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DEFENSE PROCUREMENTS

Two ADP Solicitations Unnecessarily Restrict Competition

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**Information Management and
Technology Division**

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July 9, 1991

The Honorable Sam Nunn
Chairman, Committee on Armed Services
United States Senate

The Honorable Les Aspin
Chairman, Committee on Armed Services
House of Representatives

The National Defense Authorization Act for fiscal year 1991 required us
to review, within 3 months of the act's passage, a selected number of
Department of Defense (DOD) computer procurements to determine if
they contained any barriers to full and open competition for United
States computer suppliers.[1] In subsequent discussions with your offices,
we agreed to review the Air Force procurement for the Tactical Air
Forces Workstation (TAF-WS) and the Army procurement for the Light-
weight Computer Unit (LCU) to determine if their specifications included
any barriers to full and open competition.

We provided the results of our review, including conclusions and recom-
mendations, in formal briefings to your offices in February 1991. We
agreed to prepare this report containing the charts used in the briefings,
explanatory narrative for each chart (see appendix I), and additional
information obtained while preparing the report. Subsequently we
obtained agency comments on a draft of this report (see appendix II).
These comments are presented and evaluated in the report.

Background

The Congress has historically required that purchases by federal agen-
cies be based on competition whenever practicable. Statutory provisions
now require full and open competition unless certain specified condi-
tions are met.[2] Competition helps ensure that the government pays fair
and reasonable prices; it provides a means to choose the best solution
available to meet a particular need; and it allows contractors equal
opportunity to compete for government business.

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[1] Public Law No. 101-510, Sec. 245 (Nov. 5, 1990).

[2] Under the Competition in Contracting Act of 1984, 10 U.S.C. Sec. 2301 et seq. (1988), "full and open
competition" basically means allowing all responsible sources capable of satisfying the government's
needs to compete for a contract award.

The Competition in Contracting Act of 1984 requires, among other things, that agencies develop specifications that permit full and open competition, and include restrictive specifications or conditions only to the extent necessary to satisfy the needs of the agency or when required by law. To promote competition, specifications should be written in as functional terms as possible (i.e., describing the function to be performed rather than specifying a particular solution or way of performing the function).

Results in Brief

The requests for proposals (RFPs) for the Air Force TAF-WS and the Army LCU procurements contained 12 specifications (5 for TAF-WS and 7 for LCU) that restricted competition by requiring either a specific solution or a brand name product. The Air Force and the Army adequately justified 9 of the 12 restrictive specifications. However, they did not adequately justify the other 3 restrictive specifications. These specifications required all TAF-WS units to have the same hardware architecture, operating system, and compilers, and required LCU to use brand name products to (1) physically connect the computer to other devices, and (2) provide a user with an easy way to interact with the computer.

Recommendations

We recommend, therefore, that the Secretary of Defense direct the Secretaries of the Air Force and Army to suspend the TAF-WS and LCU contracts, respectively, amend the solicitations to state the Air Force's and Army's needs in functional terms, and conduct new competitions. After evaluating the results of the competitions and considering the costs of terminating the contracts, the Air Force and Army should either award new contracts and terminate the existing ones, or reinstate the existing contracts, whichever is in the best interests of the government.
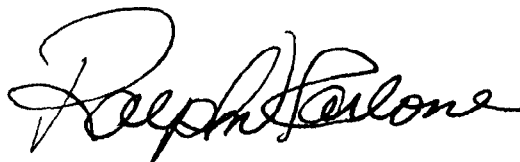
Agency Comments

DOD partially concurred with our findings and recommendations in a draft of this report. DOD agreed that the initial justifications for the three specifications were inadequate. However, on the basis of additional justification DOD has concluded that these specifications are not unnecessarily restrictive. We found the additional justifications unconvincing and continue to believe that the three specifications unnecessarily restricted competition. Our recommendations have been adjusted to reflect their comments.

As discussed with your offices, we did not verify information provided by the Air Force and Army in most cases because of the legislative mandate to complete our work within 3 months. With this exception, we performed our work in accordance with generally accepted government auditing standards.

We are providing copies of this report to the Secretary of Defense; the Secretaries of the Air Force and the Army; the Senate and House Committees on Appropriations; the Director, Office of Management and Budget; and other interested parties. We will also make copies available to others upon request.

This report was prepared under the direction of Samuel W. Bowlin, Director, Defense and Security Information Systems, who can be contacted at (202)275-4649. Other major contributors are listed in appendix III.

Ralph V. Carlone
Assistant Comptroller General

Contents

Abbreviations

ADP	Automated Data Processing
ATCCS	Army Tactical Command and Control System
AT&T	American Telephone and Telegraph Company
BSD	Berkeley Software Distribution
CD-ROM	Compact Disk-Read Only Memory
CICA	Competition in Contracting Act
DOD	Department of Defense
GAO	General Accounting Office
GUI	graphical user interface
IBM	International Business Machines, Inc.
IMTEC	Information Management and Technology Division
LCU	Lightweight Computer Unit
MIPS	millions of instructions per second
MS-DOS	Microsoft-Disk Operating System
POSIX	Portable Operating System Interface for Computer Environments
RFP	request for proposals
SPEC	Systems Performance Evaluation Cooperative
SVID	System V Interface Definitions
TAF-WS	Tactical Air Forces Workstation
VGA	video graphics array

Briefing Charts and Explanatory Narrative

GAO   Appendix I

DEFENSE PROCUREMENT:

Two ADP Solicitations
Unnecessarily Restrict
Competition

GAO   Introduction
       Objective

- To determine if the Tactical Air
  Forces Workstation (TAF-WS) and
  Lightweight Computer Unit (LCU)
  procurements' specifications include
  any barriers to full and open
  competition

Introduction

Objective

The National Defense Authorization Act for fiscal year 1991 required us to review a selected number of DOD computer procurements to determine if the solicitations provided any barriers to full and open competition for United States computer suppliers. The act also required that we report to the Senate and House Armed Services Committees in 3 months. In subsequent discussions with these offices, we agreed to review the Air Force procurement for the Tactical Air Forces Workstation (TAF-WS) and the Army procurement for the Lightweight Computer Unit (LCU) to determine if their specifications included any barriers to full and open competition.

GAO   Introduction
      Scope and Methodology

- Identify specifications that may require (1) a brand name or specific make & model, or (2) solutions that limit design options

- For specifications that may be unnecessarily restrictive, determine:
  - agency's need
  - if need could be met by less restrictive specification
  - if restrictions were reasonably justified by the agency

Scope and Methodology

To accomplish our objective, we analyzed the Competition in Contracting Act to determine the preferred way to specify requirements so as to minimize limitations on competition. On the basis of this analysis, we reviewed the RFPs for both procurements to identify specifications that may require (1) a brand name or specific make or model, or (2) solutions that limit the options that vendors can offer.

For those specifications that we judged to be potentially unnecessarily restrictive, we determined (1) the agency's minimum need, and (2) whether the minimum need could be met by a less restrictive specification. Where its need might be met by a less restrictive specification, we evaluated whether the agency had adequately justified the restrictive specification.

We performed our review from November 1990 to May 1991. Our review of the TAF-WS procurement was conducted primarily at the Air Force Computer Acquisition Center, Hanscom Air Force Base, Massachusetts. We obtained the Air Force's justifications from the contracting officer and program manager responsible for TAF-WS. We also discussed these issues with Air Force officials at Tactical Air Command Headquarters, Langley Air Force Base, Virginia.

Our review of the LCU procurement was conducted primarily at Army Communications—Electronics Command, Fort Monmouth, New Jersey. We obtained the Army's justifications from the contracting officer and project manager responsible for the LCU. Additionally, we discussed the LCU's requirements with Army Tactical Command and Control System (ATCCS) programming officials.

We also discussed these procurements with officials from the Office of the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence, the Army's Competition Advocate, and the Air Force's Competition Advocate in Washington, D.C.

The Department of Defense provided written comments on a draft of this report. These comments are presented and evaluated in the report and are included in appendix II.

GAO   Tactical Air Forces -
Workstation (TAF-WS)

What is TAF-WS?
• A family of workstations with low, medium, & high performance capabilities

How will TAF-WS be used?
• As the common hardware platform for systems being developed to supply mission-essential information

Tactical Air Forces—Workstation

What Is TAF-WS?

TAF-WS is a family of computer workstations whose purpose is to provide mission-essential information (e.g., air defense, command and control, and intelligence) to tactical wings and squadrons. These units will use TAF-WS when they are in the field and when they are stationed at military posts. The Air Force awarded a $40 million contract for approximately 2700 workstations and associated products on January 18, 1991.

How Will TAF-WS Be Used?

TAF-WS will be the common hardware platform to support new mission-critical information systems. Air Force officials estimated that these workstations will support over 2.5 million new lines of code already developed. Approximately $100 million has been spent to develop this code.

The RFP requires TAF-WS to be capable of operating in different configurations such as a stand-alone system, an intelligent workstation in a network, and a file server in a network.

GAO TAF-WS
Specifications Reviewed

- Binary code compatibility

- SPECmark: a performance measurement

- Centronics parallel port interface

- Oracle & Sybase compatibility

- MS-DOS, SVID, & Berkeley functionality

Specifications Reviewed

The RFP contains over 500 specifications, according to Air Force offi-
cials. We identified five specifications that call for either a brand name,
specific make or model, equivalence to a specific make and model, or
solutions that limit the design options that vendors can offer. The five
specifications are:

- binary code compatibility,
- SPECmark (used to measure processing capability),
- Centronics parallel interface,
- Oracle and Sybase compatibility, and
- MS-DOS, SVID, and Berkeley functionality.

GAO TAF-WS
Binary Code Compatibility

- RFP requires the TAF-WS family to execute the same binary code

- This requires the same hardware architecture, operating system, & compilers

- AF requires that TAF-WS (1) process command, control, & intelligence information; & (2) maintain hardware & software in the most efficient & economical manner

- AF believes it is the best technical solution

Binary Code Compatibility

The RFP requires that all "hardware platforms shall be object (binary) code compatible," that is, that all hardware platforms must be able to execute the same object code. Programmers write software in a variety of languages such as FORTRAN, COBOL, and assembler. The code they write is called source code. In order to be executed by a computer, source code must be translated ("compiled" in the case of higher-order languages like FORTRAN or COBOL, or "assembled" in the case of assembler language) into "ones and zeros" called object (binary) code.

Since each computer architecture has its own unique binary code, requiring binary code compatibility means that the TAF-WS family would have to have the same hardware architecture, operating system, and compilers.

Air Force officials stated that their functional requirement for TAF-WS is to process command, control, and intelligence information to support tactical operations, and to maintain the necessary hardware and software in the most efficient and economical manner. They believe that a family of binary code compatible workstations is the best technical solution to meet this need.

The Air Force has written several new application programs that will support tactical operations at the wing and squadron level. These programs total about 2.5 million lines of source code and were developed on several manufacturers' workstations. The Air Force plans to port[1] these programs to the TAF-WS family. The Air Force stated that binary code compatibility will allow application programs used on the lower-range workstations to be ported to the higher-range workstations without recompiling. They believe that not having to recompile the software will significantly reduce maintenance costs.

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[1]Port means to transfer a program from one hardware configuration and/or software system environment to another.

GAO **TAF-WS**
Binary Code (Cont'd.)

- AF has not shown binary code is most efficient & economical way to meet its needs

- Effective software management could meet AF's needs

Conclusion:
Binary code compatibility not justified; it limited competition & reduced range of vendor solutions

Recommendation:
Revise RFP and recompete

Binary Code Compatibility (Cont'd.)

The Air Force did not thoroughly evaluate alternative approaches to binary code for achieving efficient and effective software maintenance. These include using POSIX-compliant operating systems, adapting and enforcing standards (e.g., data elements and application languages), and instituting sound configuration management with a configuration management plan. Therefore, the Air Force has not shown that binary code compatibility is the most efficient and economical way to meet its needs.

We believe this requirement unnecessarily restricted competition. It limited vendor solutions to a family of workstations (low-, medium-, and high-range capabilities) with a single architecture, precluding a solution that proposed using more than one manufacturer's workstations. We believe the Air Force has not adequately justified its need for this restrictive requirement.

Since the Air Force has already awarded a contract for this procurement, we recommend that the Secretary of Defense direct the Secretary of the Air Force to suspend the TAF-WS contract and amend the solicitation to state the Air Force's needs in functional terms, specifically allowing offerors to propose alternative solutions to binary code compatibility, and conduct a new competition. After evaluating the results of the competition and considering the costs of terminating the contract, either award a new contract and terminate the existing contract, or reinstate the existing contract, whichever is in the best interests of the government.[2]

Agency Comments and Our Evaluation

In commenting on a draft of this report (see appendix II), DOD said the Air Force has updated its economic analysis by changing some of the assumptions in the model used to justify binary code compatibility. Although DOD accepts the additional justification supplied by the Air Force, we believe it is still not adequate because, as DOD acknowledges, the Air Force did not evaluate the cost and benefits of alternatives to binary code compatibility.

Achieving the goals cited by DOD—software portability, economical and efficient software maintenance, and decreased life cycle costs—involves practicing good software engineering, including good software design, adopting and adhering to meaningful standards, and instituting effective configuration management. DOD has not demonstrated that binary

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[2]The costs of terminating the contract cannot be accurately projected at this time. According to the Federal Acquisition Regulations, the costs of terminating a contract for the convenience of the government is determined by negotiations with the contractor following the procedures in the regulations.

Binary Code Compatibility (Cont'd.)

code compatibility is either necessary or sufficient for obtaining its stated goals. DOD should have required the Air Force to thoroughly evaluate the cost and benefits of other alternatives, such as approaches incorporating POSIX-compliant operating systems and effective software and data management.

Additionally, while DOD said the Air Force has the requirement for "real-time distribution of changes" across different hardware architectures, it did not explain why this requirement is necessary in completing TAF-WS's mission to efficiently and economically maintain application programs that process command, control, and intelligence information. Further, it does not provide support to show why this requirement could be met only with binary code compatibility.

GAO **TAF-WS**
SPECmark: Performance Measurement

- SPECmark measures a computer's processing speed

- AF requires TAF-WS to meet minimum processing speeds, as measured by SPECmark, to ensure adequate performance

Conclusion:
Justification is adequate

SPECmark: A Performance Measurement

SPECmark is a proprietary product that is used to measure a computer's processing speed. It is a carefully defined set of programs designed to provide a consistent way to measure and compare computers' processing speeds. It was developed by an industry group called SPEC (Systems Performance Evaluation Cooperative) which was founded in November 1988 by Apollo Computers, Hewlett-Packard, MIPS Computer Systems, and Sun Microsystems. Currently, 22 corporations that design either hardware or software belong to SPEC.

The Air Force maintains that the primary performance requirement driving the TAF-WS acquisition is to process single command and control tasks as rapidly as possible. The RFP required TAF-WS to process information at certain speeds as measured by SPECmarks. The Air Force developed this performance requirement on the basis of several prototype programs that will run on TAF-WS. In order to meet the requirement, the Air Force needs to be able to accurately evaluate the speed of potential workstations. The Air Force chose SPECmark because it provides a consistent measurement of workstation processing speed.

Currently, no government standard exists for measuring processing speed. An alternative to using SPECmark would be to accept manufacturers' claims of how many millions of instructions per second (MIPS) their equipment executes. Since manufacturers use different methods for calculating MIPS and this makes it difficult to compare different machines, the Air Force decided to use SPECmark.

We believe the Air Force has adequately justified using SPECmark to measure processing speeds for TAF-WS.

GAO **TAF-WS**
Centronics Parallel Port Interface

- AF requires ability to interface with devices with Centronics parallel ports

- TAF-WS must work with thousands of these devices

- Ability to communicate only requirement; proprietary product (Centronics parallel port) not required

Conclusion:
Justification is adequate

Centronics Parallel Port Interface

A parallel interface is a method used for connecting printers and other devices to a computer. It defines the plug, socket, and electrical signals used for controlling the transmission of data. A Centronics port is a specific design for a parallel interface.

The RFP requires that TAF-WS communicate with devices that have a Centronics port. According to Air Force officials, the Air Force has "thousands of printers" with Centronics parallel ports, and TAF-WS will be used with these printers. The RFP merely requires that TAF-WS be able to communicate with these devices; it does not require a Centronics parallel port (a proprietary product) to meet this need.

We believe that the Air Force has adequately justified its requirement for a Centronics parallel interface.

GAO TAF-WS
Oracle & Sybase Compatibility

- Oracle & Sybase (brand name products) required to run on TAF-WS

- AF applications use Oracle & Sybase

- AF estimates that using another system would cost over $12 million

Conclusion:
Justification is adequate

Oracle and Sybase Compatibility

The Air Force requires TAF-WS to be capable of supporting both Oracle and Sybase relational data base management systems.[3] Both are proprietary products.

Existing Air Force applications using Oracle and Sybase will have to run on TAF-WS. The Air Force estimated that if TAF-WS did not support Oracle and Sybase it would cost a minimum of $12 million to convert these applications, and would delay the deployment of mission-essential systems by more than 1 year.

We believe the Air Force's justification for requiring TAF-WS to be able to support both Oracle and Sybase is adequate.

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[3] A data base management system is the software that manages (i.e., retrieves, stores, controls, etc.) the physical data base. There are several data base structures or ways in which a data base can be arranged. One structure is relational, in which the data are organized into two-dimensional tables.

GAO **TAF-WS**
MS-DOS, SVID, & Berkeley

- AF requires a POSIX compliant operating system that provides all three

- AF has applications using all three

- AF plans to maintain these applications

Conclusion:
Justification is adequate

MS-DOS, SVID, and Berkeley Functionality

TAF-WS requires a POSIX-compliant operating system with Microsoft-Disk Operating System (MS-DOS), System V Interface Definitions (SVID), and Berkeley functionality. MS-DOS is a proprietary operating system developed by Microsoft Corporation. SVID and Berkeley are proprietary ways of implementing the Unix operating system.

The Air Force has a large investment in applications that run in a MS-DOS environment. It has developed over 102,000 lines of code under MS-DOS, which is running at over 60 tactical units. In addition, the Air Force has developed 2.5 million lines of code that use SVID and Berkeley implementations of UNIX. It plans to use all this software on TAF-WS.

Given that the Air Force is planning to maintain its investment in MS-DOS applications and to port 2.5 million new lines of code developed under SVID and Berkeley operating systems to TAF-WS, we believe its justification for this requirement is adequate.

GAO   Lightweight Computer Unit (LCU)

What is LCU?
- A lightweight, portable computer that will be used for tactical command & control systems

How will LCU be used?
- Army Tactical Command & Control System (ATCCS)
- Other Army tactical programs
- Marine Corps Command & Control System

Lightweight Computer Unit

What Is LCU?

LCU is a lightweight computer that will be used to satisfy a variety of tactical command and control requirements. LCU will be available in both commercial and ruggedized versions. The ruggedized version is designed for tactical use on the battlefield. The Army awarded a $14 million contract for approximately 454 lightweight computers on May 15, 1991. If the Army exercises all of the contract's options, the total value is estimated to be $452 million for 21,000 computers and associated products.

How Will LCU Be Used?

Army officials stated that LCU will be used primarily for the Army Tactical Command and Control Systems (ATCCS). ATCCS is the Army's plan to integrate five previously independent programs into a comprehensive command and control system. The ATCCS programs planning to use LCU are: Forward Area Air Defense Command and Control System, Maneuver Control System, Advanced Field Artillery Tactical Data System, and Combat Service Support Control System. LCU will also be used for other Army tactical programs and as part of the Marine Corps Command and Control System.

GAO   LCU
       History

   • In 1988 Army competitively procured
     common hardware & software for
     ATCCS

   • LCU was declared outside of the
     1988 contract's scope

History

In August 1988, the Army competitively procured a family of common hardware and software products for use throughout ATCCS. Three types of computers were available on this contract. The Transportable Computer Unit and the Portable Computer Unit are ruggedized series 9000 Hewlett-Packard workstations with co-processors. One processor's design uses Motorola chips and runs a Unix operating system, while the other processor's design uses Intel chips and runs MS-DOS. The third computer is the Handheld Terminal Unit. This machine is an International Business Machines, Inc. (IBM) compatible computer that uses Intel chips and runs MS-DOS. The Army had also wanted to obtain a computer more powerful than the handheld unit but lighter than the others. However, computers meeting this requirement were not commercially available when the contract was awarded.

Soon after contract award, lightweight computers became commercially available. The Army attempted to obtain one under the contract's "technology insertion clause." The Army believed that this clause would allow it to upgrade the handheld unit. A prototype was developed, using Intel chips and running MS-DOS, called the Enhanced Handheld Terminal Unit. ATCCS users were allowed to purchase a small number of the enhanced units under a sole source contract to permit them to continue developing new applications. However, the Army Communications—Electronics Command contracting authority declared that the technology insertion clause could not be used to purchase the enhanced unit for operational use because it was outside the contract's scope, and that a new lightweight computer had to be competitively procured.

GAO   LCU
      Specifications Reviewed

- MS-DOS and AT&T SVID compatible

- CD-ROM-accessible

- Internal VGA display

- External VGA-compatible port

- Graphical user interface (GUI)

- Centronics parallel port

Specifications Reviewed

The RFP contains over 1000 specifications, according to the LCU project leader. We identified seven specifications that call for either a brand name, specific make and model, equivalence to a specific make and model, or solutions that limit the design options that manufacturers can offer. The seven specifications are:

- MS-DOS and AT&T SVID compatible,
- CD-ROM accessible,
- internal video graphics array (VGA) display,
- external VGA-compatible monitor port,
- internal Hayes-compatible modem,
- graphical user interface, and
- Centronics parallel port.

GAO **LCU**
MS-DOS and AT&T SVID Compatible

- Army is requiring POSIX-compliant operating system with MS-DOS & AT&T SVID functionality

- Army has applications using MS-DOS & AT&T SVID functionality

- Army plans to maintain investment

Conclusion:
Justification is adequate

MS-DOS and AT&T SVID Compatible

The RFP calls for a POSIX-compliant operating system and the functionality of both MS-DOS and American Telephone and Telegraph Company (AT&T) SVID. Both MS-DOS and AT&T SVID are proprietary operating systems provided to ATCCS programs through the CHS contract.

ATCCS programs have an installed base of applications that use MS-DOS and AT&T SVID. Army officials said they plan to use most of their installed base on LCU and to maintain their operational, software development, and training investments in MS-DOS and AT&T SVID. ATCCS programs have spent $36.5 million to develop 300,000 lines of code under MS-DOS and $107.4 million to develop 813,000 lines of code under SVID.

We believe the Army has adequately justified its need for this requirement.

GAO **LCU
CD-ROM-Accessible**

- POSIX-compliant operating system must access CD-ROM from both MS-DOS & AT&T SVID extensions

- ATCCS needs both to access maps

Conclusion:
Justification is adequate

CD-ROM Accessible

Compact Disk-Read Only Memory (CD-ROM) is a technology used to store information permanently. The RFP requires the LCU's POSIX-compliant operating system to access CD-ROM with both MS-DOS and AT&T SVID extensions. Both are proprietary products.

ATCCS programs are required to display and manipulate digital terrain data maps that will be provided by the Defense Mapping Agency on CD-ROM. ATCCS applications running under both extensions need to access maps on CD-ROM, and, as discussed earlier, the Army plans to maintain its investments in both MS-DOS and AT&T SVID.

We believe that the Army's justification for requiring the LCU to access CD-ROM with both MS-DOS and SVID extensions is adequate.

GAO **LCU**
Internal VGA Display

- 640 X 480-resolution 10" diagonal internal VGA display (brand name product) required

- ATCCS' applications use VGA

- RFP did not require VGA; only required VGA compatible

Conclusion:
Justification is adequate

Internal VGA Display

The RFP calls for a "640 X 480 Resolution 10 (inch) Diagonal Internal VGA display." VGA is a brand name product that provides high-resolution graphics and displays for IBM and IBM-compatible personal computers.

Army officials said that ATCCS' installed base of MS-DOS applications requires VGA compatibility. They stated that their interpretation of the RFP was that it did not require VGA—only VGA compatibility. They said that VGA was used in the RFP to help state the requirement in easily understood terms since there is no government graphic and display standard. In addition, Army officials responded to vendors' questions about the requirement by explaining that they needed only VGA compatibility.

We believe that the Army could have stated this requirement more clearly in the RFP. However, since it has an invested base in software developed with VGA, we believe the Army's justification for this requirement is adequate.

GAO   LCU
       External VGA-compatible port

- External VGA-compatible monitor port required

- Army has thousands of VGA monitors

- Requires LCU to be compatible

Conclusion:
Justification is adequate

External VGA Compatible Monitor Port

The RFP requires LCU to have an external VGA compatible monitor port. Army officials estimated there are thousands of devices with external VGA monitors in Army units around the world. Army officials said their policy requires that all tactical command and control equipment be compatible with the equipment in these units.

The RFP requires that LCU have an external port that is compatible with VGA monitor ports; it does not require a proprietary product to meet this need.

We believe that the Army has adequately justified its need for this requirement.

GAO LCU
Internal Hayes-compatible Modem

- Internal Hayes-compatible modem required

- Army has thousands of computers with Hayes-compatible modems

- LCU required to communicate with these computers

Conclusion:
Justification is adequate

Internal Hayes-Compatible Modem

A modem is a device that allows computers to communicate across telephone lines to other computers. A Hayes modem is brand name equipment.

The RFP requires that LCU have an internal Hayes-compatible modem that supports specific protocols.[4] The RFP does not require a Hayes modem (the brand name) to meet this need. It only requires that the modem be able to communicate with other Hayes-compatible modems. Army officials said that the Army has thousands of computers with Hayes-compatible modems and that LCU is required to communicate with these devices. In addition, the officials said ATCCS' installed base of MS-DOS applications requires the additional protocols specified in the requirement.

We believe that the Army has adequately justified its requirement for the Hayes-compatible modem that supports specific protocols.

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[4]A protocol is a set of rules for sending data between computers or between a computer and a communication device.

GAO LCU
Graphical User Interface

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- OSF-Motif or Open Look (brand name products) required
- ATCCS' applications use OSF-Motif
- Open Look added to respond to vendors; Army decided conversion costs were acceptable
- Other GUIs exist

Conclusion:
Justification not adequate; limited competition & reduced range of solutions vendors could offer

Recommendation:
Revise RFP and recompete

Graphical User Interface (GUI)

A GUI is software that provides a user with a powerful and convenient way to interact with a computer system. Typically, a GUI allows a user to execute functions (e.g., store a file) by pointing to a graphical image on a computer screen with a device known as a mouse, rather than having to type a series of arcane commands.

Initially, the Army planned to require the LCU's operating system to have an OSF-Motif GUI because ATCCS programs have developed their applications using OSF-Motif. Subsequently, in conducting market surveys during the procurement, the Army determined that many vendors believed that requiring OSF-Motif would unnecessarily restrict competition. In an effort to increase competition, the Army responded by changing the requirement to either OSF-Motif or Open Look. OSF-Motif and Open Look are proprietary products that run under Unix operating systems. Currently, no GUI government standard exists.

In deciding to allow either OSF-Motif or Open Look, Army officials stated that they made a judgement that ATCCS users would be able to convert their applications from OSF-Motif to Open Look with minimum conversion costs. However, there are other GUIs that could have been offered by vendors. The officials stated that they did no analysis to determine if any other GUIs would be viable solutions.

We believe the Army has not adequately justified restricting its requirement to just OSF-Motif or Open Look. This requirement limited competition by reducing the range of solutions that vendors could offer. Once the Army decided to increase competition by allowing vendors to propose Open Look, it should have allowed vendors to propose any viable GUI.

Since the Army has already awarded a contract for this procurement, we recommend that the Secretary of Defense direct the Secretary of the Army to suspend the LCU contract and amend the solicitation to state the Army's needs in functional terms, and conduct a new competition. After evaluating the results of the competition and considering the costs of terminating the contract, the Army should either award a new contract and terminate the existing contract, or reinstate the existing contract, whichever is in the best interests of the government.[5]

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[5]The costs of terminating the contract cannot be accurately projected at this time. According to the Federal Acquisition Regulations, the costs of terminating a contract for the convenience of the government is determined by negotiations with the contractor following the procedures in the regulations.

Agency Comments and Our
Evaluation

In its comments, (see appendix II) DOD said that the Army provided an additional cost/benefit analysis that justified requiring the two brand name GUIs. The Army analyzed three ATCCS programs to determine the cost and the delays of allowing the four other GUIs, including Open Look. This analysis shows that the Army would incur a $4.5 million conversion cost and a 16-month delay if it selected Open Look, and up to a $7.6 million and an 18-month delay if it selected one of three other products: Nextstep, Silicon Graphics, or MacX. On the basis of this analysis, the Army concluded that only OSF-Motif or Open Look, or other products adhering to OSF-Motif or Open Look design features, would satisfy its requirements.

We disagree with the Army's conclusions. CICA requires that all responsible sources capable of satisfying the government's needs be allowed to compete. The Army decided to increase competition by allowing vendors to provide Open Look. However, it did not provide adequate justification for continuing to restrict competition by excluding vendors from offering other GUIs.

The Army determined that Open Look and its estimated $4.5 million conversion cost and 16-month schedule delay met its requirement, but that MacX with its estimated $7.1 million conversion cost and 18-month schedule delay, and that Nextstep and Silicon Graphics (both estimated at a $7.6 million conversion cost and 18-month schedule delay) did not. Given that the acquisition cost of the three ATCCS programs used in its analysis is estimated to be $2.9 billion,[6] the Army has not justified why the GUI with a $4.5 million conversion cost and a 16-month schedule delay was acceptable, but the other GUIs, with an additional estimated conversion cost of at most $3.1 million and an additional schedule delay of 2 months, were not.

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[6]Battlefield Automation: Army Tactical Command and Control System's Schedule and Cost (GAO/NSIAD-91-118BR, Apr. 15, 1991).

GAO **LCU**
Centronics Parallel Port

- Centronics parallel port (a brand name product) required

- Army has thousands of devices with Centronics parallel ports with which LCU must work

- Other solutions exist

Conclusion:
Justification not adequate; limited competition & reduced solutions vendors could offer

Recommendation:
Revise RFP and recompete

Centronics Parallel Port

The Army unnecessarily limited competition by requiring a brand name product instead of stating its requirements in functional terms. Army officials stated that in order to ensure that the LCU could interface with thousands of Army devices equipped with Centronics parallel ports they required that the LCU vendor provide a Centronics parallel port. The Army could have satisfied its interface requirements without unnecessarily restricting competition by specifying only that the LCU vendor provide a Centronics compatible port.

Since we are recommending that DOD recompete the LCU contract because of its GUI requirement, we recommend that the Secretary of Defense direct the Secretary of the Army to amend the solicitation to state the Army's need for a Centronics parallel port in functional terms.

Agency Comments and Our Evaluation

In its comments (see app. II), DOD agreed that the requirement in the RFP for a Centronics parallel port could have been more clearly stated. DOD said that its intent was to obtain a port compatible with the product, and not to limit procurement to the Centronics product. DOD stated that its intent was made clear in the formal questions and answers review with vendors.

We disagree. The formal question and answer review did not adequately explain the Army's need for a Centronics compatible interface capability. In addition, the Army did not amend the RFP to clarify its intent.

ASSISTANT SECRETARY OF DEFENSE

WASHINGTON, D.C. 20301-3040

COMMAND, CONTROL,
COMMUNICATIONS
AND
INTELLIGENCE

May 10, 1991

Mr. Ralph V. Carlone
Assistant Comptroller General
Information Management and Technology Division
U.S. General Accounting Office
Washington, DC   20548

Dear Mr. Carlone:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report--"DEFENSE PROCUREMENTS: Two ADP (Automated Data Processing) Solicitations Unnessarily Restrict Competition," dated March 28, 1991 (GAO Code 510676) OSD Case 8643. The DoD partially agrees with the report.

The DoD agrees that the initial service justifications, provided for those specifications GAO deemed restrictive, lacked specific clarity for some of the underlying requirements specified. The DoD continues to emphasize in procurement management training and seminars the importance of using functional specifications and encouraging the contracting community to look closely at contracts for automated data processing items to alleviate these sorts of practices.

The DoD, however, does not agree that the specifications unnecessarily restricted competition. Additional justification has been provided to the OSD, as suggested by the GAO. After a thorough review, the specifications are deemed appropriate.

Detailed DoD comments on the report findings and recommend-ations are provided in the enclosure. The DoD appreciates the opportunity to comment on the GAO draft report.

Sincerely,

Duane P. Andrews

Enclosure

GAO DRAFT REPORT - DATED MARCH 22, 1991
(GAO CODE 510676) OSD CASE 8643

"DEFENSE PROCUREMENTS: TWO ADP (AUTOMATED DATA PROCESSING)
SOLICITATIONS UNNECESSARILY RESTRICT COMPETITION"

DEPARTMENT OF DEFENSE COMMENTS

* * * * *

FINDINGS

o   FINDING A: Requirements Limiting Competition In The Air
Force Procurement Of The Tactical Air Forces Workstation.
The GAO explained that the Tactical Air Forces Workstation
is a family of computer workstations, intended to provide
mission essential information to tactical wings and
squadrons when these units are in the field and when they
are stationed at military posts. The GAO noted that the
Air Force awarded a $40 million contract on January 18,
1991, for 2,700 of the workstations and associated
products.

The GAO found that the request for proposal for the
Tactical Workstation contains over 500 specifications, five
of which the GAO identified as restricting competition by
calling for a brand name, specific make or model, or
equivalence, or by specifying solutions that limit design
options the vendors can offer. Based on its assessment,
the GAO concluded that the Air Force adequately justified
that 4 of the 5 specifications were necessary to satisfy
Air Force needs. (p. 2, pp. 10-25/GAO Draft Report)

DOD RESPONSE: Concur.

o   FINDING B: Requirement For Binary Code Compatibility In
The Tactical Air Forces Workstation. The GAO found that
the request for proposal for the Tactical Air Forces
Workstation requires that all hardware platforms be binary
code compatible. The GAO explained that, since each
computer architecture has its own unique binary code,
requiring this compatibility means that the Tactical Air
Forces Workstation family would have to have the same
hardware architecture, operating system, and compilers.

The GAO reviewed the economic analysis justifying
binary code for the Workstation and found the analysis was
incomplete, since it did not consider the cost of

Enclosure

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converting the existing 2.5 million lines of code so that
it could run on the Tactical Workstation family. In
addition, the GAO found that the economic analysis focused
only on maintenance costs. The GAO pointed out, however,
that when some of the assumptions were changed in the model
used by the Air Force to project maintenance costs, the
costs dropped significantly. According to the GAO, the Air
Force agreed that the GAO assumptions were as valid as its
own. The GAO also cited an alternative means by which the
Air Force could maintain its application programs
efficiently and economically, without requiring binary code
compatibility. The GAO acknowledged that the Air Force has
taken some steps, but found that the Air Force did not
evaluate the costs of this alternative or establish a
configuration management plan. The GAO concluded,
therefore, that the requirement for binary code
compatibility in the Tactical Air Forces Workstation
unnecessarily restricted competition. (p. 2, pp. 14-17/GAO
Draft Report)

DOD RESPONSE: Partially concur. The DoD agrees that the
initial justification for the use of binary code was
lacking, but disagrees that the requirement was
unnecessarily restrictive. Since the GAO completed its
work, the Air Force has updated the economic analysis, by
changing some of the assumptions and parameters as
previously discussed with the GAO evaluators. The analysis
determined that the Air Force would <u>still</u> avoid a cost
increase of $27 million to $189 million using the
requirement for binary code compatibility. The Air Force
examined the use of POSIX architecture prior to the release
of the request for proposal. The Air Force determined that
POSIX was not mature enough to provide 100 percent
portability of developed software across the different
hardware architectures used in the platforms. The software
changes could not be made without significant
modification, recompilation, and increased life cycle
maintenance cost. Given the immaturity of POSIX and the
requirement for real-time distribution of changes across
the different platforms, the decision was made to use
binary code compatibility and no other alternatives were
considered. The justification fully supports the Air Force
decision to specify binary code compatibility.

o   FINDING C: Requirements Limiting Competition In The Army
     Procurement Of The Lightweight Computer Unit. The GAO
     explained that the Lightweight Computer Unit will be used
     to satisfy a variety of tactical command and control
     requirements, and will include a ruggedized version for
     tactical use on the battlefield. According to the GAO, the
     Army estimated it may buy about 21,000 of these computers
     and associated products.

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tactical use on the battlefield. According to the GAO, the Army estimated it may buy about 21,000 of these computers and associated products.

The GAO reported that the Lightweight Computer Unit request for proposal contains over 1,000 specifications, of which the GAO identified seven that limit competition by calling for a brand name, specific make or model, or equivalence, or solution that limited the design options the vendors can offer. Based on its assessment, the GAO concluded that the Army adequately justified that 5 of the 7 restrictive specifications were necessary to satisfy Army needs. (p. 2, pp. 26-45/GAO Draft Report)

DOD RESPONSE: Concur.

o FINDING D: Requirement For Graphical User Interface In The Lightweight Computer Unit. The GAO explained that a graphical unit interface is software that provides a user with a powerful and convenient way to interact with a computer system. The GAO found that in the case of the Army Lightweight Computer Unit, the request for proposal requires the operating system to have a graphical user interface that conforms to one of two brand name products that run under Unix operating systems (either OSF-Motif or Open Look). The GAO noted that when the Army conducted market surveys, it determined that many vendors believed limiting the specification to only OSF-Motif would be unnecessarily restrictive. The GAO found that as a result, the Army changed the requirement to accept either OSF-Motif or Open Look.

According to the GAO, Army officials said they made a technical judgment that the users would be able to convert their applications from OSF-Motif to Open Look with minimum conversion costs. The GAO noted that there are other graphical user interfaces that could have been offered by vendors, but the Army did no analysis to determine if any of these other interfaces would be viable solutions. The GAO concluded that the requirement for either OSF-Motif or Open Look limited competition by reducing the range of solutions the vendors could offer, but the Army did not adequately justify the requirement. (p. 2, pp. 42-43/GAO Draft Report)

DOD RESPONSE: Partially Concur. The DoD agrees that the initial justification for the use of Graphical User Interface was lacking, but disagrees that the requirement was unnecessarily restrictive. Since the GAO completed its work, the Army has completed a cost/benefits analysis and

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amended the justification. The analysis shows that to use
a less mature interface standard may cost the Government
between $4.5 million and $7.1 million, and subject the
programs, which have to use the interface, to a 16 to 18
month schedule impact. Therefore the requirement for
either OSF-Motif or Open Look is justified.

o   **FINDING E: Requirement For Centronics Parallel Port For
    The Lightweight Computer Unit.** The GAO noted that in
    reviewing the Tactical Air Forces Workstation (Finding A),
    it found that the Air Force specified a Centronics parallel
    port interface. In its review of the Lightweight Computer
    Unit, however, the GAO found that, unlike the Air Force,
    the Army required a Centronics parallel port, rather than a
    Centronics port interface. According to the GAO, Army
    officials explained that the Army has thousands of
    computers and peripherals with Centronics parallel ports
    with which the Lightweight Computer Unit has to work. The
    GAO pointed out, however, that there are other reasonable
    solutions to meeting this requirement that do not require a
    Centronics parallel port. The GAO concluded that the
    requirement for a Centronics parallel port limited
    competition by reducing the range of solutions the vendors
    could offer, but the Army did not adequately justify the
    requirement. (p. 2, pp. 44-45/ GAO Draft Report)

    DOD RESPONSE: Partially concur. The DoD agrees that the
    initial solicitation requirement for Centronics Parallel
    Port could have been more clearly stated, but disagrees the
    solicitation restricted competition. The main reason for
    the use of the Centronics Parallel Port was not to limit
    competition, but for the protection of an existing Army
    inventory of equipment, existing software, and the on-going
    software development efforts. A recent informal technical
    survey of existing technology/interface adapters that
    provide Centronics interface capability has shown that
    technically acceptable solutions were available to all
    responsible vendors. The need for a Centronics parallel
    port interface was questioned by the vendors during the
    formal question and answer review. It was explained that
    the requirement for this interface was to protect the
    capability to interface with the existing inventory of
    Centronics parallel port equipment. At that point in time,
    industry had the opportunity to include in their bids a
    compatible interface or other solutions versus a Centronics
    parallel port.

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* * * * *
RECOMMENDATIONS

o   **RECOMMENDATION 1:** The GAO recommended that the Secretary
    of Defense direct the Secretary of the Air Force to (1)
    provide adequate justification for requiring binary code
    compatibility across the Tactical Air Forces Workstation
    family, or (2) amend the solicitation to state the Air
    Force needs in functional terms, conduct a new competition,
    and terminate the current contract, if that is in the best
    interests of the Government. (p. 2, p. 16, p. 17/GAO Draft
    Report)

    DOD RESPONSE: Concur. The Assistant Secretary of Defense
    for Command, Control, Communications and Intelligence has
    asked for and received, from the Air Force, the results of
    the revised economic analysis. The justification fully
    supports the Air Force position for requiring binary code
    compatibility for the Tactical Air Forces Workstation
    family of equipment. Accordingly, a new competition is not
    in the best interest of the Government. The DoD recognizes
    and has emphasized to the Services that in procurements,
    every effort must be made to state their specifications in
    functional terms, instead of vendor specific solutions, to
    the maximum extent possible.

o   **RECOMMENDATION 2:** The GAO recommended that the Secretary
    of Defense direct the Secretary of the Army to provide
    adequate justification for requiring only OSF-Motif or Open
    Look as its graphical user interface, or to amend the
    solicitation so that it states the Army needs in functional
    terms, and then recompete the procurement. (p. 2, p. 42,
    p. 43/GAO Draft Report)

    DOD RESPONSE: Concur. The Assistant Secretary of Defense
    for Command, Control, Communications and Intelligence has
    asked for and received, from the Army, adequate
    justification for requiring a graphical user interface.
    Accordingly, a new competition is not necessary. The
    Lightweight Computer Unit Statement of Work (page 29, para
    5.3, subsection 9) states: "A Graphical User Interface
    which follows the OSF-MOTIF or Open Look standard shall be
    provided for each operating system." The Army, with this
    statement, has left the way open for vendors to propose
    other solutions while maintaining user commonality with the
    existing systems and those presently under development.

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o   **RECOMMENDATION 3:** The GAO recommended that the Secretary
of Defense direct the Secretary of the Army to provide
adequate justification for requiring a Centronics parallel
port, or to amend the solicitation so that it states the
Army needs in functional terms, and then recompete the
procurement. (p. 2, p. 44, p. 45/GAO Draft Report)

DOD RESPONSE: Concur. The Assistant Secretary of Defense
for Command, Control, Communications and Intelligence has
asked for and received, from the Army, additional
information on the Centronics Parallel Port requirement.
The Government provided industry with a statement, during
the formal question and answer period, that <u>compatibility</u>
was the desired effect of requesting the Centronics
parallel port. As stated in the DoD response to Finding E,
an informal technical survey of existing technology/
interface adapters that provide Centronics interface
capability has shown that technically acceptable solutions
were available to all responsible vendors. Accordingly, a
new solicitation is not necessary. The DoD recognizes and
has emphasized to the Services that in procurements, every
effort must be made to state their specifications in
functional terms, instead of vendor specific solutions, to
the maximum extent possible.

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