BY THE U.S. GENERAL ACCOUNTING OFFICE

Report To The Secretary Of Defense

DOD Automated Materials Handling Systems--Need To Standardize And Follow GSA ADPE Approval Process

DOD activities are buying computers as components of automated materials handling systems without complying with GSA's approval process established under Public Law 89-306, and they are not adequately exploring the potential for standardizing the software used in these systems.

Several million dollars could be saved by standardizing software. The Navy used standard software in procurement of a number of automated materials handling systems and realized savings of about $2.5 million.

LCD-80-49
APRIL 24, 1980

GAO

United States General Accounting Office
Washington, DC 20548

Logistics and
Communications
Division

B-198258

The Honorable Harold Brown
The Secretary of Defense

Dear Mr. Secretary:

This report discusses improvements that are needed in the Department of Defense's acquisition and management of automated materials handling systems for its supply distribution depots.

Chapter 4 of this report contains our recommendations which, if implemented, would (1) bring the Department into compliance with the approval process established by the General Services Administration under Public Law 89-306 for the acquisition of automated data processing equipment and (2) result in savings of several million dollars through the standardization of software for the automated systems.

As you know, section 236 of the Legislative Reorganization Act of 1970 requires the head of a Federal agency to submit a written statement on actions taken on our recommendations to the House Committee on Government Operations and the Senate Committee on Governmental Affairs not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We are sending copies of this report to the Secretaries of the Army, Navy, and Air Force; the Director, Defense Logistics Agency; the Director, Office of Management and Budget; and the Chairmen of the appropriate congressional committees.

Sincerely yours,

R. W. Gutmann
Director

GENERAL ACCOUNTING OFFICE
REPORT TO THE SECRETARY
OF DEFENSE

DOD AUTOMATED MATERIALS HANDLING SYSTEMS--NEED TO STANDARDIZE AND FOLLOW GSA ADPE APPROVAL PROCESS

D I G E S T

Department of Defense (DOD) activities are procuring and planning to procure automated materials handling systems for their supply distribution depots without adequately exploring the potential for standardizing the software used in these systems. Duplication of software is costly both in terms of initial investment and in continuing costs of maintaining a variety of unique systems. (See p. 8.)

For years the Congress has directed DOD to eliminate overlapping and duplicating functions whenever and wherever possible. This has been particularly true in the areas of supply and automated data processing. (See p. 2.)

DOD activities have bought and are continuing to buy computers as components of automated materials handling systems without complying with the General Services Administration's (GSA's) approval process established under Public Law 89-306. (See p. 5.) The computers used in automated handling systems are general purpose computers, and in the opinion of GAO, are subject to this approval process. (See p. 7.)

Several million dollars could be saved by standardizing software. The Navy used standard software in procurement of a number of automated materials handling systems and reduced its costs by about $2.5 million. (See p. 8.)

DOD took a first step towards standardization in a 1978 task order which established a program to develop and maintain a standard warehousing and shipping automated system for its distribution depots. The task order designated the Defense Logistics Agency's Mechanization of Warehousing and Shipment Processing system

as the standard system and established the Defense Logistics Agency as the executive manager for overseeing its development. (See pp. 3 and 12.)

As envisioned by the task order, this standard system would automate certain functions that take place in the depots, such as recording receipts, assigning storage locations, and selecting material for issue, but would not control materials handling equipment. GAO believes that inclusion of the automated materials handling systems in the standard system, thereby making them subject to the review and approval process described in the task order, would be one way of achieving the desired standardization. (See pp. 12 and 19.)

The Secretary of Defense should:

--Instruct DOD activities that general purpose computers acquired as integral components of automated materials handling systems must be procured in accordance with GSA's approval process established under Public Law 89-306.

--Modify the October 1978 task order to specifically include automated materials handling systems at supply distribution depots as part of the DOD standard warehousing and shipping automated system, or require that all such systems not under contract be submitted to one central DOD focal point for review and approval to assure that maximum standardization of the systems' software is achieved. (See pp. 13 and 14.)

GSA agreed that DOD could obtain significant cost savings by standardizing software and strongly supports GAO's recommendation that DOD procurements of systems containing general purpose computers be made in accordance with GSA's approval process established under Public Law 89-306. (See p. 15.)

DOD officials disagreed with GAO's recommendations. Their comments and GAO's rebuttal are

in chapter 5. Their major disagreements were based on their belief that (1) compliance with the Public Law 89-306 approval process is not required and would result in long leadtimes, high costs, and less responsive systems, (2) standardization of application software was limited by building configurations, size of items, and workload volume, and (3) modification of the DOD task order to include automated materials handling systems would increase system development risks and increase the time frame for achieving benefits from the systems.

GAO continues to believe that automated systems containing general purpose computers must be procured under GSA's approval process established under Public Law 89-306 unless DOD can convince GSA that an exception should be made. Standard software can be developed with enough versatility to accommodate varying building configurations, item sizes, and volumes of work. To insure maximum standardization and associated cost savings, automated materials handling systems should be included under the DOD task order or should be submitted to one central DOD focal point for review and approval before being procured.
(See pp. 15 through 19.)

Contents

ABBREVIATIONS

ADP	automated data processing
ADPE	automated data processing equipment
DLA	Defense Logistics Agency
DOD	Department of Defense
GAO	General Accounting Office
GSA	General Services Administration
MOWASP	Mechanization of Warehousing and Shipment Processing

CHAPTER 1

INTRODUCTION

The military services presently operate over 30 supply and maintenance depots in the United States which receive, store, repair, and issue millions of items a year. These depots were traditionally very labor intensive and were not susceptible to significant productivity increases until the computer was joined to materials handling equipment to form automated materials handling systems.

Industry and the Government are installing an increasing number of automated materials handling systems to handle the receipt, issue, and storage of items, as well as other warehousing and manufacturing functions. Industry officials believe that the use of computers in the warehousing environment will extend far beyond that of simple automated materials handling. They expect that computers will eventually control the flow of work throughout the facility ensuring not only that parts arrive on time, but also identifying problems and bottlenecks encountered on the production floor and providing other vital management information.

The Department of Defense (DOD) planned to spend $221 million on modifications to existing systems or for new sophisticated automated materials handling systems from fiscal year 1979 to fiscal year 1984. Of this amount, $160 million was for the Navy, $26.7 million was for the Air Force, and $34.7 million was for the Defense Logistics Agency (DLA).

AUTOMATED MATERIALS HANDLING SYSTEMS IN DOD

DOD is acquiring two basic types of automated materials handling systems for its depot operations, man-to-material and material-to-man.

In the man-to-material system, a stockpicker vehicle is used to transport the man to the material. The vehicle is automatically guided by a computer through wires in the floor, but it can be manually controlled if necessary. This system is generally used in activities which have supply functions, such as receipt, storage, and issue of items to customers.

The material-to-man system uses computer guided cranes, carousels, conveyors, and other means to transport material or material in bins between storage locations and a staffed work station. Activities which have maintenance functions (i.e., overhaul and manufacturing) generally use this system.

However, supply activities may also use the system for receipt, storage, and issuance of items.

THE COMPUTER IN MATERIALS HANDLING SYSTEMS

The number and size of the computers which are used in automated materials handling systems vary with the type and complexity of the systems. For control purposes, automated materials handling systems have several levels of computers. The lowest level, a mini-computer located on the stockpicker vehicle or a different materials handling component, receives instructions as to which material is to be picked and informs the supervisory computer when transactions are completed. The next level, an intelligent terminal, uses the supervisory computer to determine the status, quantity, and location of parts and end items or to request parts for the repair shop.

The supervisory computer, which may be more than one computer linked together, controls stockpicker vehicles or cranes, assigns and monitors storage locations, maintains inventory records, handles order processing and production planning, and acts as a central data bank for management.

Since the computers automatically control the entire material processing cycle, the loss of control or data is critical to the operation of an automated materials handling system. To guard against failure of individual computer components, redundant computers are on standby to take over operation of the entire system.

DOD EFFORTS TO STANDARDIZE SUPPLY PROCESSING

For years the Congress has directed DOD to eliminate overlapping and duplicating functions whenever and wherever possible. This has been particularly true in the area of supply and automatic data processing (ADP).

In the early 1950s, military supply activities began to automate their operations. It was perhaps inevitable that the supply activities' automated systems would result in duplication and some incompatible procedures. The need for interservice support of common supplies and services coincided with the need to develop common computer systems and language.

As a result of the above-mentioned needs, DOD and its components took steps to develop a common language for supply data. In 1960, DOD established the Defense Material Management Project. This project resulted in developing DOD-wide

military standard requisitioning and issue procedures and a uniform material movement and issue priority system. DOD also established a Data Systems Automation Office in DLA with total responsibility for designing and programming systems which operate in a standard manner at all DLA field activities. The Air Force developed the UNIVAC 1050 II standard base supply system under which all major air bases in the United States and overseas operate under a standard system with standard equipment.

Most recently, in October 1978, DOD issued a task order "to establish a program to develop, document, test, implement (export), and maintain a standard warehousing and shipping automated system for distribution depot operation." The task order designates the DLA Mechanization of Warehousing and Shipment Processing (MOWASP) system as the standard warehousing and shipping automated system for distribution depot operations.

PUBLIC LAW 89-306

The Congress, recognizing the need for a Government-wide coordinated management system for the economic and efficient acquisition, utilization, and maintenance of automated data processing equipment (ADPE), enacted Public Law 89-306 in October 1965. The law made the General Services Administration (GSA) responsible for operations, subject to the fiscal and policy controls established by the Office of Management and Budget (OMB). Executive Order 11717, issued in May 1973, transferred ADP policy responsibilities to GSA, except those functions relating to the establishment of Government-wide automatic data processing standards. OMB retained its responsibilities with respect to fiscal control and general oversight.

One important objective of Public Law 89-306 was to achieve economic acquisition of Government ADPE. In order to promote this economic acquisition, with certain exceptions, a Federal agency wanting to acquire general purpose, commercially available ADPE must submit a purchase request to GSA for review. The purchase request must include various types of information, including

--specifications for the ADPE configuration to be acquired;

--estimated value of the procurement;

--unique software, maintenance, and support requirements, if any;

--a statement or other evidence which indicates that a performance evaluation has been made of currently installed ADP systems, when applicable, to ensure that the planned procurement represents the lowest overall cost alternative for meeting the agency's data processing need;

--evidence as to whether site construction or modification will be required;

--a statement that available ADP resources have been screened and that no such resources are available to satisfy the requirement; and

--justifications, if applicable, to support a sole-source procurement or use of a specific make or model of ADPE.

After GSA reviews the adequacy of the agency's procurement request, it will

(1) delegate to the agency authority to conduct the procurement, or

(2) delegate to the agency authority to conduct the procurement, with GSA participating in the procurement to the extent deemed necessary, or

(3) provide for the procurement to be conducted by GSA.

SCOPE AND METHODOLOGY

We interviewed agency officials and reviewed records and documents describing DOD's plans, policies, and procedures and organizational responsibilities for procuring automated materials handling systems. To gain first-hand knowledge of the systems, we selected and visited Army, Navy, Air Force, and DLA installations that had acquired or were acquiring automated materials handling systems.

CHAPTER 2

DOD'S ACQUISITION OF AUTOMATED MATERIALS HANDLING SYSTEMS NOT IN ACCORDANCE WITH GSA'S APPROVAL PROCESS ESTABLISHED UNDER PUBLIC LAW 89-306

The military services and DLA have bought and have plans to buy computers as components of automated materials handling systems for their supply and maintenance depots in a manner which is not in accordance with GSA's approval process established under Public Law 89-306.

DOD DOES NOT CONSIDER COMPUTERS AS ADPE

The services and DLA have not regarded computers used in automated materials handling systems as they would computers used for other purposes. By classifying these computers as "process controllers" and as being "embedded" in the systems, they have attempted to justify procurring the computers without complying with the Public Law 89-306 approval process established for ADPE by GSA.

The Congress and Federal agencies have long recognized the importance of reducing procurement costs and promoting the effective use of ADP resources. As stated in chapter 1, in 1965 the Congress enacted Public Law 89-306 to achieve "* * * the economic and efficient purchase, lease, maintenance, operation, and utilization of automatic data processing equipment by Federal departments and agencies."

The Congress passed this legislation because of problems in the overall management of the Federal ADP program. This law made GSA responsible for the acquisition, use, and maintenance of ADPE. It also granted GSA the authority to delegate procurement authority for ADPE to other Federal agencies when appropriate.

To preclude misapplication of guidelines, policies, and procedures pertaining to Government-wide use of ADP resources, section 1-4.1102-1 of title 41 of the Code of Federal Regulations defines ADPE in the following way:

> ' 'Automatic data processing equipment' (ADPE) means general purpose commercially available, mass-produced automatic data processing components and the equipment systems created from them, regardless of use, size, capacity, or price, that are designed to be applied to the solution or processing of a variety of problems

or applications and are not specifically designed (not configured) for any specific application."

The services and DLA claim that ADPE in automated materials handling systems is not ADPE as defined in the code and, therefore is not subject to the provisions of the Public Law because:

--ADPE functions as process control devices in the materials handling systems.

--ADPE is inherently part of the materials handling system design.

--A materials handling system, not an ADP system, is being procured.

However, DLA has determined that, once the equipment is installed, it will be managed as other ADP systems are, as an ADPE resource.

THE ROLE AND COSTS OF ADPE IN MATERIALS HANDLING SYSTEMS

In automated materials handling systems, the computers used are general purpose computers. According to the manufacturers' literature, the computers are, by themselves, general purpose, commercially available equipment. They are not specifically designed for materials handling systems, and no special or custom designed hardware or software is necessary. The equipment is listed in the GSA schedule 70 as ADPE.

Within the services and DLA, the ADPE related costs for these computer resources range from 11 percent to 45 percent of the total costs of the automated materials handling systems, including related software, hardware, peripherals, terminals, and a central control room. For example, the ADPE related costs for the Navy's Automated Storage, Kitting, and Retrieval System were $5.2 million, or 33 percent of the total contract cost. This amount included the software, central processing unit, control room, terminals, and the startup and test costs. For the DLA Depot Integrated Storage and Retrieval System, the ADPE related costs for software, engineering, central processing unit, control room, maintenance room, uninterruptible power supply, terminals, and software documentation were $3.6 million, or 45 percent of the total contract cost.

OUR LEGAL OPINION

As discussed further in chapters 4 and 5, we believe ADPE used in these systems as process controllers is general purpose, commercially available, and mass-produced ADPE as defined in the Code of Federal Regulations and must be bought in accordance with GSA's approval process established under Public Law 89-306.

As shown in chapter 1, compliance with this approval process would allow GSA to review the adequacy of DOD's procurement plans. GSA would review whether (1) unique software is needed, (2) sole-source procurement is justified, (3) use of a specific make or model of equipment is needed, (4) site construction or modification is needed, and (5) an evaluation has been made to ensure that the procurement represents the lowest overall cost alternative.

CHAPTER 3

SAVINGS REALIZABLE THROUGH STANDARDIZATION OF SYSTEMS' SOFTWARE

DOD is permitting activities to procure automated materials handling systems for their supply distribution depots without adequately exploring the possibility of standardizing the systems' software. Duplication of software is costly not only in terms of initial investment but in continuing costs of maintaining a variety of unique systems.

Savings achievable by standardizing software for automated materials handling systems are considerable. The Navy achieved savings of about $2.5 million by using standard software on the general purpose computers in automated materials handling systems installed or planned at three air rework facilities and its avionics center. This $2.5 million savings was the additional software development costs that would have been incurred had a separate system been developed for each of the four activities.

The Navy has stated it intends to standardize the software to be used on $160 million worth of Navy supply and maintenance systems planned from fiscal year 1979 to fiscal year 1984. This action should result in similar savings of an estimated $11.8 million. If the other DOD components would standardize the software in their planned systems, an additional savings to the Government of several million dollars would be realized.

THE NAVY ACHIEVES SAVINGS BY STANDARDIZING

After receiving procurement requests from several naval bases for some type of automated materials handling system, Naval Air Systems Command officials decided that a standard system with enough versatility for installation differences, such as building configurations, item sizes, and volumes of work, should be developed. As a result, the Navy developed specifications for an Automated Storage, Kitting, and Retrieval System for use at four maintenance activities, with the software being 60 percent standard for each installation. In developing the software, the Navy decided that the majority of the software costs, which constituted 11 percent of the total system costs, would be invested at the

first location where the system was to be installed. Therefore, the cost for software at the other installations would be considerably less since only the flexible portion of the standard software would need to be developed.

By using this approach, the Navy has demonstrated that a standard system can be designed with enough flexibility in the software so that it will work at facilities that do not repair the same type aircraft or engine. For example, the air rework facility at Jacksonville, Florida, repairs P-3 and A-7 aircraft, while the avionics center in Indianapolis, Indiana, does avionics repair and production. These two facilities with dissimilar maintenance functions use standard software for their automated systems.

From fiscal year 1979 to fiscal year 1984, the Navy planned to (1) spend about $160 million for new sophisticated automated materials handling systems and (2) continue procuring and managing these systems centrally to assure that standardization takes place, when and where possible. The Navy plans to install additional Automated Storage, Kitting, and Retrieval Systems at its air rework facilities and a planned Navy Integrated Storage, Tracking, and Retrieval System at various supply centers. Attainment of software cost reductions through standardization of the same proportion experienced on the original four automated systems could result in savings of an estimated $11.8 million.

THE AIR FORCE PROCURES NONSTANDARD SYSTEMS

Unlike the Navy, the Air Force has not developed a standard system which can be used at various locations to achieve savings in software development. Instead, the Air Force has procured separate automated materials handling systems to support operations at three of its five Air Logistics Centers, and each time it has procured or developed the software.

The Air Force installed its first computer controlled materials handling system--the Oklahoma City Air Logistics Center's Warehouse Information Control System--in 1975 at a cost of about $2.14 million. Three years later, in 1978, it installed a similar but improved system at the Warner Robins Air Logistics Center, Georgia, for $6.5 million. This system has the capability of receiving picking instructions randomly from the control computer rather than in batches as is the case in Oklahoma City. Both of these systems use the man-to-material computer controlled vehicle concept.

Also, about this time, the Air Force installed an Automated Storage Module materials handling system at the Ogden Air Logistics Center, Utah, at a cost of about $6.3 million. Unlike the others, this system uses material-to-man computer controlled rail-guided cranes.

The software developed for each of these systems differs. In the opinion of Air Force officials, a standard system could not be developed for its Air Logistics Centers because of different mission requirements, size of items, and building dimensions. Contrary to the Air Force's position, the Navy has demonstrated that not only can these differences be overcome by developing standard systems that use flexible standard software, but that significant savings in software development costs can be realized. Because the Air Force contracted for its three systems on an all-inclusive basis and the software costs were not separately identified, we had to estimate the savings that might have been realized had the Air Force installed standard systems.

Using the relationship of software costs to total costs of the Navy system, 11 percent, we estimate that the Air Force's software costs amounted to $1.6 million. Assuming that the Air Force would have realized the same percentage of savings as the Navy, 67 percent, by using a standard system with flexible but standard software, it could have saved about $1.07 million.

The Air Force was considering spending about $26.7 million for modifications to its system at Warner Robins and for new and more sophisticated automated materials handling systems at its San Antonio and Sacramento Air Logistics Centers from fiscal year 1979 to fiscal year 1981. By adopting standard systems with flexible but standard software, we estimate the Air Force could save up to $2 million on these systems.

DLA PLANS TO USE STANDARDIZED SYSTEMS

DLA spent $8.1 million for an automated materials handling system at its Richmond Supply Center and planned to spend an additional $34.7 million from fiscal year 1979 to fiscal year 1982. The software cost for the Richmond installation was $1.4 million. By procuring and installing a standard system with standard but flexible software, DLA will be able to use this software at follow-on locations and avoid the cost of redeveloping the software for each location.

In developing the Depot Integrated Storage and Retrieval System at Richmond, DLA examined the specifications used for the Air Force's Warner Robins Warehouse Information Control System and incorporated some of these specifications into its system. However, the knowledge gained from this examination and the similarities in the two systems did not preclude total development of new software specifications for the DLA system.

DLA officials said that they were planning to use the software developed for the Richmond system at the Columbus, Memphis, Ogden, and Tracy depots. According to the officials, the software will be furnished to the successful bidder of the follow-on systems as Government furnished material.

THE ARMY'S SYSTEMS

To date the Army has not installed automated materials handling systems similar to those in the Air Force, Navy, and DLA. It did, however, in the early 1970s, install automated systems at several Army depots. One of the systems, in operation at Tobyhanna, Pennsylvania, is an automatic rail-guided crane storage and retrieval system which brings the material to the man.

From fiscal year 1979 to fiscal year 1984, the Army planned to acquire automated materials handling systems for four supply depots. Although the Army has not yet identified the costs for these systems, the potential for savings exists if the Army adopts the Navy's and DLA's methodology and develops a standard system with standard but flexible software.

DOD OVERSIGHT NEEDED TO MANAGE AND STANDARDIZE SYSTEMS AND TO CONTROL COSTS

The Office of the Secretary of Defense has permitted procurements without regard to standardization among the services, within the services, or without fully examining the possibility of adopting a standard system.

As far back as 1947, in establishing the Commission on Organization of the Executive Branch of the Government (known as the Hoover Commission), the Congress declared its policy to promote economy, efficiency, and improved service by eliminating duplication and overlapping of services, activities, and functions. Subsequently in 1958, the Congress mandated that the Secretary of Defense eliminate duplication in DOD logistics operations. Since that time, the Secretary has issued policy statements, set up joint service committees, and taken various other actions to further this objective.

Most recently, on October 30, 1978, the Secretary issued a task order "to establish a program to develop, document, test, implement (export), and maintain a standard warehousing and shipping automated system for distribution depot operation."

The task order states that the MOWASP system shall become the standard warehousing and shipping automated system for distribution depot operations. This system will automate certain functions that take place in the depot, such as recording receipts, assigning storage locations, and selecting material for issue, but will not control materials handling equipment.

Also, the task order states that:

--DOD components shall move aggressively toward standardization.

--Unique applications shall be held to a minimum.

--DLA, as the executive manager, shall develop procedures for documentation and systems approval.

--Candidate systems for incorporation into the standard system shall be forwarded to the executive manager.

--Changes to exported systems shall be timely and responsible.

--Projects costing in excess of $50,000 cumulative for each DOD component per fiscal year must be approved by the Assistant Secretary of Defense (Manpower, Reserve Affairs and Logistics).

--Design and development of the automated system shall not commence until the functional system has been fully defined.

Although at most installations automated materials handling systems interface with systems that will be replaced or modified by MOWASP, the task order does not specifically address standardization and management of the materials handling systems. We were informed by an official of the Office of the Secretary of Defense that these systems are considered subsystems of MOWASP.

CHAPTER 4

CONCLUSIONS AND RECOMMENDATIONS

DOD was purchasing or planning to purchase over $221 million in automated materials handling systems for its supply and maintenance depots through fiscal year 1984. Currently, the computers used in these systems as process controllers are general purpose, commercially available equipment. DOD agrees that when such computers are procured separately they are subject to the procurement procedures prescribed in Public Law 89-306. However, it has taken the position that since the general purpose computers are an integral part of and embedded in the automated materials handling systems and the systems are procured as complete systems, they are not subject to GSA's approval process established under Public Law 89-306.

Our review of Public Law 89-306, its legislative history, and GSA's implementing regulations, reveal that the DOD position is in error. Such general purpose computers, even when they are components of and function as process controllers in systems, such as those discussed in this report, are subject to the GSA approval process.

The Congress and the Secretary of Defense have repeatedly urged DOD to avoid or to eliminate duplicating its logistics operations. Most recently, for example, the Secretary has issued a formal task order requiring the military services and DLA to develop, install, and maintain a standard warehousing and shipping automated system for their distribution depots. Despite this task order, DOD is permitting activities to buy costly automated materials handling systems for these depots without adequately exploring the possible cost benefits of standardizing the systems' software.

Savings achievable through software standardization for automated materials handling systems are considerable. The Navy has achieved savings of $2.5 million and its current plans should result in further savings of $11.8 million through such standardization. Additional savings of several million dollars could be realized if other DOD components would standardize the software in their planned systems.

RECOMMENDATIONS

Accordingly, we recommend that the Secretary of Defense:

--Instruct DOD activities that general purpose computers acquired as integral components of automated materials handling systems must be procured in accordance with GSA's approval process established under Public Law 89-306.

--Modify the October 1978 task order to specifically include automated materials handling systems at supply distribution depots as part of the DOD standard warehousing and shipping automated system, or require that all such systems not under contract be submitted to one central DOD focal point for review and approval to assure that maximum standardization of the systems' software is achieved.

CHAPTER 5

AGENCY COMMENTS AND OUR EVALUATION

We provided GSA, the Office of the Secretary of Defense, the Army, Navy, Air Force, and DLA with copies of a draft of this report. The Administrator of General Services provided us GSA's comments to the draft report on December 3, 1979, and the Principal Deputy Assistant Secretary of Defense (Manpower, Reserve Affairs and Logistics) provided DOD's formal comments on January 2, 1980.

GSA COMMENTS

GSA agreed that computers used in automated materials handling systems are general purpose computers and therefore subject to the provisions of Public Law 89-306. Also, it agreed that DOD could obtain significant cost savings by standardizing software. GSA strongly supports our recommendations that whenever DOD acquires systems containing or having as integral components general purpose computers, these computers must be procured in accordance with GSA's approval process established under Public Law 89-306.

DOD COMMENTS

DOD officials disagreed with our findings and recommendations. They had reservations concerning (1) the applicability of Public Law 89-306 to the acquisition of automated materials handling systems, (2) our estimate that the ADPE costs represent 30 to 40 percent of the automated materials handling systems cost, (3) the degree to which application software standardization is feasible and practical, and (4) the oversight and management responsibility for automated materials handling systems as part of the DOD Standard Warehousing and Shipping Automated System. 1/

Applicability of Public Law 89-306 approval process to the acquisition of automated materials handling systems

In its formal comments, DOD did not address our legal determination that the approval process established by GSA under Public Law 89-306 must be complied with in buying general purpose, commercially available process control computers as components of automated materials handling systems.

1/DOD has redesignated MOWASP as the DOD Standard Warehousing and Shipping Automated System. This report will use the term MOWASP throughout to avoid confusion.

Also, it did not concur with our recommendation that the Secretary of Defense issue instructions that procurement of this type of system must be in accordance with this approval process.

DOD believes that when procuring ADPE resources, Public Law 89-306 should be followed, but that to do so in the case of automated materials handling systems would not be prudent or cost effective because it would require a separate procurement of ADPE. Isolating ADPE technology from the other technologies integral to automated materials handling systems, would, according to DOD officials, result in a longer development leadtime, higher design and integration costs, and a less functionally responsive system. They also indicated that more contracting people would be needed to handle the additional procurement requirements. They were, however, unable to furnish any studies or analyses to support their position.

We believe that the acquisition of these process control computers is subject to GSA's approval process established under Public Law 89-306. This opinion is based on a legal analysis which concludes that:

--Public Law 89-306 applies to general purpose, commercially available, and mass-produced ADPE. ADPE ordinarily subject to Public Law 89-306 when procured separately is not outside the scope of the law solely because an agency acquires it along with or as part of non-ADP components or systems.

--GSA's present regulations, Federal Procurement Regulations 1-4.1101 and the Federal Property Management Regulations 101-36.101-1, are sufficiently broad that GSA has jurisdiction over the procurement of ADPE which is supplied to the Government as part of an automated materials handling system.

--The intent of Public Law 89-306 would be violated if GSA does not require Federal agencies to obtain a delegation of procurement authority simply because a Government contractor acquires ADPE and delivers it to the Government as part of an end item.

Therefore, ADPE used in automated materials handling systems must currently be bought in accordance with GSA's approval process established under Public Law 89-306. As pointed out earlier, GSA agrees with this position. If DOD officials can document their claim that compliance with this approval process will result in unacceptably lenghty development leadtimes, high costs, or less responsive systems, they should present such documentation to GSA and request exemption from or modification to the approval process.

Percentage of ADPE in automated materials handling systems

DOD officials said that we had overstated the percentage of ADPE costs in automated materials handling systems. They believed 2 to 23 percent was a more reasonable figure than the 30 to 40 percent stated in the draft report. However, in computing these percentages, they included only equipment in the ADPE costs. In their opinion, environmental facilities (i.e., process controller enclosures, uninterruptable power supply for the ADP system, and air-conditioning) and software for these systems cannot be used as Government furnished equipment at other sites.

This objection has no real bearing on our findings. We have already demonstrated that GSA has jurisdiction over the procurement of ADPE which is supplied to the Government as part of an automated materials handling system. This jurisdiction stems from the fact that such ADPE is general purpose, commercially available equipment.

We are not arguing, or even implying, that the percentage of ADPE related costs included in the total system cost has any bearing on GSA's procurement jurisdiction under the present regulations. However, since GSA's evaluation of the planned DOD procurements, as stated in chapter 1, should include considerations such as whether unique software is needed, whether the lowest overall cost alternative has been selected, and whether site modification is required, we believe it meaningful to show the percentage of total costs that are directly related to systems being automated.

However, GSA could choose to consider the amount of ADPE in a system by revising its regulations to allow agencies to procure automated systems in which ADPE is a minimal component without obtaining prior GSA approval.

Using additional information DOD officials provided, we revised our estimate of ADPE related costs for the systems discussed in this report from the earlier 30 to 40 percent to from 11 to 45 percent. But, to avoid any possible misinterpretation, we are including DOD's suggested figures in appendix I.

Degree to which application software standardization is feasible and practical

DOD officials agreed that it is generally accepted that standardization of application software used for processing

data is desirable. They recognized that by using already developed application software, project managers can often reduce costs and implement applications significantly earlier; therefore, utilization of standard software is preferable to developing unique software. However, they also took the position that the benefits of using standard software must be weighed against compromising operational requirements and effective mission accomplishment. They asserted that the degree to which standardization can be achieved in automated materials handling systems is limited by the unique characteristics of the buildings, the type of items stocked, and workload volume. However, they were unable to provide data or studies to support this position.

We agree that the degree to which software can be standardized might vary under differing circumstances. However, as the Navy demonstrated, a standard software system with enough versatility for installation differences, such as building configurations, item size, and volume of work, can be developed with significant resultant savings.

Oversight responsibilities for automated materials handling systems

DOD did not concur with the recommendation in our draft report that automated materials handling systems should be managed as a part of the standard warehousing and shipping automated system. DOD officials stated that to expand the objectives of the MOWASP system to incorporate approval, acquisition, and management of automated materials handling systems would greatly complicate the project, increase the developmental risks, and lengthen the time frame for achieving benefits. They were, however, unable to furnish data to support their position.

However, as an attempt to ensure a flexible standard interface between MOWASP and automated materials handling systems, the Office of the Secretary of Defense provided supplemental guidance to the services and DLA in October 1979. This guidance stated that automated materials handling systems, such as those discussed in this report, should be submitted to a central DOD group for review during their initiation, before contractual obligation. According to this guidance, such a review is considered critical to avoid incompatibilities and counterproductive efforts between MOWASP development and automated materials handling systems projects.

We agree that compatibility between MOWASP and automated materials handling systems is needed. However, compatibility is not enough to assure standardization of the software in the automated materials handling systems. A flexible standard interface between MOWASP and automated materials handling system means that the output from one system, in the form of data on cards, tape, or other means, can be input to the other system. In other words, the systems will be compatible. It does not ensure, as is directed by the task order for MOWASP, that the systems' software will be standardized throughout DOD and that unique applications will be held to a minimum. Including automated materials handling systems in MOWASP, thereby making them subject to the review and approval process described in the task order, would be one way of achieving the desired standardization.

However, in view of DOD's claim that expanding MOWASP to include the automated materials handling systems would complicate and otherwise impede the development of MOWASP, we have modified our recommendation concerning this matter. We are now recommending that, if MOWASP is not expanded, DOD should require that automated materials handling systems not under contract be submitted to one central DOD focal point which would have the responsibility of assuring that maximum standardization of the systems' software is achieved before they are approved for procurement.

ADPE RELATED COSTS OF AUTOMATED MATERIALS HANDLING SYSTEMS DISCUSSED IN THIS REPORT

The following schedule shows the amount and portion of total systems costs attributable to ADPE, for the various automated materials handling systems discussed in this report, in the opinion of DOD and GAO. The DOD ADPE related costs represent only equipment which, by itself, would be considered ADPE. Our ADPE related costs cover not only the equipment included in the DOD figures, but also all other items which are clearly related to the automated nature of the materials handling systems, such as software, process controller enclosures, uninterruptible power supplies, software documentation, engineering, and startup and test costs.

Navy	DOD	GAO
Automated Storage, Kitting, and Retrieval System:		
Total costs	$16,000,000	$16,000,000
ADPE related costs:		
Amount	$ 1,364,000	$ 5,282,000
Percent of total	8.5	33.0
Air Force		
Automated Storage Module:		
Total costs	$ 6,200,000	$ 6,200,000
ADPE related costs:		
Amount	$ 120,000	$ 717,000
Percent of total	1.9	11.5
Warehouse Information Control System:		
Total costs	$ 6,500,000	$ 6,500,000
ADPE related costs:		
Amount	$ 1,003,000	(a)
Percent of total	15.4	(a)

a/Contract documents did not provide a breakdown of total system costs; therefore, amount and percent of ADPE related costs were not determinable.

APPENDIX I

DLA	DOD	GAO
Depot Integrated Storage and Retrieval System:		
Total costs	$ 8,088,000	$ 8,088,000
ADPE related costs:		
Amount	$ 1,891,000	$ 3,656,000
Percent of total	23.4	45.2

APPENDIX II

General
Services
Administration Washington, DC 20405

Dec 3 1979

Honorable Elmer B. Staats
Comptroller General of
the United States
General Accounting Office
Washington, DC 20548

Dear Mr. Staats:

We have reviewed the draft report concerning improvements needed in the procurement and management of Department of Defense (DOD) automated materials handling systems. We agree with the findings of the General Accounting Office (GAO) that the computers used in the systems are general purpose type computers and therefore subject to the provisions of P.L. 89-306. We also agree that DOD could obtain significant cost savings by standardizing software. We strongly support GAO's recommendation that whenever DOD acquires systems containing or having as integral components ADPE resources as defined in the Code of Federal Regulations (CFR), those resources must be procured in accordance with the provisions of P.L. 89-306 and the General Services Administration's implementing regulations.

Thank you for the opportunity to comment on the above draft report. If we can be of any further assistance in this matter, please let me know.

Sincerely,

[illegible] III
Administrator

MANPOWER, RESERVE AFFAIRS AND LOGISTICS

ASSISTANT SECRETARY OF DEFENSE
WASHINGTON, D. C. 20301

2 Jan 1980

Mr. R. W. Gutmann
Director
Logistics and Communications Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Gutmann:

This is in reply to your letter to the Secretary of Defense regarding your draft report dated October 10, 1979, on improvements needed in DoD's acquisition and management of automated materials handling systems, OSD Case #5300, assignment code 943054.

In the draft report you conclude that the Department of Defense should do more to insure maximum standardization of automated materials handling systems (AMHS) employed in both distribution and maintenance depots. You recommend that the Department acquire automated data processing equipment (ADPE) that is an integral part of AMHS in accordance with P.L. 89-306 (the Brooks Bill), modify the DoD Standard Warehousing and Shipping Automated System (DWASP) task order to include AMHS, give the DWASP Executive Manager responsibility for management of AMHS, and require that all future AMHS proposals be submitted to the DWASP Executive Committee for review.

We concur that there should be standardization in applications software for AMHS to the extent that existing software can be economically interfaced with innovative hardware improvements acquired through performance oriented contracts. The degree to which standardization can be achieved in AMHS is limited by the unique characteristics of physical plants, the type of items stocked, and workload volume. DoD has already established procedures to ensure a flexible standard applications software interface between the DWASP Automated Information System (AIS) and current and future AMHS implemented at DWASP activities. By memorandum of October 4, 1979, the Services and DLA were directed to submit all AMHS projects to the DWASP Focal Point Group for review prior to contractual obligation. The purpose of this review is to avoid incompatibilities which would inhibit standardization of automated warehousing and shipping process control systems.

We do not concur in the draft report recommendation that process control computers embedded in AMHS be procured in accordance with PL 89-306, the Brooks Bill. In order to take advantage of the benefits associated with

APPENDIX III

AMHS technology, DoD has acquired operationally oriented AMHS through the use of performance contracts which permit the vendor to utilize various technologies, integrated into a single system which meets required functional performance standards. AMHS are designed and manufactured as engineered entities. The separate acquisition of process control devices which are integral to these systems would not be practical or cost effective. Isolating the acquisition of electronic logic circuity and control software would result in longer development lead time, higher design and integration costs, and a less functionally responsive system. With regard to the percentage of AMHS costs which is attributable to ADPE, an analysis of the Air Force, Navy and DLA systems indicates a range of 2% - 23% for ADPE costs rather than the 30% - 40% cited in the draft report.

While we agree that increased standardization of AMHS is desirable, we do not concur that these systems should be managed as a part of the DWASP program as recommended in the draft report. The purpose of the DWASP task is to develop, document, test, implement and maintain a standard warehousing and shipping automated system for storage depot operations that can be employed in all major DoD storage facilities. It is a process control system which supports the functions of receipt, storage and issue of wholesale stocks. It interfaces with, but does not include, AMHS. To expand the objectives of DWASP to incorporate approval, acquisition and management of AMHS used in distribution and maintenance depots would greatly complicate the project and thus increase the developmental risks and lengthen the time frame for achieving the benefits. Through the supplemental guidance provided to the Services and DLA by our memorandum of October 4, 1979, we have attempted to insure a flexible standard interface between DWASP and AMHS. Standardization of AMHS applications software can best be achieved through appropriate policy guidance and increased emphasis and oversight by this office.

Sincerely,

Richard Danzig

Richard Danzig
Principal Deputy Assistant
Secretary of Defense (MRA&L)

(943054)

AN EQUAL OPPORTUNITY EMPLOYER

UNITED STATES
GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE,$300

POSTAGE AND FEES PAID
U. S. GENERAL ACCOUNTING OFFICE

THIRD CLASS