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*REPORT TO THE COMMITTEE
ON APPROPRIATIONS
HOUSE OF REPRESENTATIVES*



Potential Problems In
Developing The Air Force's
Advanced Logistics System B-163074

*BY THE COMPTROLLER GENERAL
OF THE UNITED STATES*

FEB. 4, 1971



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

B-163074

Dear Mr. Chairman:

In House Report 91-698 your Committee on Appropriations directed the General Accounting Office to review, in accordance with prior requests, the need, requirements, and implementation features of the Air Force's Advanced Logistics System. The results of our review are summarized in the digest.

Although our observations and conclusions were discussed with officials of the Department of Defense, we did not request formal comments from the Department.

As agreed, copies of this report are being sent to the Secretary of Defense and to the Secretary of the Air Force for internal use only. We plan to make no further distribution of this report unless copies are specifically requested, and then we shall make distribution only after your agreement has been obtained or public announcement has been made by you concerning the contents of the report.

Sincerely yours,

A handwritten signature in cursive script that reads "Thomas P. Staets".

Comptroller General
of the United States

The Honorable George H. Mahon
Chairman, Committee on Appropriations
House of Representatives

D I G E S T

WHY THE REVIEW WAS MADE

The House Committee on Appropriations directed the General Accounting Office (GAO) to review the need, requirements, and implementation of the Air Force's Advanced Logistics System.

GAO was also asked to evaluate (1) the planning of the system, (2) the compatibility of this system with other systems, (3) the practicability of implementing the system, (4) the costs and personnel requirements of the system, and (5) the savings to be realized by use of the system.

The computer-based logistics management system is intended to improve the Air Force Logistics Command's ability to perform its mission, which it claims has been impaired by the limitations in capability of the older generation automatic data processing equipment now being used. The Advanced Logistics System is estimated to cost about \$821 million through 1979. The Air Force estimates that the new system will result in net savings of \$144 million during this period. (See p. 22.)

GAO did not request formal comments from the Department of Defense. Observations and conclusions in this report were discussed with officials of the Department of Defense and of the Air Force.

FINDINGS AND CONCLUSIONS

System planning and compatibility

The Air Force identified problems and potential problems in the current logistics management system and planned to eliminate them in the design of the Advanced Logistics System. (See p. 11.)

The system had not been developed to the point where GAO could determine whether it would be compatible with other systems, but adequate provision seemed to have been made for that purpose. GAO believes that compatibility should receive continued close management attention, since the lack of close attention has been a problem in other military computer systems. (See p. 10.)

Tear Sheet

Testing and implementation

The new system is still in the detail design stage; no computers have been installed and therefore an evaluation of the system's operation could not be made. (See p. 6.)

The Air Force plans to acquire all equipment at one time and to install and test it at the Logistics Command, five Air Materiel Areas, and Kelly Air Force Base, Texas, during a 9-month period. In the subsequent 4 months, complete system testing of the hardware and software would be performed at all locations simultaneously. During that phase the existing system would continue to carry the full logistics work load.

For about 1 year the current system and the Advanced Logistics System will exist side by side. The current system will perform the day-to-day logistics work load, while the completely installed Advanced Logistics System will be running test problems and programs. The Air Force estimates that it will cost about \$53 million to operate the current system during that year of dual performance. (See p. 16.)

The plan to acquire all the equipment at one time and to test it over a short period of time seems risky. The tight schedule leaves almost no margin for unforeseen problems.

GAO believes that it would be prudent to follow a conservative implementation program, such as the one recommended by the Air Force Scientific Advisory Board that calls for acquiring and installing hardware and software at two locations; completing testing; checking out and debugging under operational load at those two locations; and adjusting the software design and hardware configuration, as necessary, before computers are acquired and installed at the remaining sites. (See pp. 12, 16 and 17.)

As of August 1970, the planned implementation of the Advanced Logistics System had been delayed about 28 months, to April 1973. (See p. 13.)

Software

There are strong indications that problems may be encountered in obtaining and implementing adequate computer software. In August 1970, the Air Force, to mitigate such problems, amended the request for proposal to require that certain software be demonstrated by bidders in live tests before contract award. (See pp. 18 and 19.)

The Air Force also included in the request for proposal a provision, which it planned to make part of the contract, that the vendor, in case of the failure of its hardware or software to meet agreed-upon performance criteria (i.e., work load requirement), supply the necessary equipment to make up the deficiency at no extra cost. In GAO's opinion, that provision will help to protect the interests of the Government and should be retained in the contract with the successful bidder. (See p. 19.)

Costs and savings

The Advanced Logistics System has not been separately programmed and funded. Therefore it is difficult to identify all costs of the system. (See p. 22.)

The Air Force estimates that the Advanced Logistics System will result in net savings of \$144.1 million over a period of 6 years, as a result of reductions in manpower, a reduction in spare parts procurement, and overall management improvements. (See p. 23.) GAO did not verify the estimate on manpower reductions; however, the methodology leading to the estimate appeared reasonable. (See p. 26.)

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ABBREVIATIONS

ALS	Advanced Logistics System
GAO	General Accounting Office

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CHAPTER I

INTRODUCTION

The Chairman, Committee on Appropriations, House of Representatives, in a letter dated September 24, 1969, requested the General Accounting Office to review continually the Department of Defense's development, installation, and operation of automatic data processing systems and to report periodically the results of these reviews. The Chairman stated that GAO reports, such as those entitled "Inquiry into Practices Followed by the Department of Defense Components in Acquiring and Installing New Automatic Data Processing Equipment for Use in Computerized Management Systems" (B-163074, March 13, 1968) and "Centralization of Supply Management Operations (COSMOS) System in the Department of the Army" (B-163074, January 16, 1969); were reports of the type in which the Committee was interested. The Committee's report on the 1970 Department of Defense Appropriations Bill (H. Rept. 91-698) directed GAO to review the need for, requirement for, and implementation features of specific systems, including the Air Force's Advanced Logistics System (ALS).

In making our review of ALS, we were guided by the Chairman's request that we determine whether the system had been properly planned and was meeting the general planning criteria set forth in our report to the Committee dated March 13, 1968. We were also asked to evaluate, in general, the (1) compatibility of this system with other systems, (2) practicability of implementing the system, (3) costs and personnel requirements of the system, and (4) savings to be realized by use of the system.

Our fieldwork was conducted at the Air Force Logistics Command, Wright-Patterson Air Force Base, Ohio, and was completed in September 1970.

The Air Force is designing ALS (1) to forecast logistics support requirements in advance of actual needs and to automatically provide selected items to the customer, (2) to provide a high degree of product reliability, and (3) to respond effectively in support of normal Air Force

operations and to various operational contingencies. According to the Air Force, many of the concepts which underlie ALS are new but their implementation is now feasible because of advances made in computer and management sciences.

The Air Force stated that ALS would provide, through a unified data bank, the capability for the Air Force to make all operational and management decisions from a current, common set of data. According to the Air Force, ALS will be designed to provide managers with ready access to all available data in time to influence in-process logistics actions and to reduce the need for printouts of voluminous reports.

The Air Force indicated that the principal factors underlying the decision to initiate ALS were:

- That the new weapon systems and equipment being introduced into inventory were more complex and more costly than their predecessors and that more prompt and effective controls over them were needed.
- That operational units must respond effectively to any degree of conflict at any location in the world.
- That superimposed upon the above requirements were the ever-present budgetary constraints within which the logistics system must operate.

The Air Force officials believe that the present logistics systems will not achieve the increased overall effectiveness demanded in the future. They contend that system improvements are limited by existing computers which are saturated by current work load volume. The Air Force officials believe also that improved management techniques, coupled with the potentialities of advanced computers, have outmoded the present data systems. They believe further that the need for increased logistics flexibility and responsiveness dictates that the present systems be redesigned on a total single-system basis and be modernized with advanced data processing equipment and new management techniques.

The Air Force expects a number of benefits from full implementation of ALS. Included in these benefits are:

- Improved visibility and control over centrally procured Air Force items that are repaired at base or depot levels.
- Increased distribution of on-hand assets to users having the greatest need.
- Faster processing of more current, accurate logistics data.
- Improved requirements computations resulting from accurate failure rate and asset analyses.
- Reduction in resupply time and in the quantity of assets required to fill the supply pipeline.
- Improved capability to allocate resources.
- Reduction in the need to update numerous data files for the same data through the use of a single, unified data bank.
- Reduction in the number of inconsistencies now caused by updating separate data files at different times.

ALS will consist of six computer complexes which are to be located at the Logistics Command and at five Air Materiel Areas, located at Tinker Air Force Base, Oklahoma; Hill Air Force Base, Utah; Kelly Air Force Base, Texas; McClellan Air Force Base, California; and Robins Air Force Base, Georgia. A Nuclear Ordnance Logistics Support System computer to be located at Kelly Air Force Base, also is planned.

Our review was limited because no vendor had been selected and no computers had been installed. Consequently, we were not able to obtain data from actual operating experience by the Air Force. We did, however, identify potential problems that may affect the implementation and costs of ALS. (See pp. 18 and 19.)

The Air Force Scientific Advisory Board Information Processing Panel reviewed ALS. We reviewed the Panel's

report dated August 20, 1970, and noted that the conclusions and recommendations included in it coincided, in general, with our observations and conclusions.

CHAPTER 2

EVALUATION OF SYSTEM PLANNING AND COMPATIBILITY

The Air Force seems to have considered its management needs by identifying existing and potential problems in the current logistics management system and planning to eliminate them in ALS. It seems also to have made adequate provision for interface with other systems. ALS, however, had not been developed to the point where we could determine whether it would interface and be compatible with other systems.

LIMITATIONS OF CURRENT SYSTEMS

The Logistics Command has stated that it is restricted in its ability to improve its logistics management because of (1) the limitations and work load saturation of the Logistics Command's second-generation equipment, (2) the diversity of systems currently in existence, and (3) the duplication of data required under the current systems.

As of January 31, 1970, the Logistics Command had 430 different data systems and 133 computers of 21 different models manufactured by seven different vendors. About 120 of these computers were utilized in support of the Logistics Command's logistics operations. ALS will replace 91 of these computers.

According to the Logistics Command, the output of second-generation computers often contains conflicting and outdated data. The Command stated that this was caused by the need to arrange data in sequence before it could be processed. Currently, obtaining data for one-time management reports is costly and results in the production of voluminous data and thus reduces effectiveness.

For example, a recent one-time requirement was to obtain data to make a cost evaluation concerning the Vietnamization program. This was estimated to require about 3,000 hours of programming effort and 150 hours of computer time. The Logistics Command stated that under ALS no programming effort would have been necessary and only 5 hours of computer time would have been required.

In June 1966, the Logistics Command recognized what it considered to be a pending crisis in that work load demands would soon exceed the processing capability of the existing second-generation computers. To resolve this problem on an interim basis, the Logistics Command leased four third-generation computers. Logistics Command officials stated that without ALS another crisis undoubtedly would occur in the future.

The Logistics Command believes that the limitations of second-generation computers place it in the position of reacting to known problem areas rather than predicting and taking corrective action before the problem gets out of control. According to the Logistics Command, the system concepts and requirements included in ALS can be realized only through the use of advanced third-generation data processing equipment. The Logistics Command believes that this equipment can meet requirements by (1) providing the rapid response necessary to influence in-process logistics actions, (2) providing a variety of configurations to meet the demands of separate locations and conditions, (3) allowing two or more operations to be processed simultaneously, and (4) providing direct access to data from remote stations. We were informed by a leading computer manufacturer that the capabilities of third-generation computers include all the foregoing attributes.

COMPATIBILITY

We noted that the Logistics Command had made considerable effort in its planning and actions to date in identifying ALS compatibility¹ requirements and had established procedures for controlling design changes to other Air Force systems resulting from those compatibility requirements. Although it appears that ALS can be developed into a

¹Compatibility may be viewed from the standpoint of concepts and mechanics. In terms of concepts, compatibility refers to one system's being complementary to, or integrated with, another system. Mechanics would include such items as programming languages, data elements and codes, and hardware configuration.

conceptually and mechanically compatible Air Force computer system, we believe that this area should receive continued close management attention since it has been a problem in other military computer systems.

ALS is a Logistics Command internal system which will replace many existing systems. It must accommodate Department of Defense military standard input and output and must directly interface, and be compatible with, certain areas of four systems external to the Logistics Command. These systems are:

1. The Standard Base Level Automated Inventory Control System which uses the UNIVAC 1050-II computer. This is the most widely used base system.
2. The Base Level Supply System, a punched card system, used at smaller bases.
3. The Accounting and Finance System for Operations as it pertains to Logistics Command operations.
4. The Defense Logistics Services Center system.

The base supply systems and the Defense Logistics Services Center system are operational. The Accounting and Finance System for Operations is not expected to be fully operational within the Logistics Command until about February 1971.

The base supply systems and the Accounting and Finance System for Operations are Air Force standard systems under the design cognizance of the Air Force Data System Design Center. This Center and the Logistics Command have established procedures for ensuring the cooperation and coordination necessary for interfacing the ALS and Air Force standard systems.

Until April 1970, Logistics Command ALS development efforts had been directed toward interfacing ALS with the Defense Integrated Data System, which is a new materiel management system under development by the Defense Logistics Services Center at Battle Creek, Michigan. In April 1970, the Department of Defense approved an extension of the

Defense Integrated Data System implementation to May 1973. ALS is now being designed to interface with the current Defense Logistics Services Center system and will later be re-designed to interface with the new system when it becomes operational.

PRACTICABILITY OF ALS

The initial concept for ALS was developed by Logistics Command personnel late in 1966 and early in 1967. During the ALS concept development phase, Logistics Command personnel visited computer vendors and other firms that were designing and implementing major third-generation systems. These visits were made to ascertain whether the Logistics Command's conceptual approach was practicable.

The Logistics Command also used the services of several commercial consulting firms in developing ALS. Through June 30, 1970, about \$800,000 was spent for such services. In September 1967, the Logistics Command hired COMRESS, Inc., to assist in performing computer simulations of the concepts envisioned for ALS. The RAND Corporation, which also has been retained on a consulting basis, has provided the Logistics Command with general guidance on the design of ALS and has made specific design studies. In 1968, the Logistics Command contracted with Computer Sciences Corporation to obtain assistance in confirming its approach in such areas as system and equipment specifications, software,¹ operational concepts, functional design, and computer-selection techniques.

The Air Force has considered most of the system weaknesses discussed in prior GAO and Air Force audit reports in the design of ALS as being part of the Air Force's effort to ensure that known deficiencies in the current systems are not carried over to ALS. The Air Force Auditor General is evaluating ALS on a continuing basis and is providing assistance to ALS development personnel to inform them of system problems.

¹Software in ALS consists of those computer programs, routines, compilers, assemblies, and narrators which control the computer complex and provide the interface between the user and the equipment.

CHAPTER 3

IMPLEMENTATION AND TESTING

The Logistics Command plans to make a series of extensive tests prior to actual acquisition of ALS. These live-test demonstrations will provide information on which to base key decisions that might affect the timing and cost of implementation. It appears that adequate plans for testing have been made. Program-logic testing, as well as software testing, are planned before delivery of the first ALS computer.

Once these live-test demonstrations have been completed, the Air Force plan calls for acquisition of the equipment and its installation at the Logistics Command, five Air Materiel Areas, and Kelly Air Force Base during a 9-month period of operational testing of the complete system. The Air Force Scientific Advisory Board recommends acquisition and pilot testing of hardware and software at two locations before equipment is acquired for all locations.

IMPLEMENTATION

The Air Force issued a request for proposal in October 1969, which proposal was subsequently amended. Bids are due in April 1971. It is expected that, after a 4-month period for evaluation, a contract will be awarded in August 1971.

The first delivery of an ALS computer, which will be to the Logistics Command, is scheduled for March 1972. The Logistics Command stated that the first key-decision point would be reached during the testing at the Logistics Command and that the date for delivery of the ALS computer to the first, or pilot, Air Materiel Area would be decided on the basis of the testing at the Logistics Command. The implementation milestones (see p. 13) indicate that the computer is planned for installation at the pilot site 5 months after installation at the Logistics Command. The Logistics Command and the pilot Air Materiel Area plan to conduct individual and dual production tests.

The Logistics Command plans to recommend the delivery dates for the remaining ALS computers on the basis of the checking out and debugging of the basic ALS hardware and software at the pilot site and at the Logistics Command. The implementation milestones indicate that installation of the computers at the second and third sites and at the fourth and fifth sites are now planned for 3 and 4 months, respectively, after the computer is installed at the pilot site.

Implementation delays

ALS was programmed for phased implementation over the 4-1/2 to 5 years following the issuance of the request for proposal in October 1969. A comparison of the originally planned implementation dates with the most recently revised dates follows.

Air Force Implementation Estimates for ALS

<u>Dates estimates were made</u>	<u>March 1, 1968</u>	<u>May 26, 1969</u>	<u>April 30, 1970</u>	<u>August 7, 1970</u>
ALS key milestones:				
Release of request for proposal	2-17-69	7-16-69	10-27-69 ^a	10-27-69
Announcement of selected vendor	8-14-69	3- 1-70	12-24-70	8-24-71
Installation of computers:				
At Logistic Command	2-28-70	9- 1-70	7- 1-71	3- 2-72
At pilot site	9-17-70	2- 1-71	11-24-71	8- 2-72
At second and third sites	12-31-70	5- 1-71	2-24-72	11- 2-72
At fourth and fifth sites	12-31-70	6- 1-71	3-24-72	12- 2-72
Implementation of system:				
First-step testing	12-31-70	7- 1-71	7-24-72	4- 2-73
Second-step testing	12-31-71	7- 1-72	7-24-73	4- 2-74
Third-step testing	12-31-72	7- 1-73	7-24-74	4- 2-75

^aActual date.

As shown above, there has been an overall delay of over 2 years in the planned implementation dates. According to the Logistics Command, this delay has been caused by:

1. Additional time needed for the development of equipment specifications.

2. Late issuance of the request for proposal.
3. Additional time allowed for vendor evaluation of, and response to, the request.
4. Additional time allowed for testing, converting the old system to the new, and training.

TESTING

Live-test demonstration

The Air Force has planned live-test demonstrations by interested bidders prior to the final selection of a vendor. The request for proposal requires that each bidder demonstrate, in a live-test environment, the capabilities of its proposed system using only hardware and software components proposed for the total system. The test is to be a timed demonstration and is to contain system performance specifications embodied in four specially designed problems which are representative of the total work load requirements of ALS. This test will provide a basis for determining whether the proposed system will meet the work load requirements specified in the request for proposal. For a bidder to be eligible for further consideration, its system must satisfactorily pass the test.

Operational Testing

The Logistics Command has stated that ALS cannot be pilot tested or implemented at only one site, because it would not be in an environment representative of actual operating conditions. The portion of ALS located at each of six sites is interdependent on the portions of the system at all the other sites, and therefore a meaningful test should include the system's operating at all six sites.

In its report on ALS, the Air Force Scientific Advisory Board Information Processing Panel did not agree that the test should include the system's operating at all six sites. Rather, the Panel concluded that the hardware and software should be pilot tested at two sites before they are acquired and gradually installed at other sites.

The ALS master plan envisages the conversion from the present automated logistics management system to ALS taking place in two major steps. The first step, beginning 6 months after the award of contract, and estimated to last about 1 year, consists of installing and testing of hardware and software at the Logistics Command, five Air Materiel Areas, and Kelly Air Force Base. During this first step of testing, the existing system will continue to carry the full logistics work load. For 1 year the current system and ALS will exist side-by-side; the current system will be carrying out the

day-to-day logistics work load while the ALS, although completely installed, will be running only testing problems and programs. The Air Force estimates that it will cost about \$53 million in phase out costs for the current system during that year of dual performance.

The first step of testing is estimated to incorporate about 60 percent of the total ALS program logic and about 75 percent of the first year's ALS work load. Successful completion of the first step of testing would result in the simultaneous and instantaneous cutover of ALS at all locations--at which point in time the ALS would become the sole operational logistics system. The Logistics Command presently plans this for April 1973. In the second step, ALS will take on the remaining programs and processes gradually over a 2-year period.

The report dated August 20, 1970, of the Air Force Scientific Advisory Board Information Processing Panel on its review of the Advanced Logistics System stated, in part, that:

"We believe that the nominal ALS schedules are very stringent. Our concern about the ALS phasing, however, is more fundamental than the length of the schedules: the content of the ALS Testing Program appears to the Panel to have been planned on the assumption that the selected ALS design will perform as desired. *** The evidence accumulated for the past fifteen years of computer systems development is too well known and overwhelmingly one-sided against such an expectation.

"It would be more realistic to assume that the LTD [live-test demonstration] cannot be a conclusive test, and that the initial system design will require considerable refinement, and possibly some modifications, which will become known only when the system is subjected to actual, full load conditions. We must emphasize that we are not talking about checkout and debugging, but adjustments in the hardware *** and software to make the system meet the workload, availability, and other performance criteria stipulated by the RFP [request for proposal]."

The Air Force Scientific Advisory Board recommended a modified ALS testing program schedule, which we endorse, of (1) acquisition and installation of hardware and software at two sites--the Logistics Command and a pilot Air Materiel Area--as fast as possible, (2) completion of testing, checking out and debugging under operational load at those two sites and adjustment, as necessary, of the software design and equipment configuration, to be followed by (3) acquisition and installation of the hardware configuration as determined by the testing in step (2) at the remaining Air Materiel Areas and at Kelly Air Force Base and continuation of ALS testing program at those sites.

Air Force officials believe that the modified testing schedule recommended by the Air Force Scientific Advisory Board is worthwhile and is similar to their own plan. The Air Force, intends to acquire all the systems needed at one time, rather than delay acquisition of five systems until the first two have been tested and proven, as the Board suggested.

ALS AND THE BLUE RIBBON DEFENSE PANEL REPORT

The report to the President and to the Secretary of Defense on the Department of Defense by the Blue Ribbon Defense Panel, chaired by Mr. G.W. Fitzhugh, recommended, among other things, that a Logistics Command at the Office of Secretary of Defense level be directed to develop, under the policy guidance of the Assistant Secretary of Defense (Telecommunications), an automatic data processing logistics system to encompass supply distribution elements that can be shared among the military services and that all development and procurement activity toward separate automatic data processing logistics systems not essential to support impending operations be suspended.

We discussed this matter with Air Force and Office of the Secretary of Defense officials and inquired whether they felt that ALS was one of the automatic data processing logistics systems that should be stopped. It was their opinion that ALS would not be affected by the Panel's recommendation (1) because ALS was needed to support impending operations and (2) because, before a single automatic data processing system could be developed, the logistics organizations of the military departments would have to be changed.

CHAPTER 4

SOFTWARE

There are strong indications that problems may be encountered in obtaining and implementing adequate computer software.

Conferences were held with vendor representatives in April and June 1969 to discuss their questions on software requirements. During these conferences one vendor indicated that the software requirements might be beyond the state of the art. Another said that, even if the hardware could be assembled, there was a serious question on the availability of adequate software. Still another vendor stated that one part of the software was not available off the shelf, would take at least 1 year to design, and would be costly. This vendor asked for a change in the proposal to extend to 1 year after the contract award the delivery date for this part of the software. The request for proposal originally specified delivery of this part of the software about 2 months after the contract award. Another vendor stated that the ALS software requirements were a phenomenal step forward in software design but nevertheless were feasible.

The ALS specifications required that the vendors propose a single, totally integrated processing system in which the functions accomplished at each site, with one exception, would be identical and that the systems proposed consist of components--both hardware and software--selected from off-the-shelf systems. Regarding the apparent inconsistency between the vendor response indicated above and the off-the-shelf requirements in the ALS specifications, the Logistics Command stated that it was not intended that "off the shelf" be interpreted literally. Some software development was expected. The Logistics Command intended that adequate software be available within a reasonable time after the award of the contract and that adequate software be made available in sufficient time to avoid serious delays in proceeding with the implementation of ALS.

Although the Air Force has stated that adequate software could be made available, we believe that the matter of adequate software may present serious problems. We believe

also that our view is strengthened by the recent experience of a major airline company in its procurement of advanced computer equipment. This company canceled a \$56 million contract with a major vendor for a large-scale, multifunction data processing system in the wake of recurrent delays, principally in software implementation and data security provisions.

We believe that the matter of adequate software poses a potential problem. During discussions with the Logistics Command, we raised a question concerning the reasonableness of delivering the first ALS computer prior to fully testing the vendor software. Initially, the Logistics Command planned that the vendor-developed software would be available for testing at the vendor's facility 2 months after the contract award. When the request for proposal was released, the vendor's software delivery date was changed to 6 months after the contract award. As a result, the availability of this software would coincide with the first installation of computer equipment at the Logistics Command. Consequently, the first full testing of the vendor's software was scheduled to be done at that site.

After our inquiry the Air Force advised the competing vendors of a proposed revision in the vendor's software delivery date to be incorporated in the request for proposal. This revision would require that the vendor's software be demonstrated before the contract is awarded. This demonstration would become an important factor in selecting a vendor for the contract award. In August 1970, the request for proposal was amended to include this requirement.

We believe that the adequacy of the ALS software will be a critical factor in the overall success of the system. The Air Force's action to advance the availability and demonstration of the vendor's software prior to the award of the contract is desirable.

An August 1970 amendment to the request for proposal, which the Air Force plans to make part of the contract, provided that, in the case of failure of vendor's hardware or software to meet agreed-upon criteria of performance (work load requirement), the vendor supply, at no extra cost, the necessary equipment to make up the deficiency.

We believe that this provision will help to protect the interests of the Government and should be included in the contract with the successful bidder.

CHAPTER 5

COSTS AND SAVINGS

ALS has not been separately programmed and funded since its inception in fiscal year 1967, and therefore it is difficult to identify all costs of the project. Past funding for ALS has been largely from operation and maintenance appropriations.

The estimated costs to develop, implement, and operate ALS were furnished to us by the Air Force in a cost-benefit study, dated September 30, 1970, and supplemented December 3, 1970. This study included data on the number of personnel required to operate ALS and on the expected savings.

The Air Force cost-benefit study compared the cost of operating ALS with the cost of continuing the present systems augmented by additional computers and personnel at appropriate points in time. Costs shown in the study were based on current prices and were not adjusted for anticipated price-level changes.

The cost study showed that, in a project of the magnitude of ALS, which has a lengthy period of implementation, there would be changes which would affect data in the study and that revisions to the study would be necessary. A summary of the cost-study results, which covers fiscal years 1967-79, is presented below. (Only a limited verification of this cost data was made.)

Estimated ALS Cost, Current System Cost, and
ALS Savings for Fiscal Years 1967-79 (note a)

	Amount
	(millions)
Cost to implement ALS:	
Development cost	\$125.9
Operational cost	\$571.1
Current-system cost during phaseout	<u>124.4</u>
Total operational cost	<u>695.5</u>
Total ALS cost	821.4 ^b
Less cost to remain on the current system (note c)	<u>708.5</u> ^b
Net cost to implement ALS	112.9
Estimated savings to result from ALS:	
Elimination of 3,007 functional per- sonnel spaces	125.1
Reduction in spare-parts procurements	91.9
Overall management improvement	<u>40.0</u>
Total estimated ALS savings	<u>257.0</u>
Net savings to be realized from implement- ing ALS	<u>\$144.1</u>

^aIncludes only first 8 months of FY 1979.

^bIncludes about \$425 million of current-system costs, consisting primarily of current-system personnel costs which will be incurred whether the current system is continued or ALS is implemented.

^cBased on augmenting current system to absorb estimated 6.2-percent work load increase each year.

Note: A time-phased schedule by fiscal year is included as app. I.

DEVELOPMENT COSTS

A detailed summary of the estimated development costs included in the cost-benefit study for fiscal years 1967-75 is as follows:

	Amount (<u>millions</u>)
Automatic data processing personnel	\$ 88.4
Mission personnel	19.4
Training (note a)	9.6
Automatic data processing equipment	1.9
Travel	2.5
Facilities	2.3
Contract services (note b)	1.2
Communications	0.5
Miscellaneous support	<u>0.3</u>
Total estimated development costs	<u>\$126.1</u> ^c

^aIncludes \$0.7 million for facilities and equipment.

^bIncludes about \$0.8 million through June 30, 1970, for contracts with COMPRESS, Inc., Computer Sciences Corporation, Computer Command and Control Company, and RAND Corporation.

^cDue to rounding, this amount is \$200,000 more than that shown in the Air Force study and on p. 22.

The Air Force stated that about \$92 million of the above development costs would be incurred, regardless of ALS. For example, the total estimated development costs include about \$69 million for automatic data processing personnel who would normally be working on the current system, to improve and maintain it, but who are now working on the development of ALS. The Logistics Command believed that it could maintain the current system without serious problems until ALS was implemented, even though the planned personnel use will have some adverse effect on the current system.

The Air Force estimate of actual costs expended as of June 30, 1970, in developing ALS is as follows:

	Amount (<u>millions</u>)
Personnel	\$29.4
Travel	0.8
Computer usage	0.5
Contract services	0.8
Facilities, printing, and other costs	<u>1.6</u>
 Total estimated actual develop- ment costs	 <u>\$33.1</u>

OPERATIONAL COSTS

The Air Force estimate of ALS operating costs was based on a 7-year system life covering the period March 1, 1972, to February 28, 1979, and on implementation for the first phase in April 1973. A summary of the Air Force estimated ALS operating costs for the 7-year system life is as follows:

	Amount (<u>millions</u>)
Automatic data processing personnel	\$275.0
Automatic data processing equipment rental	271.9
Automatic data processing equipment supplies	16.6
Communications	4.6
Travel	2.2
Facilities	0.4
Contract services	0.2
Miscellaneous support	0.2
Phaseout cost of current system (note a)	<u>124.4</u>
 Total estimated operating costs	 <u>\$695.5</u>

^aCost of operating those computers to be replaced by ALS during the period March 2, 1972, to June 30, 1975. About \$53 million pertains to the period of about 1 year during which ALS computers will be installed but will not be processing any current-system work load.

The estimated automatic data processing personnel cost of \$275 million includes \$26.6 million for the cost of 425 personnel estimated by the Logistics Command to be needed for operating the ALS computers. The balance of this cost, or \$248.4 million, represents the cost of programmers, system analysts, and others who will be required for operating and maintaining ALS during fiscal years 1973-79.

The automatic data processing equipment rental cost of \$271.9 million was estimated by the Air Force. It used system and computer evaluation and review technique simulations, which technique is a special-purpose computer program for evaluating computer hardware.

According to the Air Force, the equipment rental cost was used in computing the estimated operating costs for the ALS equipment because the best method of financing cannot be determined until the bidder proposals are received in April 1971. Bidders will furnish data on the cost of renting the equipment versus the cost of purchasing the equipment. The Air Force will have the option of either renting or purchasing the equipment proposed by the bidders.

Our review revealed that the rental prices used for the computer configuration included in the simulations were based on the prices shown in the latest available General Services Administration supply schedule. We did not review the validity of the configuration or other data used in the simulation.

ESTIMATED SAVINGS AND PERSONNEL REQUIREMENTS

As shown in the Air Force cost study, the cost to develop and operate the ALS will exceed the cost to operate an augmented current system over the same period by \$112.9 million. The additional cost of \$112.9 million to acquire ALS is expected by the Air Force to be offset by about \$257 million in savings (see p. 22), which will result in net savings of \$144.1 million. According to the Air Force, these savings consist of net budget savings of \$104.1 million and indirect savings of \$40 million from improved operation.

Potential personnel reductions shown in the Air Force cost study were based on a percentage of the Logistics Command's 1968 mission manpower authorization levels. According to the Air Force, personnel reductions subsequent to 1968 were not considered in the cost study. The Air Force noted that reductions of 1968 manpower levels may result in a reduction in savings actually achieved.

The Air Force estimates that, with the implementation of ALS, 4,330 authorized spaces will be eliminated and 1,323 new remote-operator positions for new functions will be added, which will result in a net reduction of 3,007 functional personnel spaces at savings of \$125.1 million. The Government's contribution to civilian employee benefits are not included.

The Air Force determined impact of the personnel reduction by comparing the current logistics system with that proposed under ALS. Although we did not verify the validity of the estimated personnel reduction, the methodology followed by the Air Force in arriving at this estimate appeared reasonable.

Although the study supporting the estimated reduction was made late in 1968, we were advised by the Comptroller of the Logistics Command that the base period was considered still valid. We were told by the Commanding General of the Logistics Command that he was firmly committed to the personnel reduction.

The estimated reduction of \$91.9 million in the procurement of spare parts under ALS is based on a 1-percent

reduction in the 1975 budget and a 3-percent reduction in the annual budget request for spare parts during the period 1976-79. According to the Logistics Command, the 3-percent reduction in funding requirements represents the budgetary impact of more timely and accurate data on such areas as available inventory, usage information, maintenance factors, shop-flow times, and improved failure data. Although the 3-percent reduction in spare-parts requirements is based on judgment, it appears reasonable to expect some reduction in material requirements if the stated objectives of ALS are achieved.

The estimated savings of \$40 million for overall management improvement represents the Air Force estimate of reduced inventory requirements over the life of ALS due to improved responsiveness, control, accountability, overhaul projection, and redistribution capability. These factors cannot be accurately appraised as budget reductions in advance of ALS implementation.

APPENDIX

TOTAL COSTS AND BENEFITS BY FISCAL YEARS

<u>Cost category</u>	<u>Before 1971</u>	<u>1971 (note a)</u>	<u>1972 (note b)</u>	<u>1973</u>	<u>1974</u>
	(000 omitted)				
Total ALS one-time and development costs	\$33,119	\$20,976	\$24,851	\$ 24,270	\$ 12,648
Total ALS operations costs	82	224	2,002	31,864	64,540
Total costs of operations of current systems during phaseout	-	[64,262]	19,436	51,080	31,196
Total new system cost	33,201	21,200	46,289	107,214	108,384
Total operations costs of augmented current systems	<u>20,765</u>	<u>14,728</u>	<u>40,806</u>	<u>87,289</u>	<u>89,672</u>
Net cost of new system	12,436	6,472	5,483	19,925	18,712
Total tangible benefits	-	-	-	-	<u>10,038</u>
Net tangible benefits	-12,436	-6,472	-5,483	-19,925	-8,674
Management Improvement (note d)	-	-	-	-	-
Overall net benefits	<u>-\$12,436</u>	<u>-\$6,472</u>	<u>-\$5,483</u>	<u>-\$19,925</u>	<u>-\$8,674</u>

^aFiscal year 1971 total costs of operations of current system during phaseout (\$64,262,000) is not included in the total cost of ALS, as it accrues before the 7-year economic life (May 1, 1972, to Feb. 28, 1979). If it were included, an identical amount would need to be added to the fiscal year 1971 total operations costs of augmented current systems.

^bIncludes last 4 months of fiscal year 1972 only for total costs of current systems during phaseout and total operations costs of augmented current systems.

^cIncludes only first 8 months of fiscal year 1979.

^dIncludes reduction of spare-parts inventory over the ALS life. The \$40 million was not time phased by the Air Force and is included under fiscal year 1979.

<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u> <u>(note c)</u>	<u>Total</u>
(000 omitted)					
\$ 10,041					\$125,905
76,964	\$107,345	\$106,566	\$108,575	\$72,956	571,118
<u>22,731</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>124,443</u>
109,736	107,345	106,566	108,575	72,956	821,466
<u>94,087</u>	<u>98,833</u>	<u>96,149</u>	<u>98,489</u>	<u>67,748</u>	<u>708,566</u>
15,649	8,512	10,417	10,086	5,208	112,900
<u>30,389</u>	<u>47,640</u>	<u>48,347</u>	<u>48,347</u>	<u>32,214</u>	<u>216,975</u>
14,740	39,128	37,930	38,261	27,006	104,075
<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>40,000</u>	<u>40,000</u>
<u>\$ 14,740</u>	<u>\$ 39,128</u>	<u>\$ 37,930</u>	<u>\$ 38,261</u>	<u>\$67,006</u>	<u>\$144,075</u>

