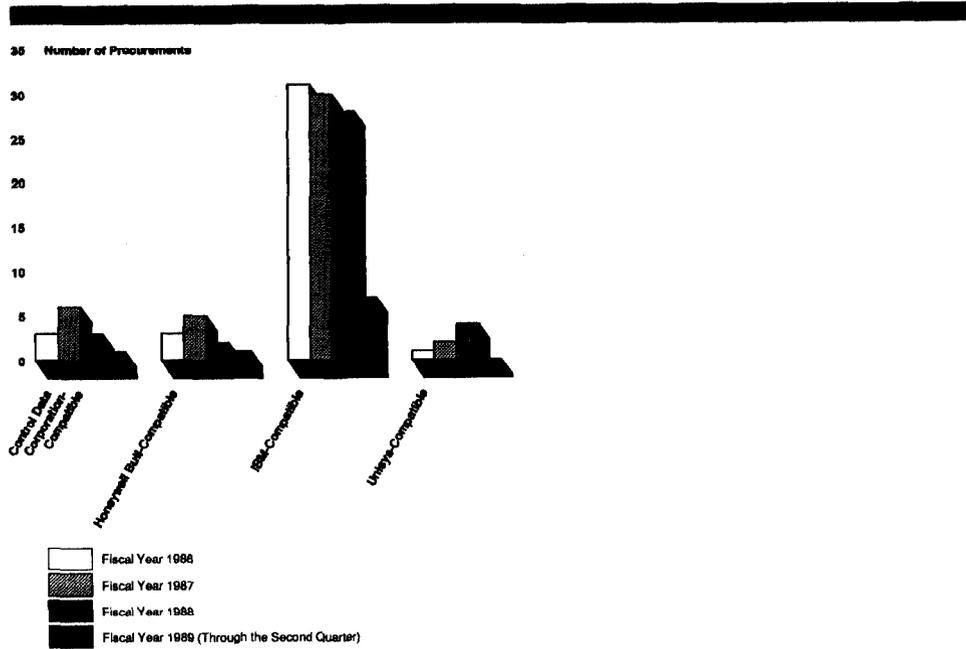
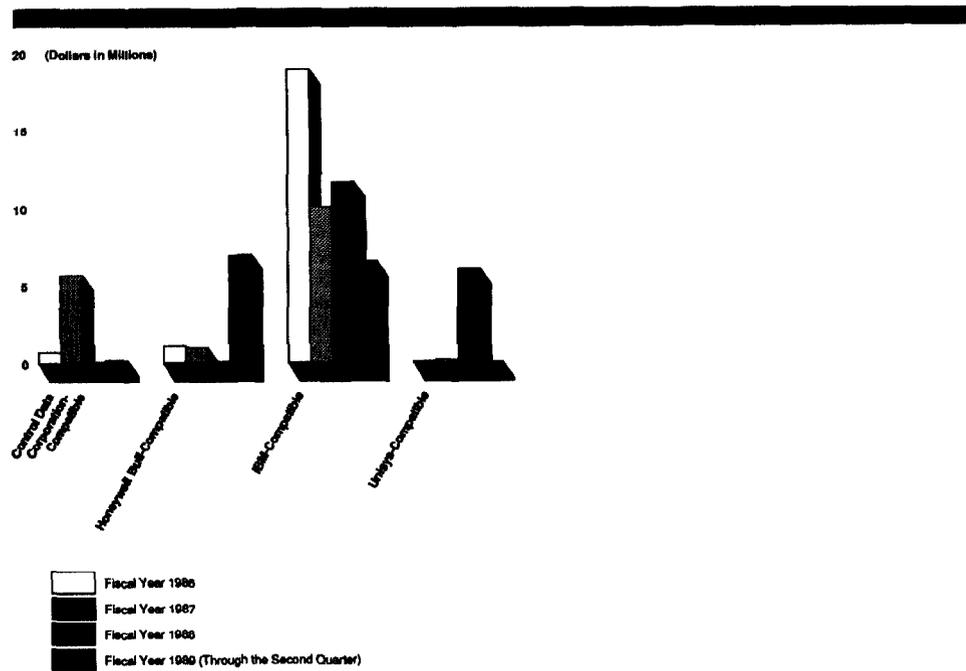


Figure I.4: Dollars for NASA Compatible Procurements According to Type of Compatibility



What equipment manufacturers are involved in NASA's IBM-compatible mainframe and mainframe peripheral procurements?

NASA obtained IBM equipment in the majority of its IBM-compatible procurements in each of fiscal years 1986 through 1988. In the first half of fiscal year 1989, NASA obtained Amdahl equipment in most IBM-compatible procurement situations. Of the 96 IBM-compatible procurements during fiscal years 1986 through 1989 (through the second quarter), 68 (71 percent) resulted in NASA obtaining IBM equipment. Similarly, of the \$47.2 million obligated to IBM-compatible procurements, \$29.3 million (62 percent) was for procurements involving IBM equipment. In addition to IBM and Amdahl, other manufacturers involved in NASA's IBM-compatible procurements included Memorex, National Advanced Systems, and Storage Technology Corporation.

Appendix I
Questions and Answers About
NASA Procurements

Figure I.5: Number of NASA IBM-Compatible Procurements According to Manufacturer of Equipment

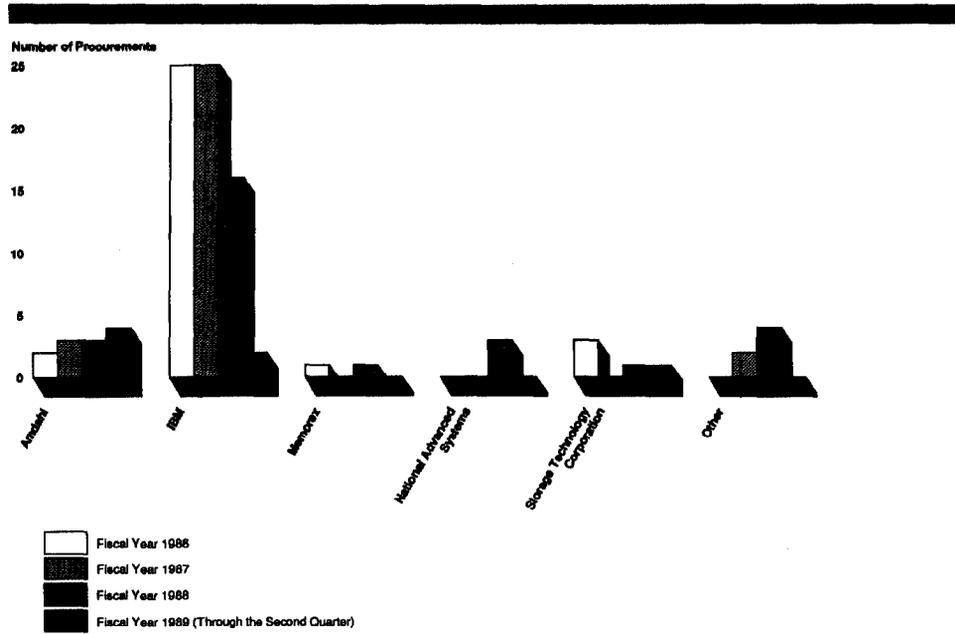
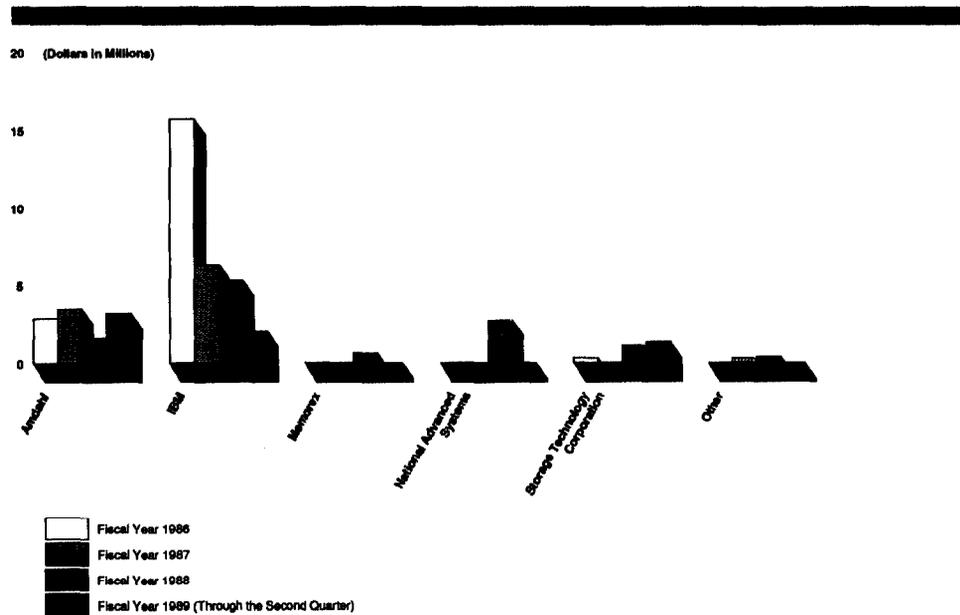


Figure I.6: Dollars for NASA IBM-Compatible Procurements According to Manufacturer of Equipment



What procurement methods were used to obtain all types of compatible mainframe computers and mainframe peripheral equipment? And, did NASA frequently use new contracts with 8(a) contractors to obtain compatible mainframes and mainframe peripherals?

Using the number of procurements as a measure, General Services Administration (GSA) schedule purchases were the most frequently used method of obtaining equipment when NASA identified compatible requirements. However, when measured using obligated dollars, NASA performed most procurements that required compatibility through competitive new contracts with more than one offeror participating in the selection process. New contracts with 8(a) firms were not used by NASA in any of the 127 compatible procurements.

**Appendix I
Questions and Answers About
NASA Procurements**

Figure I.7: Number of NASA Compatible Procurements According to Procurement Method

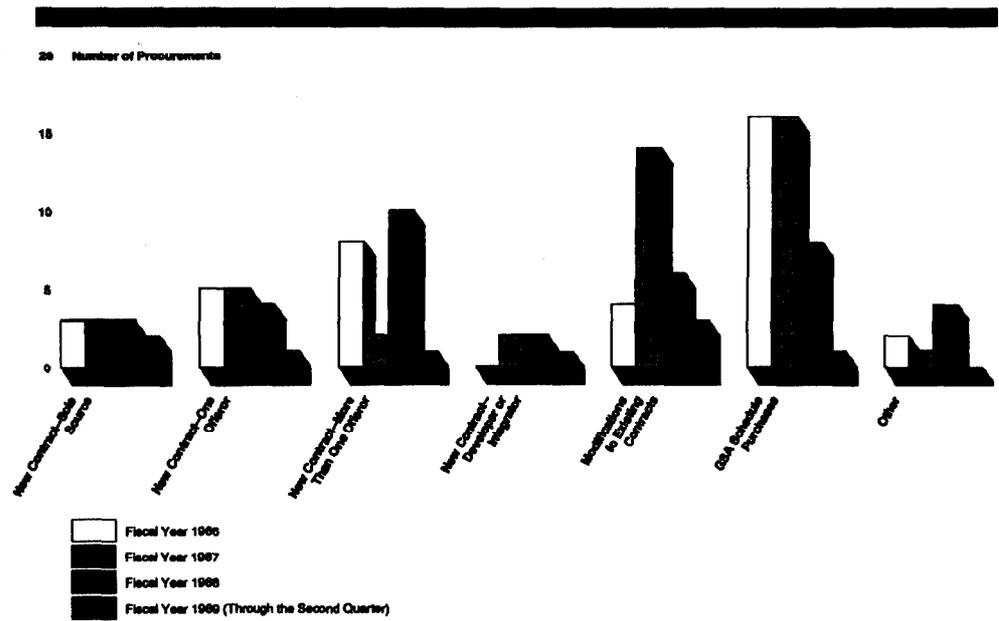
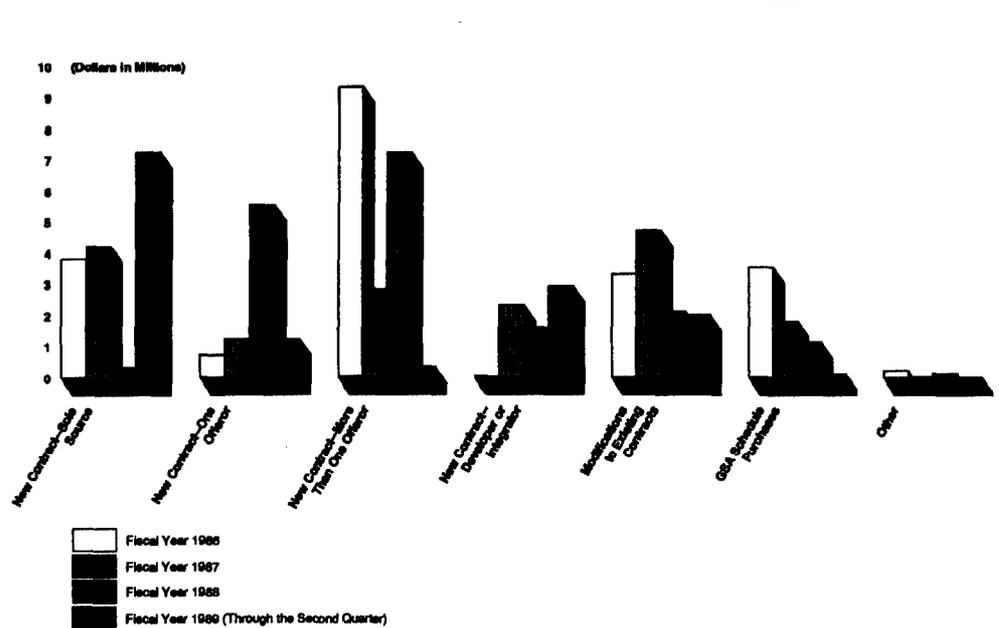


Figure I.8: Dollars for NASA Compatible Procurements According to Procurement Method



What procurement methods were used to obtain IBM-compatible mainframe computers and mainframe peripheral equipment? And, did NASA frequently use new contracts with 8(a) contractors to obtain IBM-compatible mainframes and mainframe peripherals?

NASA most frequently used GSA schedule purchases as the procurement method for obtaining IBM-compatible equipment. However, new contracts with more than one offeror participating in the selection process accounted for more dollar obligations than any other procurement method. New contracts with 8(a) firms were not used by NASA for any of the 96 IBM-compatible procurements during the 3 1/2 year period.

**Appendix I
Questions and Answers About
NASA Procurements**

Figure I.9: Number of NASA IBM-Compatible Procurements According to Procurement Method

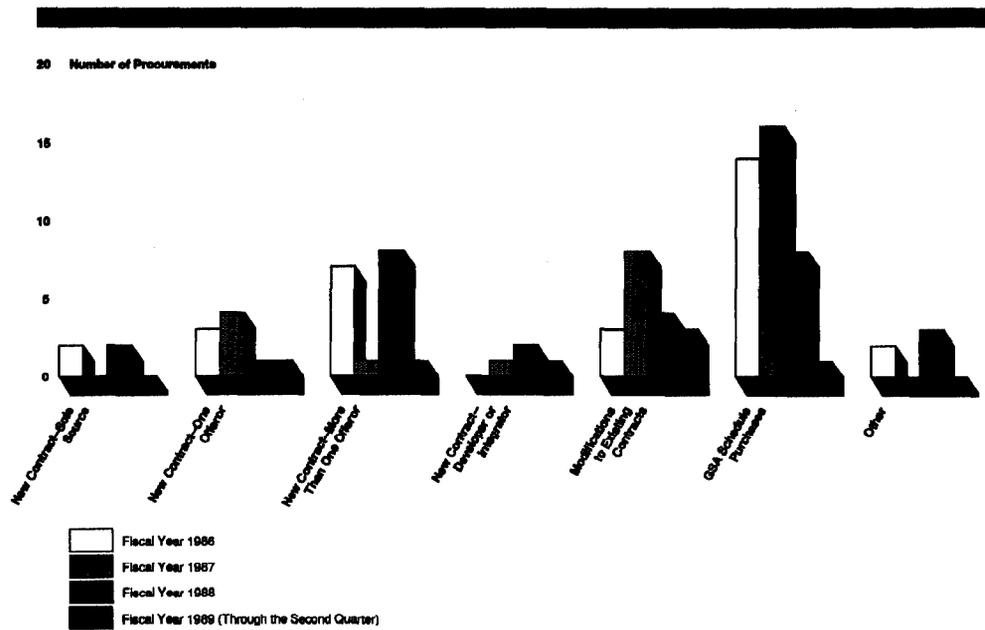
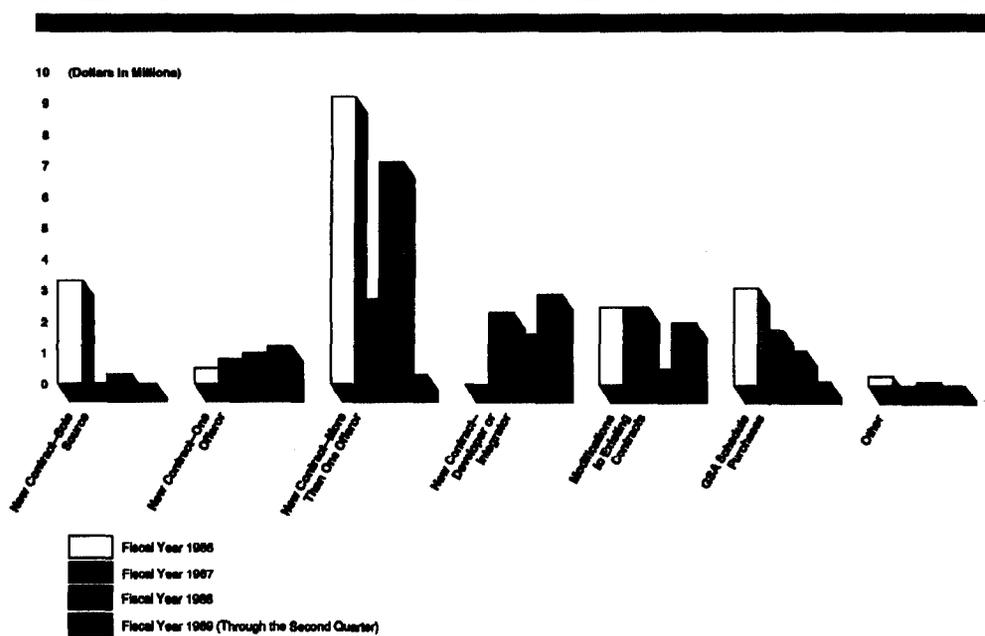


Figure I.10: Dollars for NASA IBM-Compatible Procurements According to Procurement Method



What equipment manufacturers are involved in NASA's mainframe and mainframe peripheral procurements, including both procurements where compatibility is required and procurements with no compatibility requirement?

IBM equipment was most frequently supplied to NASA for mainframe and mainframe peripheral procurements in each of fiscal years 1986 through 1988 and for the first half of fiscal year 1989, with 105 out of 187 total procurements. Additionally, using obligated dollars as the measure, NASA's obligations for IBM equipment during the same 3 1/2 year period were \$56 million of a total of \$104.4 million. Amdahl, Control Data Corporation, Honeywell Bull, National Advanced Systems, Storage Technology Corporation, and Unisys equipment was also supplied to NASA during the 3 1/2 years.

Appendix I
 Questions and Answers About
 NASA Procurements

Figure I.11: Number of NASA Mainframe and Mainframe Peripheral Procurements According to Manufacturer of Equipment

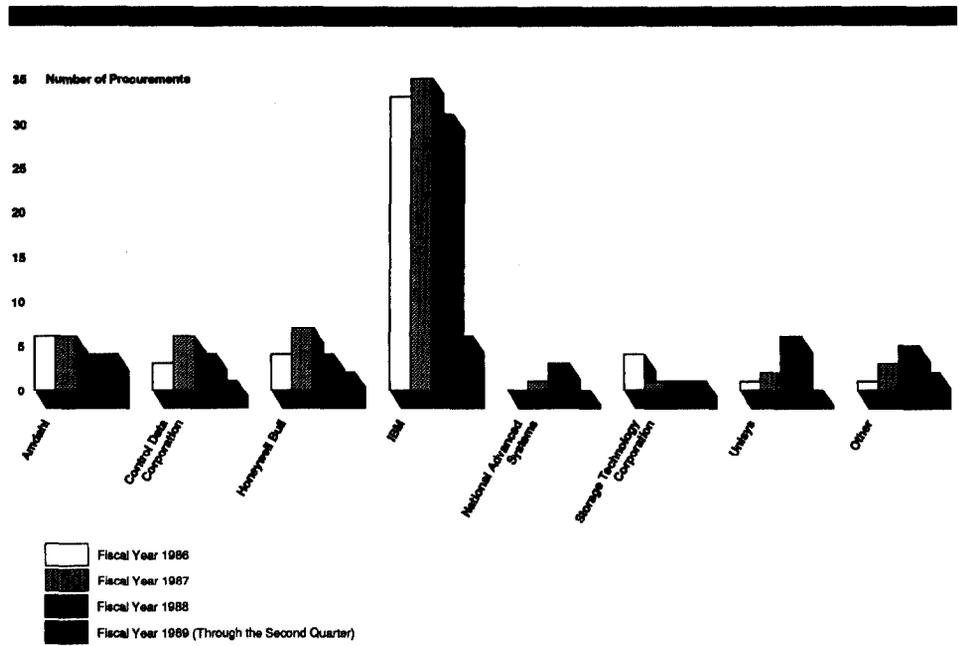
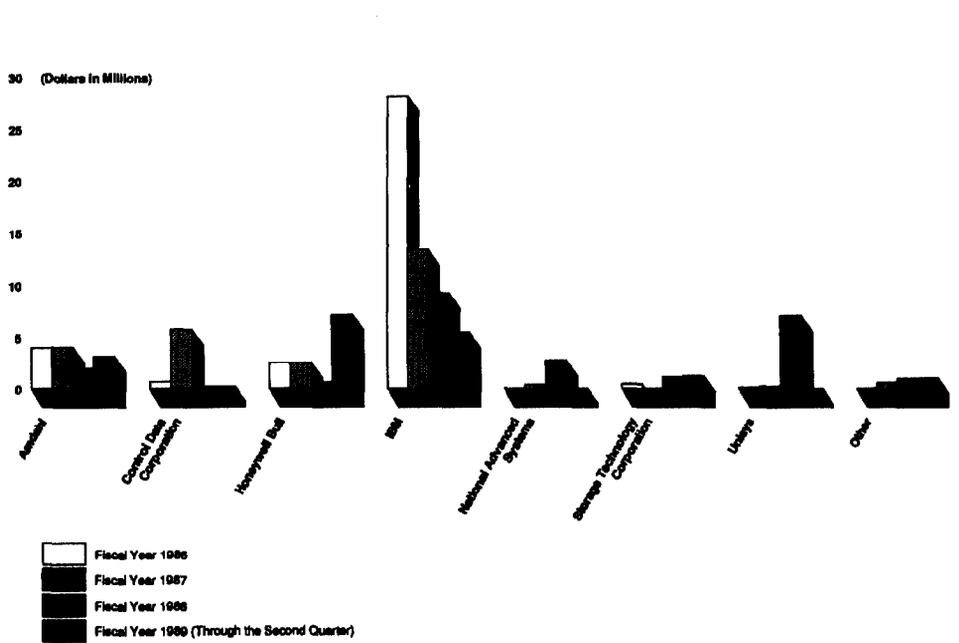


Figure I.12: Dollars for NASA Mainframe and Mainframe Peripheral Procurements According to Manufacturer of Equipment



How much mainframe computer operating system software did NASA procure during the 3 1/2 year period ending March 31, 1989, and what types of mainframe computers was the software for?

NASA had 85 contracts for operating system software totaling \$9.1 million in obligations during the 3 1/2 year period. Seventy-eight of these, accounting for \$8.3 million in obligations, were for IBM-compatible mainframes, with the remainder divided among Control Data Corporation, Honeywell Bull, and Unisys mainframes.

Detailed Statistics on NASA Procurements

Table II.1: NASA Mainframe and Mainframe Peripheral Procurements

Dollars in millions

	Fiscal Year 1986		Fiscal Year 1987		Fiscal Year 1988		Fiscal Year 1989 ^a		Total	
	Number	Amount	Number	Amount	Number	Amount	Number	Amount	Number	Amount
Compatible	38	\$20.8	43	\$17.0	37	\$17.9	9	\$13.7	127	\$69.4
Other	14	15.0	18	9.7	21	5.9	7	4.4	60	35.0
Total	52	\$35.8	61	\$26.7	58	\$23.8	16	\$18.1	187	\$104.4
Compatible Percent of Total	73%	58%	70%	64%	64%	75%	56%	76%	68%	66%

^aFiscal year 1989 through the second quarter.
Table II.2: NASA Compatible Procurements According to Type of Compatibility

Dollars in millions

	Fiscal Year 1986		Fiscal Year 1987		Fiscal Year 1988		Fiscal Year 1989 ^a		Total	
	Number	Amount	Number	Amount	Number	Amount	Number	Amount	Number	Amount
Control Data Corporation-Compatible	3	\$0.7	6	\$5.7	3	\$0.1	1	\$0.2	13	\$6.7
Honeywell Bull-Compatible	3	1.1	5	1.0	2	0.1	1	7.0	11	9.2
IBM-Compatible	31	18.9	30	10.1	28	11.7	7	6.5	96	47.2
Unisys-Compatible	1	0.1	2	0.2	4	6.0	0	0.0	7	6.3
Total	38	\$20.8	43	\$17.0	37	\$17.9	9	\$13.7	127	\$69.4

^aFiscal year 1989 through the second quarter.
Table II.3: NASA IBM-Compatible Procurements According to Manufacturer of Equipment

Dollars in millions

	Fiscal Year 1986		Fiscal Year 1987		Fiscal Year 1988		Fiscal Year 1989 ^a		Total	
	Number	Amount	Number	Amount	Number	Amount	Number	Amount	Number	Amount
Amdahl	2	\$2.9	3	\$3.5	3	\$1.6	4	\$3.2	12	\$11.2
IBM	25	15.7	25	6.3	16	5.3	2	2.0	68	29.3
Memorex	1	b	0	0.0	1	0.6	0	0.0	2	0.6
National Advanced Systems	0	0.0	0	0.0	3	2.7	0	0.0	3	2.7
Storage Technology Corporation	3	0.3	0	0.0	1	1.1	1	1.3	5	2.7
Other	0	0.0	2	0.3	4	0.4	0	0.0	6	0.7
Total	31	\$18.9	30	\$10.1	28	\$11.7	7	\$6.5	96	\$47.2

^aFiscal year 1989 through the second quarter.^bLess than \$50,000.

**Appendix II
Detailed Statistics on NASA Procurements**

Table II.4: NASA Compatible Procurements According to Procurement Method

Dollars in millions

	Fiscal Year 1986		Fiscal Year 1987		Fiscal Year 1988		Fiscal Year 1989 ^a		Total	
	Number	Amount	Number	Amount	Number	Amount	Number	Amount	Number	Amount
New Contract—Sole Source	3	\$3.8	3	\$4.2	3	\$0.3	2	\$7.2	11	\$15.5
New Contract—One Offeror	5	0.7	5	1.2	4	5.5	1	1.2	15	8.6
New Contract—More Than One Offeror	8	9.3	2	2.8	10	7.2	1	0.3	21	19.6
New Contract—Developer or Integrator	0	0.0	2	2.3	2	1.6	1	2.9	5	6.8
Modifications to Existing Contracts	4	3.3	14	4.7	6	2.1	3	2.0	27	12.1
GSA Schedule Purchases	16	3.5	16	1.8	8	1.1	1	0.1	41	6.5
Other	2	0.2	1	b	4	0.1	0	0.0	7	0.3
Total	38	\$20.8	43	17.0	37	\$17.9	9	\$13.7	127	\$69.4

^aFiscal year 1989 through the second quarter.

^bLess than \$50,000.

Table II.5: NASA IBM-Compatible Procurements According to Procurement Method

Dollars in millions

	Fiscal Year 1986		Fiscal Year 1987		Fiscal Year 1988		Fiscal Year 1989 ^a		Total	
	Number	Amount	Number	Amount	Number	Amount	Number	Amount	Number	Amount
New Contract—Sole Source	2	\$3.3	0	\$0.0	2	\$0.3	0	\$0.0	4	\$3.6
New Contract—One Offeror	3	0.5	4	0.8	1	1.0	1	1.2	9	3.5
New Contract—More Than One Offeror	7	9.2	1	2.7	8	7.1	1	0.3	17	19.3
New Contract—Developer or Integrator	0	0.0	1	2.3	2	1.6	1	2.9	4	6.8
Modifications to Existing Contracts	3	2.5	8	2.5	4	0.5	3	2.0	18	7.5
GSA Schedule Purchases	14	3.1	16	1.8	8	1.1	1	0.1	39	6.1
Other	2	0.3	0	0.0	3	0.1	0	0.0	5	0.4
Total	31	\$18.9	30	\$10.1	28	\$11.7	7	\$6.5	96	\$47.2

^aFiscal year 1989 through the second quarter.

**Appendix II
Detailed Statistics on NASA Procurements**

Table II.6: NASA Mainframe and Mainframe Peripheral Procurements According to Manufacturer of Equipment

Dollars in millions

	Fiscal Year 1986		Fiscal Year 1987		Fiscal Year 1988		Fiscal Year 1989 ^a		Total	
	Number	Amount	Number	Amount	Number	Amount	Number	Amount	Number	Amount
Amdahl	6	\$4.0	6	\$4.1	4	\$2.0	4	\$3.2	20	\$13.3
Control Data Corporation	3	0.7	6	5.7	4	0.2	1	0.2	14	6.8
Honeywell Bull	4	2.5	7	2.5	4	0.6	2	7.1	17	12.7
IBM	33	28.1	35	13.3	31	9.2	6	5.4	105	56.0
Memorex ^c	1	b	0	0.0	1	0.6	0	0.0	2	0.6
National Advanced Systems	0	0.0	1	0.3	3	2.7	0	0.0	4	3.0
Storage Technology Corporation	4	0.4	1	b	1	1.1	1	1.2	7	2.7
Unisys	1	0.1	2	0.2	6	7.0	0	0.0	9	7.3
Other	0	0.0	3	0.6	4	0.4	2	1.0	9	2.0
Total	52	\$35.8	61	\$26.7	58	\$23.8	16	\$18.1	187	\$104.4

^aFiscal year 1989 through the second quarter.

^bLess than \$50,000.

^cIncluded in Other on Figure I.11 and Figure I.12.

Table II.7: NASA Operating System Software Contracts According to Type of Mainframe

Dollars in millions

	Fiscal Year 1986		Fiscal Year 1987		Fiscal Year 1988		Fiscal Year 1989 ^a		Total	
	Number	Amount	Number	Amount	Number	Amount	Number	Amount	Number	Amount
Control Data Corporation	0	\$0.0	0	\$0.0	2	\$0.1	0	\$0.0	2	\$0.1
Honeywell Bull	1	b	1	0.2	0	0.0	1	0.2	3	0.4
IBM-Compatible	16	1.5	21	3.1	27	2.3	14	1.4	78	8.3
Unisys	0	0.0	1	0.1	1	0.2	0	0.0	2	0.3
Total	17	\$1.5	23	\$3.4	30	\$2.6	15	\$1.6	85	\$9.1

^aFiscal year 1989 through the second quarter.

^bLess than \$50,000.

Objective, Scope, and Methodology

In February 1989 we were requested by the Chairman and the Ranking Minority Member, House Committee on Government Operations, to perform a comprehensive review of the government's use of IBM-compatible automated data processing (ADP) procurements. In response to the requests and in discussions with the Chairman's and Ranking Minority Member's offices, we agreed that procurements of mainframes and mainframe peripherals would be included in our review, with emphasis on compatible procurements. Our review covered procurements during the 3 1/2 fiscal years ending in March 1989, at 35 federal agencies.

Our primary objective was to obtain and analyze information on specific aspects of each agency's ADP-related procurements. This report focuses on NASA and includes the number and aggregate dollar value of NASA's mainframe-related contracts, distribution of procurements among equipment manufacturers, and breakdown of various procurement methods NASA used to obtain mainframe-related equipment. Further, as requested, we obtained data on NASA's procurements of mainframe computer operating system software.

We used the following mutually exclusive procurement methods to group NASA's procurements. The first three methods represent specific types of new contracts with mainframe and peripheral equipment manufacturers. These consist of sole source new contracts, new contracts that resulted from competitive procedures where only one offeror remained in the procurement at the time the awardee was selected, and new contracts that resulted from competitive procedures where the awardee was selected from among multiple competitors. We also included a category for new contracts with system developers and integrators—except any contracts separately categorized as awarded to 8(a) firms. We also obtained and analyzed data on NASA's modifications to existing contracts, the use of GSA's multiple award schedule contracts, and other miscellaneous procurement methods.

To accomplish our objective and facilitate NASA's information gathering, we designed a questionnaire which, when properly completed by NASA, provided us with the necessary information. Our questionnaire included several charts and provided detailed instructions, with definitions and examples, to help NASA identify and report the relevant information. Our questionnaire instructions cited pertinent federal regulations to ensure consistency in understanding of the terms used and to identify key definitions.

In preparing instructions for our questionnaire, we recognized the need to clearly and consistently identify mainframe computers, as opposed to superminicomputers and supercomputers. Because technology changes, criteria such as storage capacity, processing speed, physical size, cooling requirements, and cost do not provide an adequate basis for clear and consistent identification of mainframes. Therefore, after consulting with computer vendors, GSA, other federal agency officials, and Datapro,⁶ we considered vendor marketing strategy—in addition to computer architecture and performance—as the basis for classifying particular computers as superminicomputers, mainframes, or supercomputers. Like Datapro, we classified as mainframes some smaller and less expensive models if they belong to a product line, or family, of mainframes sharing a common architecture or operating system. However, models with similar performance characteristics that do not belong to a mainframe family and are manufactured by companies that are not traditionally recognized as mainframe manufacturers were not classified as mainframes. We provided a list of mainframe manufacturers and models in the instructions for our questionnaire as examples of computers that agencies should include in completing the questionnaire.

We obtained comments on preliminary copies of our questionnaire from information resources management officials at the Departments of Agriculture and Transportation, to aid in ensuring the questionnaire's clarity. After modifying the questionnaire based on comments received from officials at the Departments of Agriculture and Transportation, we asked the senior information resources management officials at NASA and 34 other federal agencies to complete the questionnaire.

Our questionnaire was furnished to NASA in mid-April 1989. In May 1989 we discussed our questionnaire with NASA officials and indicated that their response should include all mainframes and peripherals classified as general purpose equipment. Upon receiving NASA's response in August 1989, the information was reviewed to determine if the instructions were followed correctly and if the information was clear and consistent. Although we did not independently validate the information supplied in the NASA response, our questionnaire contained several internal checks to determine if inconsistencies were present. In some situations we modified the data on the basis of discussions with NASA officials. In other cases we excluded inappropriate data. For example, we directed the

⁶Datapro is a trade publication that provides detailed information on computers, peripheral equipment, and software.

agencies to include only procurement data for mainframe-related equipment. However, in a few instances NASA included procurements for computers other than mainframes. In order to maintain consistency in the statistics across the 35 federal agencies, any procurements reported by NASA for equipment other than mainframes and related peripherals were deleted from our analysis. Our work did not include solicitation or evaluation of documents related to NASA's individual procurements. The figures and tables in appendixes I and II were developed from our analysis.

We did not solicit or obtain comments from NASA about this report, however, we discussed our scope and methodology with NASA officials in February 1990. Our review was conducted from February 1989 through February 1990. We discussed our work with NASA officials at NASA headquarters. Additionally, meetings were conducted with the Department of Agriculture, the Department of Transportation, and the General Services Administration in Washington, D.C. Our work was performed in accordance with generally accepted government auditing standards.

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