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LM107057

REPORT BY THE  
**Comptroller General**  
OF THE UNITED STATES

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**The Navy's Advanced Information System--A Personnel Management Information System For The 1980-1990s**

The House Government Operations Committee requested that GAO conduct a comprehensive review of the Navy's Advanced Information System to see if it had been properly planned and studied, and whether mistakes made in similar projects in the past have been avoided.

GAO reviewed procedures for planning, approving, and managing the proposed acquisition of computer equipment and related development activities, and compared Navy management practices with Government-wide guidance for managing, acquiring, and using computer systems.

If this system is to meet its objectives of more effectively controlling civilian, military, active, and reserve personnel; basic deficiencies in the management approach; acquisition of computer equipment; and the design selection for the field reporting system must be corrected.

System officials have agreed to resolve these problems.

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LCD-78-122  
SEPTEMBER 18, 1978



COMPTROLLER GENERAL OF THE UNITED STATES  
WASHINGTON, D.C. 20548

B-146864

The Honorable Jack Brooks, Chairman  
Committee on Government Operations  
House of Representatives

Dear Mr. Chairman:

On July 12, 1977, you requested that we review the Navy's Advanced Information System to determine if it had been properly planned and studied and whether mistakes made by similar projects in the past have been avoided. Because of time constraints you also requested that we conduct our review in two phases and report at the end of each phase.

This report covers the second phase of our review. The first, regarding the proposed interim upgrading of the New Orleans, Louisiana, computer facility was issued November 21, 1977 (LCD-78-103).

As requested by your office, we did not take the additional time needed to obtain written agency comments. The matters covered in the report, however, were discussed with System officials and their comments are incorporated where appropriate.

During this review we have worked closely with your office. Their advice and assistance were most helpful in analyzing this computer system development effort.

As arranged with your office, we are sending a copy of this report to the Secretary of Defense. We plan no further distribution until 30 days from the date of the report. At that time, we will send copies to interested parties and make copies available to others upon request.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "James A. Stacks".

Comptroller General  
of the United States

COMPTROLLER GENERAL'S REPORT  
TO THE HOUSE COMMITTEE ON  
GOVERNMENT OPERATIONS

THE NAVY'S ADVANCED INFORMATION  
SYSTEM--A PERSONNEL MANAGEMENT  
INFORMATION SYSTEM FOR THE  
1980-1990s

D I G E S T

The Advanced Information System was conceived by the Navy to effectively and efficiently manage its total force--civilian, military, active, and reserve personnel.

If this System is to meet its objectives, basic deficiencies regarding the management approach, the acquisition of computer equipment, and the design selected for the field reporting system must be corrected.

The Navy has developed broad objectives for managing its total force and a personnel resource plan but, there is no formal and clearly defined set of relationships established among its (1) mission and objectives, (2) policies, regulations, and directives, (3) programs and activities, and (4) System program management, System development, and System user needs. (See pp. 5 and 6.)

The result is fragmented management and planning for the System with limited user involvement. (See pp. 6 to 8.)

GAO found limited coordination mechanisms within the System for effective managerial control, such as a tracking system to measure actual versus projected performance. (See pp. 8 and 9.) No risk assessment was found to determine the degree of security control required versus the nature of the threat. (See pp. 10 and 11.)

To increase its chances for success the Secretary of the Navy should

LCD-78-122

- accelerate the translation of the personnel plan objectives into management requirements so that the System may be designed to address these objectives,
- more extensively involve users in the planning effort,
- designate a civilian as project manager of the System to improve managerial continuity,
- develop a more extensive mechanism to track actual System development results against anticipated performance,
- increase coordination of other manpower and personnel system development efforts with the System, and
- analyze the security risk associated with the operation of the System being designed. (See pp. 11 and 12.)

System officials agree with these findings and will, with the exception of "coordination of other development efforts," initiate corrective actions on each. The System management's purview regarding development effort is limited to activities under the control of the Deputy Chief of Naval Operations-Manpower. He said that within this organization, all development will be coordinated by the System project office and that coordination of development efforts outside this organization, such as efforts by one of the fleet commands, must be directed by higher authority.

The original objective for the System's proposed computer system procurement was questionable because of the Navy's computer capacity, workload projections, and the possibility of a joint procurement with the Navy Finance Center. When the computer system procurement is restructured to adequately reflect the Navy's needs, GAO believes that an improved set

of specifications could increase the competition for the System.

GAO's review of the justification for the efforts to competitively obtain a computer system to accommodate the System into the 1980s disclosed that:

- The Navy's position that additional computer equipment will be required to support the System is valid. (See pp. 13 and 14.)
- Until recently, the Navy was proceeding with an independent procurement without considering the economic and operational benefits that could accrue from a joint procurement with a similar activity. (See pp. 14 and 15.)
- The current version of the System's specifications are unnecessarily restrictive in nature and could reduce competition. (See pp. 16 and 17.)
- The computer workload estimates contained in the System's specifications did not accurately reflect the anticipated workload requirements and could result in the acquisition of more computer equipment than needed. (See p. 17.)
- The useful life of the software system may be extended by using a contracting method which features preplanned, phased upgrades of the computer equipment. GAO is suggesting this contracting method rather than the usual procurement practice which tends to limit the software system's life to about 8 years (the usual hardware amortization). This alternative extends the equipment's useful life to match that of the software system. This approach should allow

the Navy to optimize its investment while fostering competition. (See pp. 17 to 21.)

For an effective formal long-range computer system plan, GAO believes that more detailed direction and control are necessary. The Secretary of the Navy should:

- Conduct a well documented study of the advantages and disadvantages of a joint procurement and collocation with the Navy Finance Center.
- Revise the System specifications to present the correct workload estimates and to eliminate mandatory requirements which will restrict free and open competition.
- Incorporate the revised System specifications into a phased procurement approach for computer system acquisition. (See pp. 21 and 22.)

System officials agreed with the matters and are working toward their resolution.

The current source data system has been unable to provide timely and accurate source data to the central pay and personnel data bases.

GAO found

- all alternatives considered were more sophisticated than necessary to address the basic problem--untimely and erroneous source data; however, the incremental benefits and costs attributable to the added degree of sophistication had not been adequately analyzed (see pp. 24 to 26);
- the degree of automated support required under the selected alternative for each of the field locations and how that support could be best provided had not been fully evaluated (see pp. 26 and 27); and

--a significant amount of the savings attributable to the new System were overstated; however, GAO was unable to thoroughly analyze the proposals because of lacking support documentation. (See pp. 27 and 28.)

The analysis made to date provides little assurance that the proposed System offers either the most effective or efficient approach to correcting the source data problems.

The Secretary of the Navy should make an acceptable cost-benefit analysis which will include

--evaluation of the most practical alternatives to the source data problem, not just the most sophisticated;

--consideration of user needs for each alternative evaluated; and

--productivity measures to assist in quantifying the results. (See p. 29.)

System officials acknowledged that these were valid considerations. Accordingly, they have agreed to prepare a fully documented economic analysis, based on a detailed user-need study which

--shows the cost and benefits of the minimum system needed to solve the source data problem,

--presents alternatives showing incremental costs and benefits accruing to each major system capability, and

--thoroughly evaluates the opportunities for using Navy's existing automated resources.

As requested by the House Committee on Government Operations, additional time was not taken to obtain written agency comments. The matters covered in the report, however, were discussed with System officials and their comments were considered in the preparation of this report.

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ABBREVIATIONS

AIS	Advanced Information System
GAO	General Accounting Office
MANTRAPERS plan	Manpower, Training, and Personnel plan
NAVDAC	Naval Data Automation Command
PASS	Pay and Personnel Administrative Support System
SDS	Source Data System

## CHAPTER 1

### INTRODUCTION

The Department of the Navy organizes, trains, equips, prepares, and maintains the readiness of Naval forces for the performance of military missions as directed by the National Command Authorities--the President and the Secretary of Defense. The proper management of personnel resources is an essential element in accomplishing this mission. However, in recent years, the Navy's management of these resources has been too decentralized to be effective or efficient. To improve the management of these essential resources, the Department of the Navy plans to centralize the management of its personnel resources under a "Total Force Management" concept.

#### THE "TOTAL FORCE MANAGEMENT" CONCEPT

The "Total Force Management" concept is intended to help the centralized management of all Navy personnel resources from recruitment to retirement. This concept requires concurrent consideration of all elements of manpower and personnel--active, reserve, civilian, and contractor--to determine the optimum composition of the force needed to accomplish the Navy's mission. Congressional committees, the Defense Manpower Commission, and the Navy, have expressed a need for improving and centralizing the management of these resources. For example, in S. Rept. 94-878 (May 14, 1976), the Senate Armed Services Committee stated:

"\* \* \* Navy manpower and personnel management appears to be fragmented \* \* \* Different offices are responsible for planning, developing requirements, training, and managing the allocation and assignment of military, civilian, and reserve manpower. The result is a piecemeal approach to manpower issues."

The Defense Manpower Commission and the Navy-sponsored studies also expressed similar criticisms. The problem of fragmented personnel resource management has been substantially worsened by erroneous and untimely data in the Navy's 15 independent computer-based manpower and personnel information systems. For example,

--about 40 percent of the unit diaries, the basic personnel reporting document, contained errors;

--about 16 percent of the various personnel reporting documents arrived at their destination more than 2 months after preparation; and

--reported obligations against Navy's military pay appropriation were estimated to vary as much as \$6.2 million from the actual amounts.

The Manpower, Training, and Personnel (MANTRAPERS) plan was developed by the Deputy Chief of Naval Operations-Manpower to help resolve these issues and to help expedite the move toward "Total Force" management. This plan specifies the broad management objectives for such functions as recruitment, personnel distribution, and personnel requirements. An essential component of the plan is the development of a computer-based information system referred to as the Advanced Information System (AIS).

#### AIS

AIS is intended to support the "Total Force Management" concept by

--providing accurate, timely, and appropriate information to organizations responsible for managing personnel resources;

--achieving the most effective use of scarce computer system resources through the central control of resource allocation; and

--providing a worldwide reporting and flow-back capability to electronically interconnect all activities where manpower and personnel actions occur.

AIS is envisioned as a system which features central computers working in unison with other computing devices located at major Navy installations around the world. This concept features a master data base maintained by the central computers with data base segments applicable to each installation replicated locally. The major modules of this system are the:

--Central System--intended to provide the basic computing power, the data base facilities, generalized software capabilities, and the communication capabilities for AIS.

--Major Network System--the telecommunication link which will make the central computer operations relatively independent from the number and types of users, and the services provided.

--Source Data System--intended to gather source data from a multitude of locations for processing by the central system and support the field activities personnel information needs.

The development and computer equipment acquisition costs for this undertaking are estimated at over \$130 million.

#### Tasks under AIS

AIS has undertaken several operational and developmental task-oriented systems. The operational systems primarily cover the military side of the Navy, while systems in the offing provide for the civilian community. AIS management further envisions adding new systems as manpower and personnel information needs develop. The following are examples of systems identified to become part of AIS.

--Future Manpower and Personnel Management Information System--primarily the personnel accounting system.

--Navy Manpower Planning System--the system that will pull together and upgrade Navy's diffused manpower planning systems.

--Personalized Recruiting for Immediate and Delayed Enlistments--the recruiting management information system which handles Navy recruiting data.

#### AIS STATUS

AIS should be largely operational by late 1983, with the aid of private and Government system consultants, as well as Air Force personnel who were heavily involved in the development of the Air Force personnel system. By the end of fiscal year 1978, an estimated \$26 million will have been expended for the AIS development. Major undertakings to date include work toward

--combining computer center operations in Washington, D.C., by October 1978,

- a development effort to prototype the Source Data System (SDS),
- the preparation of computer workload requirements and system specifications for a request for proposals to competitively acquire the host computer system, and
- the development of selected application subsystems.

## CHAPTER 2

### FUNDAMENTAL ACTIONS NEEDED

#### TO INCREASE CHANCES FOR SUCCESS

The Navy's current manpower and personnel systems do not effectively support "Total Force" management. A comprehensive information system capable of supporting the MANTRAPERS plan objectives by providing timely, accurate, and appropriate information to the Navy manpower and personnel community is needed. The AIS development effort was evaluated to determine whether it will effectively satisfy this need.

#### NEED TO DEFINE MANAGEMENT REQUIREMENTS

AIS is to support those objectives outlined in the MANTRAPERS plan; however, we found that only limited progress has been made in translating these objectives into specific tasks. Consequently, the AIS planning and development effort is proceeding without the benefit of a clear definition for establishing computer system requirements.

The MANTRAPERS plan specifies the objectives for the management and administration of the Navy "Total Force." These objectives are stated in very general terms. Following are typical objectives of the plan:

- To develop a manpower data system responsive to management needs, including accurate and timely data, which uses standardized coding within the system and provides accurate and responsive audit of data changes.
- To analyze present "Total Force" requirements and identify possible improvements through interchanging.
- To centrally control and coordinate the various programs and objectives in support of the management of human resources.

We found, however, that little emphasis was being placed on the development of specific management requirements.

The project office is employing a management consultant to analyze its management system requirements. However,

this analysis may not be based on the MANTRAPERS plan requirements. Furthermore, a representative of this firm stated that, to date, the identification of functional management requirements has not proceeded to the point where computer system needs can be reliably established.

The Deputy Chief of Naval Operations-Manpower agreed with our observation that it is best to identify specific management requirements before proceeding with detailed computer system planning; however, he stated that such a "series approach" would significantly extend the estimated 7-year development cycle of AIS. Navy is under both internal and external pressure to revamp its manpower and personnel systems. This notwithstanding, the Deputy agreed to accelerate the translation of the MANTRAPERS plan into specific management requirements.

We recognize the Navy's concern regarding timely overhaul of its manpower and personnel systems, and believe that it is critical to clearly define the management requirements before investing significantly in supporting computer systems. We are concerned therefore, that identification of the management requirements of the System will not be given emphasis before computer system planning and development.

#### NEED FOR MORE EXTENSIVE USER PARTICIPATION IN PLANNING

AIS' success depends on its users total commitment. Such commitment may be assured by involving the ultimate users in the System planning effort. Although AIS users have been somewhat involved in the planning effort, there is no formal user group to adequately represent all user needs. We found that some major users are unfamiliar with AIS and/or uncertain as to whether it will meet their needs. This has resulted in their development of systems which may partially duplicate AIS' planned functions.

#### Efforts to involve users

Navy has taken a "top-down" approach in involving users to assure top level commitment to the endeavor. AIS officials consider users to be those headquarter-level commands which have control over or represent other commands and organizations which use the data. For example, documents list the Chief of Naval Personnel and the Navy

Comptroller's Office as the users of SDS, when in reality, this system will serve all users of pay and personnel data, including all major field activities. To date, user involvement has been achieved primarily by having headquarters officials represent the users at various AIS meetings and symposia. A major user official perceived the approach to user involvement in planning for AIS as "we know your functions; therefore, we know your needs."

AIS management is encouraging involvement of field organizations in the SDS project by providing them with limited interim computer systems capabilities currently afforded headquarters organizations. The officials believe that by involving users in this manner, they will begin to express their needs in terms of requests for more and/or varied computer system capabilities.

#### Lack of user confidence

Several organizations which will rely on AIS for data were continuing the development of their own personnel information systems because they were uncertain whether AIS would fill their needs. AIS officials attributed this lack of user confidence to a lack of familiarity with the benefits which AIS should provide, misgivings, resulting from headquarters' earlier performance and doubts that sufficient resources will be made available for this effort.

The Naval Education and Training Command is developing a personnel system to meet its management requirements. An official of this organization stated that they fully support the AIS effort, particularly SDS, the system module which they will rely on most. However, they are uncertain whether SDS will meet their requirements. Therefore, they plan to continue with their development effort until they are convinced that SDS will meet their needs.

Similarly, at the time of our review, the Naval Bureau of Medicine was developing its own personnel system. The official in charge of this system was aware of AIS and recalled being approached once regarding the Bureau's AIS support needs. However, he told us this development was continuing because AIS did not appear to serve the Bureau's needs, particularly in regard to lengthy records storage and specialized reporting.

We agree with efforts to obtain top level commitment to the AIS effort. We also agree with plans to promote

user interest in the development effort by providing these users with early, if limited, computer system support. However, we do not believe that these efforts can replace a formal user group.

#### STEPS BEING TAKEN TO ASSURE AIS TOP MANAGEMENT CONTINUITY

Because of the short term of the normal military tour of duty, a civilian rather than a military top manager for AIS is needed to provide the managerial continuity required in a multiyear development effort of this magnitude. Since 1974, the position of Assistant Chief of Naval Personnel for Financial Management and Management Information has been in charge of AIS and its forerunner systems. Three Admirals have served in that position since then, and the incumbent is expected to be transferred during 1979.

We believe that AIS, with its anticipated 7-year development cycle, needs more continuity in its top management, which a civilian rather than a military top manager could provide. Both the Deputy Assistant Secretary-Manpower and the Admiral now serving as project manager agree that the top AIS official should be a civilian. We were told that steps are being taken to establish such a civilian position.

#### NEED TO DEVELOP AN EFFECTIVE TRACKING MECHANISM

AIS management has not yet developed an effective mechanism for monitoring and evaluating development progress and system performance against anticipated costs, schedules, and performance. This limits their ability to respond quickly to inquiries about the System and can jeopardize effective management of the development effort.

Such tracking is now accomplished by the various organizations having immediate authority over AIS subsystems. This is consistent with Navy's practice of accounting by activities (units), rather than individual projects which may cut across organizational lines.

Tracking data is also discussed, to some degree, in weekly meetings of AIS management. In addition, routine updates to computer system plans require the reassessment of costs, benefits, and progress. However, the absence of an effective tracking system makes it difficult to respond to inquiries about the System costs.

An inquiry about the AIS cost to date, and anticipated total cost of subsystems, required a response time of nearly 3 months. AIS management attributed this delayed response to competing problems and the difficulties in obtaining consistent data from external organizations which control certain subsystems.

A statement of AIS policies will require that AIS category managers track all projects and resources. However, it provides no specific guidance on how to do so, and it does not address the tracking of benefits resulting from the System.

A centrally administered tracking system would provide greater assurance that the AIS policy and operational decisions are based on the best possible information. We have previously reported that care should be taken to include all relevant costs for computer systems development and operation (FGMSD-78-14, Feb. 7, 1978).

#### NEED FOR GREATER COORDINATION OF RELATED SYSTEMS

Although AIS is intended to be the "Total Force" automated system, no controls have been established to preclude the development of duplicative systems. (The development of several other manpower and personnel systems was underway at the time of our review (see p. 7).

AIS documents indicate that AIS would serve the civilian personnel community. However, until November 1977, the Office of Civilian Personnel was independently planning and developing its own personnel data gathering system. At that time, the AIS project office and the Office of Civilian Personnel agreed to coordinate their planning efforts; however, both continued development of their separate systems.

The Deputy Assistant Secretary-Manpower was advised of this and other Navy personnel-related systems which were beyond the control of AIS management. The Deputy agreed that the AIS project office will support "Total Force" management. The Deputy stated that the AIS project office would have cognizance over manpower and personnel system development for all activities under the Deputy Chief of Naval Operations-Manpower. The Deputy added that the Navy was planning to move the system development aspects of civilian personnel under the Deputy Chief of Naval Operations-Manpower. However, the Deputy did not agree to direct that

all Navy manpower and personnel-related development efforts coordinate with the AIS project office because the resources for enforcing such a directive were not available.

The AIS project manager told us that it would be beneficial if such outside systems had to coordinate with his office, because it would help ensure that these systems meet AIS standards, thus facilitating interface and potential integration into AIS.

It is essential that development of all automated manpower and personnel-related systems at least coordinate with the AIS project office. This will help ensure that automated manpower and personnel support needs are brought to the attention of AIS management rather than be fulfilled by duplicative and potentially less economical systems.

#### SECURITY RISK ASSESSMENT REQUIRED

The possibility afforded by the new system for unauthorized access to pay and personnel data has not been adequately assessed. This need is critical because AIS will handle Navy personnel data including individual performance evaluations. Furthermore, SDS, one of the AIS modules, in addition to processing personnel data, will also handle pay data for the Navy Finance Center.

Federal Information Processing Standards Publication 41 provides guidance for implementing the computer security safeguards necessary for complying with Public Law 93-579, the Privacy Act of 1974. This publication states that those agencies designing new computer systems--especially large remote-access systems--should consider the risks of deliberate system penetration at the time they are initially determining the system configuration. It should be noted also that a recent revision to OMB Circular A-71 (July 27, 1978), now requires that a risk analysis shall be done before approving the design specifications for new computer systems. The risk assessment goal identifies and gives priority to those events which would compromise the integrity and confidentiality of data processed on the system. This assessment should be conducted by a team which is fully familiar with the problems that occur in the daily handling and processing of the information.

Under the present system, pay and personnel data enters the respective automated systems at the Navy headquarters

or Finance Center central computer sites. Under the new operation, data will be entered in more than 1,100 terminals through a worldwide telecommunication network connected to the central computers. This operational approach makes the system vulnerable to manipulation, because of the increased access through remote terminals and the concentration of shared data. Furthermore, the planned integration of the pay and personnel functions may weaken the existing protection provided by the separation of duties.

A formal risk assessment for AIS was not done. A planning official stated that he did a risk assessment based on his knowledge of military security requirements and the data being processed; however, this effort has not been documented. The assessment was not adequate to identify the security risks which may arise in the new operating environment. Also, security standards drafted without benefit of a comprehensive security analysis may not be sufficient to reasonably assure that pay and personnel information processed on the system is protected from unauthorized use or manipulation. Furthermore, designing security features into a system after it becomes operational can be extremely costly.

#### CONCLUSIONS

The Navy has not clearly defined the relationships involved in achieving a successful development of AIS. Although the Navy has developed a MANTRAPERS plan, there is no formal set of relationships established between the Navy's (1) mission and objectives, (2) policies, regulations, and directives, (3) programs and activities, and (4) AIS program management, development, and user needs.

As a result, we found fragmented management and planning for AIS with limited user involvement.

AIS had limited coordination mechanisms to provide effective managerial control, such as a tracking system to measure actual versus projected performance. Also, AIS had no risk assessment to determine the degree of security control required versus the nature of the threat.

#### RECOMMENDATIONS

To increase the chances for AIS' success, we recommend that the Secretary of Defense see that the Secretary of the Navy

- accelerate the translation of the MANTRAPERS plan objectives into management requirements so that AIS may be designed to address these objectives,
- more extensively involve users in the planning effort,
- designate a civilian as project manager of AIS to improve managerial continuity,
- develop a more extensive mechanism to track actual system development results against anticipated performance,
- increase coordination of other manpower and personnel system development efforts with AIS, and
- analyze the security risk associated with the operation of the system being designed.

AIS officials agree with these findings and will, with the exception of "coordination of other development efforts," initiate corrective actions on each. AIS management's purview regarding manpower and personnel system development efforts is limited to activities under the control of the Deputy Chief of Naval Operations-Manpower. The Deputy stated that within this organization, all development will be coordinated by the System project office. He also stated that coordination of development efforts outside this organization, such as efforts by one of the fleet commands must be directed by higher authority.

### CHAPTER 3

#### NEED FOR A MORE COMPREHENSIVE

#### PROCUREMENT APPROACH

The original course of action for the AIS proposed computer system procurement was questionable. Our reasoning is based, in part, on an evaluation of the Navy's computer capacity, workload projections, and the possibility of a joint procurement with the Navy Finance Center. When the computer system procurement is restructured to adequately reflect the Navy's needs, an improved set of specifications could enhance the competition for the system. We suggest a phased procurement approach to extend the life of the AIS software--the major portion of the AIS investment.

#### COMPUTER ACQUISITION CRITERIA

Chapter 101 of the Federal Property Management Regulations, parts 101-35 and 101-36, effective June 30, 1978 (these regulations were previously contained in Federal Management Circular 74-5 and other circulars), prescribes policies and procedures for agencies to follow in acquiring computer system equipment. The Regulation in relation to the proposed procurement requires that

- action has been taken to determine the possibility of improving performance of the existing data processing equipment;
- any new system must be designed to achieve the highest practicable degree of effectiveness and operational economy;
- system specifications shall be designed to ensure free and open competition for all vendors--hardware, software, third party, etc.; and
- the need for new equipment shall be based on well-documented general systems and/or feasibility studies.

#### NEED FOR NEW COMPUTER SYSTEM

The existing manpower and personnel systems are primarily supported by a computer center in Washington

with one IBM 370/165 and a center in New Orleans with one IBM 360/65 and an IBM 360/40. To help management control over development of AIS and more efficient use of this equipment, AIS management plans to merge the New Orleans center into the Washington center during late 1978. These processors working in unison with adequate peripheral equipment should provide the computing power necessary to support the AIS effort through 1981. (See app. II.)

Based on our analysis of anticipated workload growth and machine capabilities, we agree with AIS management that beyond this point, the current system will not adequately support AIS needs. Furthermore, the main processor, the IBM 370/165, was obtained under a sole-source procurement and according to Federal regulation must be replaced through competitive acquisition. Therefore, within the constraints identified below, we believe the project office should proceed with plans to obtain additional computer capacity to accommodate AIS.

#### POTENTIAL BENEFITS FROM JOINT PROCUREMENT

The Navy was proceeding with a unilateral procurement for AIS without adequately evaluating the economic and operational benefits of a joint undertaking with another related naval activity. The project office and the Navy Finance Center in Cleveland, Ohio, are both planning to competitively acquire new computers to replace their current systems. Both centers process personnel-related data--AIS processes manpower and personnel data; the Finance Center processes pay and disbursing data. The centers routinely share and compare such data, however, at the time of our inquiries in February 1978, the potential economic and operational benefits of a joint procurement and collocation of these centers had not been evaluated.

Potential benefits attributable to a joint procurement and collocation include (1) single acquisition cycle costs, (2) systems backup and ready cross communications afforded by common hardware and software, (3) economies of scale associated with a large buy, (4) single site operational costs, and (5) easier integration of pay and personnel functions should the Navy move in this direction in the future. For example, regarding economies of scale, a processor capable of handling current AIS workload could be purchased for about \$2.65 million. However, for \$3.7 million, a 40-percent increase, the project office could acquire two and one-half times more computing power. Collocation of these operations, according to Navy officials

could reduce the combined operating cost by at least 20 percent. The AIS computer installation costs \$2.5 million to operate annually; the Finance Center, \$2 million.

AIS officials, in early 1978, had become aware that the Finance Center was required to competitively replace its current equipment, and had contacted officials in other cognizant Navy organizations to explore the possibility of a joint procurement effort. The AIS project manager stated that a joint procurement could result in substantial benefits to the Navy and that the possible benefits of collocation of the centers should be investigated.

Because of the uncertainty of whether or not a joint procurement effort would result, the AIS project office continued planning for a unilateral procurement. The System specifications for the acquisition had been completed and the project office was targeting to award a contract for it before the end of 1978.

Officials in the Navy Comptroller's Office, to which the Finance Center reports, stated that no studies regarding a consolidated procurement or collocation had been done. These officials declined to discuss the issue until an official Navy position could be established.

Officials of the Naval Data Automation Command (NAVDAC), the Navy agency having cognizance over nontactical computer acquisition, were aware that both the AIS project office and the Finance Center were planning to acquire new computer systems. Nevertheless, NAVDAC had not explored the feasibility of a joint acquisition for these two organizations.

Since our inquiries, the Navy has decided that NAVDAC should serve as project manager of a joint procurement effort for AIS and the Finance Center, unless a recently commissioned study shows that a joint procurement is not justifiable. No decision regarding collocation of the centers has been made; however, the advantages and disadvantages of collocation are being analyzed as part of the study.

We believe that if a thorough, well-documented study of the advantages and disadvantages of a joint procurement and collocation is done, the Navy can better decide how to proceed with these undertakings which may result in substantial savings to the Government.

#### REVISED SYSTEM SPECIFICATIONS NECESSARY

The current version of the System's specifications for competitive acquisition of new computer equipment, because of its restrictive nature, will not foster free and open competition as required by Federal regulation. Furthermore, this restrictive nature may result in the acquisition of an outdated system.

Specifications for the acquisition of a computer system can range from two extremes--"closed" specifications which state many mandatory system requirements and few, if any, optional requirements, and "open" specifications which express needs in terms of mission requirements rather than system requirements. "Closed" specifications result in vendor proposals which are easy to evaluate against the rigid specifications criteria. However, this approach tends to favor a given type product line and can prevent acquisition of the most effective technological solutions to the data processing requirements. Conversely, "open" specifications afford vendors the opportunity to compete along a number of dimensions--creativity of solutions, adaptability of systems to changing requirements, life cycle cost, etc. This "open" approach makes evaluation of the proposals more difficult.

AIS officials elected the "closed" specifications approach for acquisition of its new computer equipment. The specifications developed, according to one of the AIS consultants, could unnecessarily restrict competition. We agree with this observation. Furthermore, these specifications could result in proposals based on old technology, thus leaving AIS in the mid-to-late 1980s with a potentially outdated system.

In mid-February 1978, the System specifications were delivered to NAVDAC to be incorporated into a request for proposal. NAVDAC action on this matter was delayed until the joint procurement issue could be resolved. However, NAVDAC officials stated that Finance Center officials were being furnished a copy of these specifications to use as a guide for preparing their system specifications.

NAVDAC, as project manager of the joint procurement, should eliminate those system requirements which will restrict free and open competition. It should also work with the AIS management toward loosening the stated System

requirements to encourage innovative state-of-the-art proposals. Similar actions should also be applied to the Finance Center's requirements.

#### WORKLOAD ESTIMATES MUST BE REEVALUATED

The computer workload estimates, appearing in the System specifications, provide little assurance that the computer equipment acquired would be properly sized for AIS needs. For example, the estimated computer requirements for 1981, the planned installation date for the new equipment, are about 75 percent greater than the capacity of the equipment to be replaced. We recognize that the efforts to operate on the current equipment until 1981 (see p. 14) will result in postponement of some computer applications; however, we believe that an immediate 75-percent increase in workload is unrealistic.

These estimates are an extension of those used to support earlier plans which were changed to obtain a noncompetitive upgrade of its current computer equipment. They did not accurately reflect the future workload because basic technical assumptions used in preparation of these estimates were invalid. The reliability of the later year estimates is even more questionable. An AIS consultant extended the basic study by 4 years through the addition of an arbitrary growth factor.

AIS officials agree with this assessment and plan to revalidate the entire workload analysis and develop new workload projections. A NAVDAC official stated that workload estimates contained in the System specifications are generally a basis for vendor offerings. Consequently, we believe that NAVDAC should assure that these workload estimates are revalidated, and that similar scrutiny over the Finance Center's workload estimates should be exercised.

#### OPPORTUNITY FOR EXTENDED SYSTEM LIFE

The useful life of well designed AIS software (computer programs) could meet the Navy's needs for 15 or more years. There are 2 reasons why software life can be 15 or more years. First, a discipline called software engineering has emerged. It is the practical application of scientific knowledge in (1) the design and construction of computer programs and (2) the associated documentation required to develop, operate, and maintain them. The

second reason is that software engineering techniques facilitate substantial reductions in future software maintenance and conversion costs.

There are installed systems that are examples of long system life cycles. For example, in our report, "An Analysis of IRS' Proposed Tax Administration System: Lessons For The Future" (GGD-78-43, Mar. 1, 1978), we state that the useful life of the computer system used to verify taxpayers' calculations and do other service center's functions can be effectively extended into the 1990s. IRS obtained this system in 1974 therefore, its life cycle would be 15 or more years.

Consistent with approved Government practice, AIS officials are planning to acquire computer equipment with an estimated 8-year useful life. This limited machine life could prematurely force the Navy to redesign AIS, over a \$130 million investment. A modified computer equipment acquisition method could result in synchronous useful lives for AIS hardware and software, thereby allowing the Government to optimize its system investment while fostering competition.

#### Problems with artificially short life cycles

The asynchronous useful lives of software and hardware have manifested themselves in several negative ways. As a general rule, software has become the predominant cost of automated systems and is generally not easily or efficiently transferred from one manufacturer's equipment to another. This situation is due in a large part to the limited progress in developing or enforcing Federal or industrial data processing standards. In the Federal sector we reported on these issues in our report, "The Federal Information Processing Standards Program: Many Potential Benefits, Little Progress and Many Problems" (FGMSD-78-23, Apr. 19, 1978).

To avoid major expenditures in developing new software when acquiring new hardware, agencies have converted existing computer programs for use on the new equipment. Generally, under such circumstances, the new equipment does not perform efficiently nor does the software operate effectively because of the mismatch of the new equipment and the old software. Two other methods of avoiding the problem are (1) procuring excessive computer capacity or (2) acquiring sole-source brand name equipment to augment the

existing hardware. Both are attempts to extend the useful life of a system; however, the first is wasteful and the second restricts competition unnecessarily.

Another approach is simply to discard the existing software and redesign the system with each change in computer equipment. This should assure efficient hardware operations; however, the existing software, which could continue to be used effectively, may be prematurely discarded. The computer system resources to be acquired should support an agency's needs for the duration of a system. However, because of the potential of increasing future requirements, acquiring hardware today to meet the needs for 10- to 15-years in advance is extremely costly and highly inefficient. Consequently, agencies have settled on shorter acquisition cycles--approximately 8 years.

#### The extended life cycle

The useful life of computer systems can be extended through the use of well-planned contracts which call for phased acquisition of compatible computer equipment over the useful life of the system software. Under a contract which would feature phased acquisition of compatible equipment, an agency would, during the development stages of the system, be required to

- Estimate the probable useful life of the system software (not limited to an artificial 8-year cycle).
- Define its functional workload requirements over that life.
- Establish specific workload requirements for the early years of that life.
- Initially design or redesign all software using Federal Information Processing Standards where available. Where a Federal standard is not available use an American National Standards Institute standard until an applicable Federal standard becomes available.

Interested vendors, based on this data, would be required to

--bid a system that would support the specific early year requirements and

--demonstrate the ability to provide the additional processing capability for the long-term requirements as stated in the initial acquisition.

The computer system selected during the first phase of this bidding cycle would serve as the foundation hardware for the AIS system life cycle. Since software maintenance represents the major portion of future life-cycle cost, efforts should be made to minimize software maintenance costs. By requiring that each subsequent phase within the AIS life cycle be based on the foundation hardware, and that the initial design and redesign use high-level computer languages, software maintenance costs can be effectively minimized.

However, provision should be made for future competitive offerings by hardware manufacturers or other companies wishing to present compatible equipment. Although the computer hardware industry currently offers only limited compatibility among competitive computer systems, the phased procurements during the system life cycle should be flexible enough to accommodate future compatible hardware and/or software proposals from industry.

The advantages offered by this approach are that:

--It is consistent with the House Committee on Government Operations' recommendation contained in H. Rept. 94-1746 (Oct. 1, 1976), that before an agency can acquire computer hardware, it is required to develop long-range plans governing computer system needs that are based on the agency's projected mission requirements.

--The purchasing agency, because of the extended system life, is assured a relatively stable computer equipment environment to design and operate an effective system.

--Computer system standardization is encouraged because vendors have an incentive to offer compatible equipment to compete for subsequent phased hardware contracts. This should improve the competitive situation and work to the advantage of the Government.

--Because the lives of the hardware and software are synchronized, the agency's investment in software can be used fully.

--The planned phased augmentations should provide for orderly system growth and should afford vendors the opportunity to compete in offering technological advancements which could improve system performance, while remaining compatible with existing software.

The revised procurement method does not diminish the need for additional Federal data processing standards that will help the development of software that can operate on various makes of computers. However, until computer independent software is a reality, this approach, used widely in industry, offers potential advantages for this and other Government systems acquisitions.

#### CONCLUSIONS

Our review of the justifications for, and efforts to competitively obtain a computer system to accommodate AIS into the 1990s disclosed that:

--Additional computer equipment is required to support AIS.

--Until recently, the Navy was proceeding with an independent AIS procurement without considering the economic and operational benefits that could accrue from a joint procurement with a similar activity.

--The current version of the System specifications are unnecessarily restrictive in nature and could reduce competition.

--The computer workload estimates contained in the System specifications do not accurately reflect the anticipated workload requirements and could result in the acquisition of more computer equipment than is needed to support AIS.

#### RECOMMENDATIONS

To help insure effective implementation of a formal long-range computer system plan, more detailed direction and

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control are necessary. Accordingly, we recommend that the Secretary of Defense see that the Secretary of the Navy:

- Conduct a well-documented study of the advantages and disadvantages of a joint procurement and collocation with the Navy Finance Center.

- Revise the System specifications to present the correct workload estimates and eliminate requirements which restrict free and open competition.

- Incorporate the revised System specifications into a phased procurement approach for computer system acquisition.

AIS officials agreed with these matters and are working toward their resolution.

## CHAPTER 4

### NEED TO REEVALUATE PROPOSED SOLUTION

#### TO SOURCE DATA PROBLEM

Under AIS, the Navy was planning a worldwide distributed processing network to replace its current mail-based data gathering system. However, we questioned whether the Navy had evaluated all of the practical alternatives. Our evaluation suggests that several economical approaches should be considered. We also evaluated the validity of the projected savings for the Navy's proposed solution to the source data collection problem, and questioned the amount of the estimated savings, and the economics of the proposed solution.

#### EFFORTS TO OVERCOME SOURCE DATA PROBLEMS

Navy studies revealed that the central personnel data base contains many errors arising from the gathering of inaccurate or untimely source data. For example, recent statistics revealed that

- about 40 percent of the unit diaries, the basic personnel reporting document, contained errors;
- about 16 percent of the various personnel reporting documents arrived at their destination more than 2 months after preparation; and
- reported obligations against Navy's military pay appropriation were estimated to vary as much as \$6.2 million from the actual amounts.

The untimely submitted data also affects the Navy pay system. Disbursing officers were manually overriding about 40 to 50 percent of the pay transactions involving changes, such as promotions, because of service members' requests to be paid according to pay information that had not cleared the automated system.

The Navy concluded that the data error and timeliness problems could be resolved by capturing and editing data at the source. They also concluded that this could be done with less staff by using various computer-assisted data entry schemes.

Pay and Personnel Administrative  
Support System

In an attempt to improve source data accuracy and timeliness, reduce costs, and upgrade services, Navy plans to consolidate its 3,500 military personnel offices and 500 disbursing offices into about 100 offices under its Pay and Personnel Administrative Support System (PASS). This will be done in three phases, by

- collocation of the pay and personnel offices by March 1980,
- provision of automated support to the collocated offices by June 1981, and
- integration of the pay and personnel functions at a later time.

SDS

AIS officials consider automated support essential to the PASS project, thus, SDS was conceived to provide this support. SDS was envisioned to be a distributive processing system employing a number of remote minicomputers coupled with the host computers and remote terminals through a worldwide telecommunications system.

AIS management planned to begin developing SDS in fiscal year 1977, however, we found that such development in advance of the competitive computer procurement might increase software conversion costs. They agreed to limit SDS development to prototyping until it resolves the issues we have raised.

ARBITRARY REQUIREMENTS MANDATED  
SOPHISTICATED SOLUTIONS

In May 1977, the AIS project office published an economic analysis for the PASS project which presented three SDS alternatives. They were distributed computer support with

- worldwide batch communications with the host computers,
- worldwide batch and limited on-line communications (within the continental United States) with the host computers, and

--overseas batch and continental United States on-line communications with the host computers.

Alternative three, the most sophisticated, was recommended as the best. All three alternatives envisioned distributed processing networks. Less sophisticated alternatives, such as remote terminals to central computer(s) or a combination of this and any of the three above alternatives were either deemed unacceptable or not considered at all.

System performance requirements such as 24-hour data currency and the requirement for processing capabilities to meet local management needs ruled out lesser system designs. An AIS official stated that source data problems could probably be solved through the use of remote data entry terminals which featured some limited inquiry capabilities. However, such alternatives were not explored because they did not fulfill performance requirements.

The performance specifications were not based on mission requirements. An early source data improvement study specified that the data be as current as that afforded by a mail-based system assuming data was being accurately submitted. Although there had been no change in mission requirements, 24 hours was specified for updating the central data base in the economic analysis, the selected alternative will yield data which is virtually always current. The benefits derived from this tighter performance requirement and the cost associated with achieving that level of performance were not incrementally analyzed.

Similarly, the costs and benefits of providing support for local management were not incrementally analyzed. Under the three proposed alternatives, personnel data would be stored at various naval activities on local data base files. These files would accommodate headquarters as well as local management data requirements and permit the preparation of ad hoc local management reports. The local support requirement would reportedly overburden a central processing system; therefore, distributed processing with local data base files was the only feasible solution. This assumption, however, was not substantiated and the benefits arising from local management support have not been quantified.

Finally, the Navy has determined that it will extend SDS to the reserve community to replace the reserves'

new semi-automated field reporting system. This decision was made without the benefit of adequate analysis. The extension will involve the use of terminals with limited processing capability which transmit accumulated drill and personnel data in batch mode to SDS minicomputers. The minicomputers will, in turn, forward this data to the host computers. Drill attendance data is now reported in a mail-based system similar to that used for credit card purchases. Personnel data, recorded on optically scannable documents, is also submitted by mail.

The drill attendance reporting system, an interim solution to data problems, was assigned an arbitrary useful life of only 5 years. According to reserve personnel officials, this system is serving its purpose well, and should continue to be useful beyond its estimated life. Therefore, we believe that the decision to extend SDS support to the reserve community should be revalidated based on (1) the quality of service being provided by the newly-implemented system and (2) the costs and benefits associated with replacing this system with SDS support.

#### EXCESSIVE NUMBER OF PLANNED REMOTE PROCESSORS

AIS planners assumed that computers were needed at each of the PASS field sites, and decided that minicomputers rather than resources available through naval computer service centers should be used to meet this need. These decisions were not based on a systematic analysis of the Navy population to be supported by each of the PASS sites or the advantages and disadvantages associated with the use of existing local computer assets.

About 48 minicomputers were envisioned for the distributed processing network. Project planners developed this estimate based on the assumption that at least one minicomputer will be required to support each primary PASS office. However, an AIS design official told us that about 15,000 to 20,000 personnel served per minicomputer had been established and should have been used in determining how many devices were necessary. Using the lower of the 2 figures, we estimate that about 25 of the planned 48 minicomputers were unwarranted. Even if the need for a distributed processing system is sustained by more thorough analysis of the mission requirements, about \$3 million in equipment savings can be realized through elimination of the unneeded minicomputers. These savings do not include those site

preparation, operation, and maintenance costs which would also be avoided.

Forty-two percent of the personnel to be served by the SDS project are at locations adjacent to Navy Data Processing Service Centers. In addition, five of the seven personnel concentrations large enough to justify minicomputers are adjacent to these processing centers. However, AIS management intends to use minicomputers instead of these centers for field support.

These centers were established to meet the needs of multiple users within their geographic areas of service. The Service Center's project director, when advised of the SDS approach, indicated an interest in using the Centers' computers to fulfill at least part of SDS' minicomputer requirements. AIS officials discounted this approach without formal analysis because they thought it would create insurmountable software design and maintenance problems. Nevertheless, we believe the potential to substitute this available field hardware for at least some additional minicomputers merits a thorough economic analysis of associated advantages and disadvantages.

#### PROJECTED SAVINGS INFLATED AND LACK ADEQUATE DOCUMENTATION

The lack of adequate supporting documentation for the PASS/SDS economic analysis prevented a thorough evaluation of either the costs or benefits presented. However, our review of the available data raised serious questions about its validity.

Projected savings accruing from the PASS project were about \$216 million over the 11-year life of SDS. Most of these estimated savings were based on manpower reductions resulting from (1) PASS consolidations, (2) lessened paperwork, and (3) the reduction of error research staffs.

For the most sophisticated alternative presented in the analysis, Navy projected annual savings of 2,134 man-years, or about \$23.5 million annually. We found, however, that for various reasons, including recruiting shortfalls, a number of the positions to be eliminated have been unfilled. The major savings were in "personnelman" billets, which since the beginning of 1977 have been understaffed by about 12 to 17 percent. Had this been considered for

the consolidation effort and SDS in the field alone, the annual savings would have been about \$10.6 million, or 45 percent less than projected.

Additionally, planning documents indicate that some of the proposed system costs may have been understated, further eroding the projected savings. For example, the economic analysis incorrectly assumed that no one would be required to operate the planned 48 minicomputers. It also assumed that no land and building costs were associated with the PASS/SDS project. However, the estimated cost to renovate a facility to house Navy's San Diego PASS/SDS operation is approximately \$80,000.

We attempted to further verify these manpower savings claims; but, we were unable to do so because of inadequate supporting documentation and unexplained differences among figures. Moreover, all of the Navy personnel involved in the preparation of the analysis have since been transferred and the present staff was unable to support these claims.

For example, the analysis shows that in opting for alternative II over alternative I, an incremental 450 man-years, or about \$5 million, is saved. The same additional savings are coincidentally realized in opting for alternative III over alternative II. We were told that there is no available documentation for these figures and that an explanation would require a massive effort. Such a lack of documentation not only reduces credibility and limits auditability, but increases the likelihood that updates may be inconsistently prepared.

We recognize the Navy's need to improve its source data and that not all costs and benefits are necessarily quantifiable. However, the selection of an alternative must be based on a fully documented economic analysis which realistically quantifies costs and benefits.

#### CONCLUSIONS

The current source data system has been unable to provide timely and accurate source data to the central pay and personnel data bases. Our review of this undertaking disclosed that:

--All alternatives considered were more sophisticated than necessary to address the basic problem--untimely

and erroneous source data; however, the incremental benefits and costs attributable to the added degree of sophistication had not been adequately analyzed.

--The degree of automated support required under the selected alternative for each of the field locations and how that support could be best provided had not been fully evaluated.

--A significant amount of the savings attributable to the new system were overstated; however, we were unable to thoroughly analyze the proposals because of lacking support documentation.

The analysis done to date provides little assurance that the proposed system offers either the most effective or efficient approach to correcting the source data problems.

#### RECOMMENDATIONS

We recommend that the Secretary of Defense see that the Secretary of the Navy make an acceptable cost-benefit analysis which will include

- evaluation of the most practical alternatives to the source data problem, not just the most sophisticated,
- consideration of user needs for each alternative evaluated, and
- productivity measures to assist in quantifying the results.

AIS officials acknowledged that these were valid points, and have agreed to prepare a fully documented economic analysis, based on a detailed user-need study which

- shows the costs and benefits of the minimum system needed to solve the source data problem,
- presents more elaborate alternatives showing incremental costs and benefits accruing to each major system capability, and
- thoroughly evaluates the opportunities for using Navy's existing automated resources.

## CHAPTER 5

### SCOPE OF REVIEW

On July 12, 1977, the Chairman of the Committee on Government Operations, House of Representatives, requested that we review the Navy's efforts to develop AIS to determine whether or not it had been properly planned and studied and that mistakes made by similar projects in the past had been avoided.

On November 21, 1977, we issued a preliminary report (LCD-78-103) to the Chairman about location of the proposed processing center for AIS and the immediate need for additional computer equipment. This phase of the review was in response to the overall issues raised by the request.

Responding to this request, we reviewed procedures for planning, approving, and acquiring computer equipment and related development activities, and compared Navy management practices with Government-wide guidance for managing, acquiring, and using computer systems. We discussed the development of management information systems and the procurement of computer equipment with officials of the following organizations:

#### Department of the Navy:

Bureau of Naval Personnel, Washington, D.C.

Office of Civilian Personnel, Washington, D.C.

Naval Material Command, Washington, D.C.

Navy Finance Center, Cleveland, Ohio.

Chief of Naval Education and Training,  
Pensacola, Florida.

Enlisted Personnel Management Center,  
New Orleans, Louisiana.

Bureau of Medicine and Surgery, Washington, D.C.

Navy Recruiting Command, Washington, D.C.

Naval Data Automation Command, Washington, D.C.

Air Force Personnel Center, San Antonio, Texas.

General Services Administration, Washington, D.C.

APPENDIX I

**MAJORITY MEMBERS**  
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NINETY-FIFTH CONGRESS  
**Congress of the United States**  
**House of Representatives**  
 COMMITTEE ON GOVERNMENT OPERATIONS  
 2157 Rayburn House Office Building  
 Washington, D.C. 20515

July 12, 1977

The Honorable Elmer B. Staats  
 Comptroller General of the United States  
 Washington, D.C. 20548

Dear General:

The Navy is planning a large ADP consolidation and integration project for its Bureau of Personnel. The project involves the relocation of the Bureau's Washington data processing activities to its New Orleans facility and the redesign of existing software applications to support a new integrated system called the Advanced Information system (AIS). As part of this plan, the Navy is requesting procurement authority to acquire interim ADP resources for the New Orleans facility to provide sufficient capacity for the consolidated workload and for the AIS software development work. According to the Navy, the interim equipment will be competitively replaced prior to full implementation of AIS.

While the Committee fully supports the total systems concept being used by the Navy for this project, it is also aware of the numerous failures of similar management information system projects in the Government. Such failures have cost the Government hundreds of millions of dollars and have undermined sound ADP management practices by causing many agencies to abandon large system projects in favor of a less conspicuous, but considerably more costly, piecemeal approach.

I request that you conduct a comprehensive review of the Navy proposal to determine if it has been properly planned and studied, and that the mistakes made by similar projects in the past have been avoided. Because of certain time constraints, it will be necessary to approach your review in two phases: 1) A review of the general project design as compared to other alternative designs to meet the Bureau's functional requirements,

APPENDIX I

**MINORITY MEMBERS**  
 FRANK HORTON, N.Y.  
 JOHN N. ERLINGER, ILL.  
 JOHN W. WYDLER, N.Y.  
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 PAUL W. McCLOSKEY, JR., CALIF.  
 GARRY UROWN, NECH  
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 ARLAN STANGLAND, MINN.  
 JOHN E. (JACK) GORDENSHAM, WASH.  
 MAJORITY 223 8231  
 MINORITY 223 5324

APPENDIX I

APPENDIX I

2 - The Honorable Elmer B. Staats

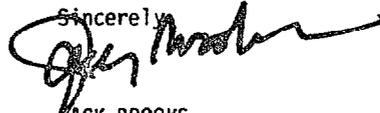
July 12, 1977

coupled with a technical review of the interim upgrade for the New Orleans facility; 2) If Part 1 is acceptable, a detailed review of the specific design modules of the project to determine if they have been properly planned and designed and will maintain the integrity of the overall systems design. I would like particular attention to be paid to the telecommunication module since it is the interlocking thread to the whole concept.

I would appreciate an interim report at the end of each phase.

With best wishes, I am,

Sincerely,



JACK BROOKS  
Chairman



COMPTROLLER GENERAL OF THE UNITED STATES  
WASHINGTON, D.C. 20548

21 NOV 1977

B-146864

The Honorable Jack Brooks, Chairman  
Committee on Government Operations  
House of Representatives

Dear Mr. Chairman:

On July 12, 1977, you requested that we comprehensively review the Bureau of Naval Personnel's proposed Advanced Information System to determine whether it had been properly planned and studied and whether the mistakes made by similar projects in the past had been or will be avoided. This review was to be undertaken in two phases. In response to phase I of your request, we examined the general system development and evaluated the proposed interim upgrading of the New Orleans, Louisiana, computer facility.

As of September 30, 1977, we found that:

- The system is being developed and implemented without an adequate long-range plan.
- The proposed upgrading of computer equipment is unwarranted at this time.
- Although consolidation of the Bureau's computer processing capabilities appears sound, locating these capabilities in New Orleans, as proposed, would involve more managerial and technical risks than would locating them at the Bureau's computer center in Washington, D.C., and, according to Bureau estimates, would be more costly.

Bureau officials generally concur in these observations and have agreed to:

- Suspend development of new system modules until an adequate long-range plan is developed.
- Continue to operate on its current computers without interim upgrading until competitively procured equipment is available.
- Consider consolidating computer facilities in Washington rather than New Orleans.

LCD-78-103  
(941139)

B-146864

According to Navy data, this revised development effort will cost approximately \$5.3 million less than the proposed interim upgrading and the consolidation of computer capabilities in New Orleans. These findings are highlighted below.

GOAL--"TOTAL FORCE" PERSONNEL  
MANAGEMENT SYSTEM

The Navy is committed to the development of a "total force" personnel management system, which will enable it to more effectively control personnel resources--civilian and military, active and reserve--from recruitment to retirement. The Bureau is developing an automated system called the Advanced Information System to assist in this objective. This system is intended to provide a remote, interactive processing capability which the current system does not. The Bureau believes this will be a substantial improvement over the current batch-processing-oriented system.

The Bureau's current personnel system is supported by a computer center in Washington with one IBM 370/165 and a center in New Orleans with one IBM 360/65 and an IBM 360/40. To (1) facilitate management control over development of the Advanced Information System and (2) provide the computer power considered necessary to accommodate the present and planned workload, the Bureau was planning during 1978 to:

- Move the Washington, D.C., computer equipment to New Orleans.
- Obtain noncompetitively at least one additional IBM 370/165 computer.
- Dispose of the current Government-owned computers at the New Orleans facility.

The IBM 370/165s were to be replaced with competitively acquired equipment in late 1981.

NEED FOR LONG-RANGE PLANNING

The Bureau initiated the development and implementation phases of the Advanced Information System without the early detailed long-range planning required to strengthen the probability of its success. It had neither defined the scope of the system nor determined the life-cycle costs. Nor had it systematically evaluated the various design alternatives to determine which could best provide the information required

B-146864

by Navy personnel management at least cost. For example, the Bureau had not thoroughly evaluated, in quantitative terms, the need for the remote interactive processing capability it planned to acquire or the economics involved in consolidating the computer capabilities in Washington rather than New Orleans.

At the time of your request, the Bureau had combined several ongoing projects into the Advanced Information System and was developing several additional modules. All development work was being designed for and performed on IBM computers with full knowledge that a major conversion effort might be necessary when the Navy procured new computer equipment in 1981.

We discussed these concerns with Bureau officials, and they agreed to alter their approach. They will:

- Suspend development of new modules, such as officer, enlisted, and plans and fiscal, until the competitively selected computer hardware is identified.
- Limit development on the source data system to the prototype.
- Develop a long-range plan, which will include the scope, life-cycle cost, and associated cost/performance analysis for the Advanced Information System.

#### ADDITIONAL EQUIPMENT UNWARRANTED AT THIS TIME

The proposed interim acquisition of a second IBM 370/165 at an additional cost of \$2 million is not warranted at this time. Our review indicated that the present IBM 370/165 computer in Washington, with the IBM 360/65 from New Orleans, will be able to handle the workload through 1981. The IBM 350/40 workload, which is relatively small, can be absorbed by the above configuration. Therefore, the IBM 360/40 will be available for other work.

The estimated computing power needed to process the projected workload through 1981 was substantially affected by two factors: (1) the assumptions used to describe the technical environment in which the system would operate and (2) the modules that would be developed and implemented during this period. According to the Bureau's workload projection, by 1980 the present computers would not be able to process the peak hour workload since estimated processing time would range from 1 hour and 14 minutes to 1 hour and 20 minutes.

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Our review, however, showed that several assumptions used in estimating the computer requirements did not realistically depict the environment in which the Advanced Information System would operate. For example, these requirements were based on the premise that the interactive and batch work would have to be processed simultaneously when in reality much of the batch work could be deferred to periods of low activity. Another assumption was that all interactive work would be processed on the main computer. However, most of the interactive work is to be preprocessed by remote processors, such as minicomputers, located at numerous sites throughout the United States. Handling the interactive work in this manner will require approximately one-third less support from the main computer.

The decision to delay development of several modules will further reduce requirements for computer use.

To develop more reasonable estimates of the computer capability needed through 1981, Bureau officials worked with us to reevaluate these assumptions on the basis of (1) a more realistic interpretation of the work environment and (2) the decision to delay the development of several modules.

Based on these revised constraints, a new analysis was jointly prepared of the projected workload and the capacity of the available equipment. The unit of measurement is central processing unit minutes per hour, for a configuration consisting of one IBM 370/165 and one IBM 360/65. This configuration yields 60 productive IBM 370/165 equivalent minutes per hour.

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Workload Projections 1978-81

	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
	—————(minutes per hour)—————			
Prime time (note a):				
Average hour:				
Interactive	16.7	23.3	25.0	25.8
Batch	<u>24.2</u>	<u>25.8</u>	<u>27.3</u>	<u>27.3</u>
Total	<u>40.9</u>	<u>49.1</u>	<u>52.3</u>	<u>53.1</u>
Peak hour (note b):				
Interactive	23.4	32.7	35.0	36.1
Batch	<u>24.2</u>	<u>25.8</u>	<u>27.3</u>	<u>27.3</u>
Total	<u>47.6</u>	<u>58.5</u>	<u>62.3</u>	<u>63.4</u>
Non-prime time (note c):				
Average hour batch	57.2	61.9	65.7	66.1

a/Prime time is between 7 a.m. and 6 p.m. Monday through Friday.

b/Peak hour is when the level of interactive operation is 40 percent greater than the average hour workload.

c/Non-prime time is between 6 p.m. and 7 a.m. Monday through Friday plus the weekend. Computer maintenance time is recognized in this average.

Bureau officials agreed with the revised estimates and stated that the non-prime time batch work could be made to fit even though the analysis shows a slight overrun; for example, additional batch work could be performed during prime time. Therefore, it is anticipated that the Bureau's IBM 370/165 and 360/65 operating together will be able to handle its current workload and foreseeable increases through 1981. We plan additional work on this matter during phase II of our review.

Bureau officials agreed to operate on their current computer equipment until the competitively acquired equipment is available. However, they proposed, as part of the request for this hardware, that the Bureau be granted standby authority for an interim upgrading should the workload grow faster than expected. We concur with this approach provided that use of this standby provision be predicated on an independent validation of the workload increase.

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CONSOLIDATION OF COMPUTER HARDWARE

Consolidation of the Bureau's computer processing activities should make management easier and utilization of these resources more efficient. In April 1976, the Navy informed Members of Congress that consolidation of the Bureau's automated data processing functions in New Orleans was highly beneficial and economical. According to the Bureau's current estimates, however, consolidation in New Orleans rather than at the primary computer facility in Washington would be approximately \$3.3 million more costly over a 4-year period. Consolidation in Washington would be more economical because of savings in personnel, telecommunications, and facility enhancement. In addition, Bureau officials stated that a Washington consolidation would involve less management and technical risk. Therefore, based on the information we obtained, the proposed consolidation can more effectively be achieved in Washington rather than New Orleans. The Bureau is now considering this action.

FUTURE AUDIT DIRECTION

As discussed with your office, we are continuing into phase II of your request to review the specific design modules of the system to determine if they have been properly planned and designed and will maintain the integrity of the overall design. We will pay particular attention to the telecommunications modules, because of their central importance to the system. We expect to brief your office during April 1978 and to provide you a final report by the fall of 1978.

Also, as discussed with your office, we are sending copies of this letter to the Chairmen, House and Senate Armed Services and Appropriations Committees, and the Chairman, Senate Committee on Governmental Affairs. We are also sending copies to the Secretary of Defense, the Secretary of the Navy, and the Administrator of General Services.

Sincerely yours,



Comptroller General  
of the United States

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