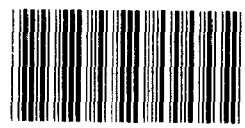
GAO

Report to the Secretary of Defense

October 1986

TACTICAL AIRLIFT

Air Force European Distribution System—Lessons Learned



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GAO

United States
General Accounting Office
Washington, D.C. 20548

National Security and
International Affairs Division

B-203466

October 15, 1986

The Honorable Caspar W. Weinberger
The Secretary of Defense

Dear Mr. Secretary:

This report summarizes our observations and conclusions from our review of the Air Force European Distribution System. In general, these observations relate to certain planning issues which we believe should have been more effectively resolved prior to asking the Congress to fund the system. We also believe these observations will be of value in planning the other similar systems currently being considered by the Department of Defense.

This report contains recommendations to you in chapter 5. As you know, 31 U.S.C. 720 requires the head of a federal agency to submit a written statement on actions taken on our recommendations to the Senate Committee on Governmental Affairs and the House Committee on Government Operations not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We are sending copies of this report to the Secretaries of the Army, Navy, and Air Force. Copies are also being sent to the Director, Office of Management and Budget; the Chairmen of the Senate and House Committees on Armed Services; and other appropriate congressional committees.

Sincerely yours,

David A. Littleton

Frank C. Conahan
Assistant Comptroller General

Executive Summary

Purpose

The U.S. Air Force plans to spend an estimated $1.3 billion to develop, acquire, and operate its European Distribution System (EDS). EDS, the first of several similar Air Force spare parts distribution systems being considered with aircraft dedicated to Air Force use, departs from the traditional, multiservice airlift concept. GAO reviewed the Air Force's planning for EDS; system performance capabilities, including planned use of the aircraft; and system cost growth. GAO's overall objective was to identify lessons learned which can be applied to future distribution systems and opportunities to improve EDS operation.

Background

EDS evolved out of the Air Force's desire for greater assurance that spare parts will be available to keep tactical aircraft operational in Europe during wartime. EDS will consist of an automated logistics command, control, and communications (LOG C^3) system; three spare parts warehouses; and 18 C-23A aircraft. Through EDS' rapid movement of spare parts and engines between about 100 bases, from 15 to 300 additional operational tactical aircraft were expected to be available daily in the early stages of a European war. The system began initial operations in March 1985 with six aircraft and one warehouse in the United Kingdom; the LOG C^3 was still being developed as of April 1986.

Results in Brief

The Air Force did not thoroughly plan EDS. Some issues regarding EDS' design and intended uses, including geographic coverage, were not resolved, and its peacetime and wartime operational plans were not completed at the time of this review. While EDS will improve the Air Force's capability to keep tactical aircraft operational, it will be less effective and much more costly than the system originally justified to the Congress.

Dedication of EDS aircraft to the support of Air Force tactical aircraft should be reexamined. The U.S. European Command (USEUCOM) is examining the possible use of EDS aircraft by other services in peacetime. GAO believes the analysis should be expanded to cover wartime use by the other services and interested North Atlantic Treaty Organization (NATO) allies.

Future EDS-type distribution systems should be thoroughly justified and properly planned before proceeding into development and implementation. The issues discussed in this report could and should have been resolved during EDS planning and development with proper analysis and compliance with Department of Defense (DOD) guidance.

Principal Findings

System Planning

The Air Force approved and began implementing EDS without sufficient planning and analysis to determine such matters as how the system would operate in peacetime and wartime, the number of aircraft needed, the extent to which the aircraft should transport engines, the spare parts to be stocked in EDS warehouses, and the amount of warehouse space needed.

Performance Capabilities

EDS will probably not be able to serve all of Europe, as intended. There continues to be a question as to the extent of geographic coverage that will be provided. Other capabilities envisioned also may not be realized. For example, the C-23A is too small to carry some aircraft engines, and safe loading of any engine involves a minimum of three skilled workers and close tolerances, making routine transport of the engines impractical.

Spare Parts Storage

The Air Force planned to initially stock only essential consumable items in the warehouses in quantities based on high priority needs. These criteria were not followed for various reasons and additional items and quantities have been selected for storage. This may lead to stocking excess items. For example, a random sample by GAO of 85 items shipped to the first EDS warehouse showed more than a 3-year supply for about half of the items.

Storage Site Requirements

The Air Force did not analyze its EDS storage site requirements when it decided on three 20,000 square foot warehouses. As a result, excess storage space may be acquired. For example, at one location where construction of an EDS warehouse is planned, sufficient storage space is apparently available in a nearby U.S. leased commercial warehouse.

Expanded Roles for EDS

The Air Force did not coordinate its need for EDS with other services and allies in accordance with DOD guidance to permit its most cost-effective use. Although DOD has stated that more wartime airlift is needed in Europe, the Air Force did not intend that EDS carry cargo for others. Such potential exists since EDS aircraft will use many facilities in close

proximity to other U.S. and allied military activities. The Senate Committee on Appropriations directed USEUCOM to examine the possible use of EDS aircraft by all the services.

EDS Cost Growth

EDS cost estimates for fiscal years 1983-87 increased from $120 million to about $196 million between May 1982 and January 1985. One reason for the cost growth was the purchase of a larger aircraft than initially planned. Originally the 18 EDS aircraft and initial spares were estimated to cost $44 million; actual costs were about $65 million. Also, EDS' LOG C^3 will require at least $51 million more funding to achieve full wartime capability, bringing the total increase in the original cost estimate to about $127 million.

Reprogrammings of $19.9 Million

To help cover these increased costs, the Air Force simultaneously reprogrammed to the EDS just under $10 million in both fiscal year 1983 and 1984 funds, a total of $19.9 million. DOD regulations require consent from the House and Senate Committees on Appropriations and on Armed Services when a procurement reprogramming is $10 million or more. Therefore, although DOD had to notify the congressional committees of the reprogramming actions after they were accomplished, it did not have to obtain their consent.

Recommendations

GAO recommends that the Secretary of Defense:

- Direct the Air Force to thoroughly justify and properly plan other EDS-like systems considered in the future before proposing that funds for developing them be requested from the Congress. The justification and planning of such systems should consider the needs of all potential users and be directed toward preventing the types of problems encountered by EDS.
- Direct the Joint Chiefs of Staff (JCS) and the Air Force to require their respective subordinate commands (i.e., USEUCOM and U.S. Air Forces in Europe) to complete EDS peacetime and wartime operating plans and integrate them into theater-wide plans, after first fully assessing the system's potential to serve U.S. and allied needs; limitations of the system's aircraft; the need for improved forward stockage criteria; and number, size, and locations of the warehouses needed.

Agency Comments

In commenting on this report, DOD agreed with the intent of the first recommendation. However, it viewed the circumstances and issues surrounding the formation of EDS as development challenges inherent in a complex evolutionary program that should not be defined as problems due to inadequate planning. DOD disagreed with the second recommendation, taking the position that EDS planning was thorough and complete and that, except for the congressionally directed evaluation of the potential for EDS use by other military services, no further assessment is needed. DOD, however, noted that inclusion of EDS in war plans is proceeding.

GAO continues to believe that EDS planning could have been improved and that its recommendations should be implemented. Most of the problems discussed in this report should have been more completely addressed during the EDS planning phase. Also, at that time, the system's potential to serve broader, theater needs should have been considered. However, since they were not, they should be now.

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Appendixes

Tables

Figures

Abbreviations

AFLC	Air Force Logistics Command
DLA	Defense Logistics Agency
DOD	Department of Defense
EDS	European Distribution System
GAO	General Accounting Office
GSA	General Services Administration
JCS	Joint Chiefs of Staff
LOG C^3	logistics command, control, and communications
MAC	Military Airlift Command
NATO	North Atlantic Treaty Organization
OSA	operational support airlift
USAFE	U.S. Air Forces in Europe
USAREUR	U.S. Army, Europe
USEUCOM	U.S. European Command

Introduction

The European Distribution System (EDS), which began operations in March 1985, evolved out of the Air Force's determination that it needed increased assurance that critical assets, such as spare parts and engines, would be available at specific bases where they were needed to keep U.S. tactical aircraft in Europe operational during wartime. By using an automated logistics command, control, and communications (LOG C^3) system, which will connect European air bases, additional parts storage locations, and relatively small cargo aircraft dedicated to Air Force use, the Air Force believes the system will expedite the location and distribution of parts and engines, available within the European theater, to the bases needing them. Formerly, in-theater distribution was dependent on communications and transportation means that were considered too slow, and needed material often had to be obtained from sources in the United States. This report discusses the planning and status of EDS, potential improvements in its operations, and ways to avoid repeating certain problems in developing similar distribution systems in the future.

EDS Planning, Cost, and Status

Formal planning for EDS began in July 1979 when the Air Force commissioned The Rand Corporation to evaluate the potential benefits to the Air Force of increasing the responsiveness of its logistics transportation support in the European theater. Rand, which had done an extensive amount of related research for the Air Force during the 1970s, performed the study and published its results in December 1981. Rand concluded that, if intratheater logistics transportation in Europe could provide timely and mutual support among bases, from 15 to 300 additional operational tactical aircraft would be available each day for the first 30 days of a conflict.

In the fiscal year 1983 budget, the Air Force proposed the EDS to provide wartime intratheater airlift of critical spare parts and engines to support U.S. tactical aircraft at about 100 European airfields. The Air Force used the results of the Rand study extensively during the budget process to justify its need for EDS. The Congress approved $9.1 million for fiscal year 1983 to begin developing and implementing the system.

EDS consists of a LOG C^3 system to facilitate tactical aircraft spare part identification and distribution decisions; storage sites with inventories of parts to augment stocks of parts located at air bases; and 18 small, off-the-shelf, commercial cargo aircraft.

A logistics readiness center, located at the U.S. Air Forces in Europe (USAFE) headquarters, Ramstein, Federal Republic of Germany (Germany), was established as a focal point for EDS operations. When a base is unable to provide a spare part that an aircraft needs to perform its mission, the base will use the EDS LOG C^3 system to (1) determine which other European bases have the necessary part, (2) "search" supply systems at other bases to locate the part, and (3) request release and shipment of the part. USAFE's logistics readiness center will resolve any release disputes between bases. If no base has the part, the base needing the part will follow a similar procedure to query EDS storage sites and to obtain the part, if available, from one of them. The transportation officer at the base or storage site releasing the part will decide whether to ship it by EDS aircraft or one of the other transport modes available (e.g., Air Force scheduled flights or Army trucks).

Several organizations have been delegated responsibilities for implementing EDS, including the Military Airlift Command (MAC), which flies the EDS aircraft; and the Air Force Logistics Command (AFLC), Defense Logistics Agency (DLA), and General Services Administration (GSA), which provide spare parts and supplies to the storage sites. USAFE decides on and controls the specific parts transfers (i.e., items to be transported and sources and recipients of such items) through its logistics readiness center and the EDS LOG C^3 system.

EDS' estimated near-term and life-cycle costs are summarized in table 1.1. These costs, developed by AFLC and expressed in then-year dollars,[1] are discussed further in chapter 4.

Table 1.1: EDS' Estimated Costs

Dollars in millions

Program component	Near-term costs through fiscal year 1987	Life-cycle costs, fiscal years 1983 - 2002
Aircraft	$156	$853
Log C^3 system	28	408
Warehouses	12	52
Total	**$196**	**$1,313**

[1]Then-year dollars include estimated inflation.

The EDS aircraft, designated the C-23A by the Air Force (see figure 1.1), were manufactured by Short Brothers, Limited, of Belfast, Northern Ireland, which also provides logistics support for the aircraft at its C-23A maintenance facility at Zweibruecken, Germany, under contract with the Air Force. International Telephone and Telegraph's Federal Electric Corporation will design, develop, install, test, and maintain the LOG C^3 system. AFLC will operate the three EDS storage sites or warehouses, one of which is planned for each geographic region in Europe. These warehouses will be located at the Royal Air Force Kemble air base (an air base being used by the U.S. Air Force) in the United Kingdom and at sites in Zweibruecken, Germany, and Torrejon Air Base, Spain.

EDS began initial operations in March 1985, with six aircraft and one warehouse in the United Kingdom. The aircraft commenced routine deliveries in June 1985 and, as of July 1985, had flown 100 missions and carried over 121,000 pounds of cargo, including parts needed to improve the mission readiness of fighter aircraft, according to USAFE. The 18th EDS aircraft was delivered to the Air Force in December 1985. The first of the three planned EDS warehouses is being stocked with and has started distributing tactical aircraft spare parts. A second warehouse in Spain is under construction. The automated LOG C^3 system had only limited operational capability at the time our fieldwork was completed.

Air Force officials noted that other commands are considering assured distribution systems that would be similar in some ways to the EDS. According to these officials, EDS-type systems are being planned or considered for the Pacific Air Forces, Strategic Air Command, Alaskan Air Command, U.S. Southern Command, AFLC, and Air Force Surgeon General's office. These systems will add many millions of dollars to DOD's future budget requests.

Objectives, Scope, and Methodology

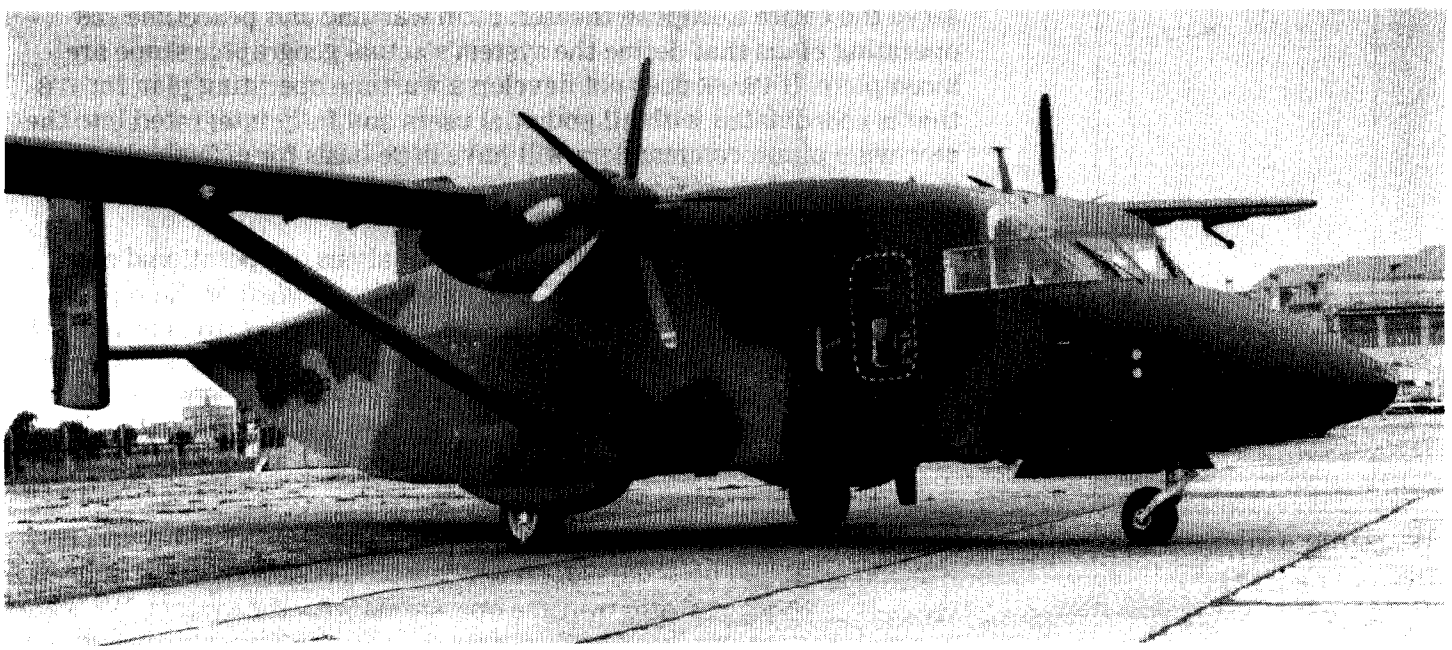
Our objectives were to (1) review the adequacy of the Air Force planning of EDS, (2) evaluate EDS performance capabilities, including the intended use of its aircraft, and (3) determine the reasons for EDS cost growth, with a particular view towards identifying lessons to be learned that can be applied to the acquisition of similar systems in the future.

We focused on Air Force justification and planning related to EDS, on whether the system design fully satisfies the stated requirements, and on actions taken to develop peacetime and wartime plans for operating the system. Because so little data were available, we could not assess the

other similar systems being proposed, although we did consider how the results of this review would be relevant to those systems as they are developed.

We examined DOD and Air Force policies, procedures, and practices applicable to (1) creating EDS, (2) justifying the system to the Congress and keeping it apprised of program changes and cost increases, (3) planning for the system's operation, and (4) implementing the system. To do so, we reviewed pertinent records and conferred with responsible officials at DOD and Air Force headquarters and supporting commands and organizations, including AFLC, in the United States and Europe. We also obtained information from and held discussions with officials of The Rand Corporation on the methodology of its study, which was the principal Air Force justification for EDS. Appendix I lists the organizations contacted and locations visited during the review. Because the LOG C^3 system was not fully operational, we did not evaluate its capability and adequacy, nor did we evaluate the procedures used in awarding the LOG C^3 contract or the performance under the contract. Our review, completed in April 1986, was performed in accordance with generally accepted government audit standards.

Figure 1.1: The C-23A Aircraft



Source: Department of the Air Force.

EDS May Not Be Able to Effectively and Efficiently Accomplish Its Intended Missions Because of Inadequate Analysis and Planning

The Air Force approved and began implementing EDS without sufficient planning for the (1) actual geographic coverage which could be achieved in peacetime and wartime considering the number of aircraft acquired, (2) extent to which the aircraft should carry spare engines, (3) types and quantities of spare parts to be stocked in-theater, (4) amount of warehouse space needed, and (5) LOG C^3 system. As a result, EDS operations will probably vary considerably from the system originally envisioned when justified to the Congress. For example, EDS aircraft may be unable to serve all of Europe or move engines efficiently. In addition, the system may stock unnecessary or inappropriate quantities of repair parts in Europe and create unnecessary warehouse space. Further, according to DOD, the cost of implementing the LOG C^3 system required to link the entire system will be at least $51 million more than previously estimated.

Anticipated Geographic Scope of EDS May Not Be Achievable

The Air Force, in its budget justification documentation and testimony, told the Congress that it would use EDS to serve about 100 European bases daily in wartime with 18 C-23A type aircraft. However, this may not be possible in view of the number and range of the aircraft bought for EDS. Rand Corporation and MAC studies of route structures envisioned EDS serving significantly fewer bases. Also, some Air Force officials stated that the present fleet of 18 C-23A aircraft was not designed to serve the entire European theater. Firm wartime and peacetime EDS operating plans that define the system's actual geographic scope are incomplete. If USAFE does not develop a wartime operating plan for EDS that is coordinated with all potential users and fully integrated into theater-wide plans, commanders will have little basis for effectively practicing wartime operations for the system.

The Air Force did not prepare a detailed analysis of operational need (i.e., the bases to be served; the level of service needed; or the number, types, and locations of the parts that require transport) to determine the number of aircraft needed. Air Force officials advised us that 18 aircraft were acquired because funding constraints prevented them from buying more and because an airlift squadron normally consists of 18 aircraft.

Wartime and Peacetime Plans for EDS

EDS was justified primarily on the basis of wartime need. However, no wartime plan had been developed which would enable USEUCOM and USAFE to practice realistic wartime operations with the system. We were advised that the Air Force will operate the system similarly during peacetime but in a much smaller geographic area. Under USAFE's overall

EDS concept, wartime operations will be managed by the USAFE Logistics Readiness Center. Part of the fleet of EDS aircraft will be deployed from the main operating base at Zweibruecken, Germany, to several dispersed operating locations. At the time of our review, USAFE was investigating the feasibility of a wartime deployment of three aircraft to one site in the northern European region, three to each of two sites in the central region, and three to each of two sites in the southern region. The remaining three aircraft could operate from a site in the Zweibruecken area in the central region.

USAFE's concept for wartime use of the EDS differed from both the Rand and the MAC route concepts. Rand considered one central operating base in Germany capable of serving 44 main and colocated operating bases, while MAC suggested that five central operating sites would be needed to serve 84 locations. The six-site plan being considered by USAFE did not offer assurance that the C-23A aircraft can provide effective service to the anticipated 100 locations, as discussed below. Also, the need for the EDS aircraft to serve Torrejon, Spain, is unclear because the Air Force does not plan to operate fighters from Spain during the early period of a conflict. Rand and MAC representatives stated that assigning a C-23A to the Spanish route would not be the preferred use of the aircraft because (1) the limited number of available C-23A aircraft would be more effectively used serving the critical needs of central Europe and (2) Spain will be served by C-130 aircraft. Appendix II contains a more detailed discussion of the relationships between EDS operational concepts and the related number of aircraft required.

At the completion of our fieldwork in April 1986, USAFE and MAC had not completed their EDS peacetime operating plan. USAFE officials gave us an EDS routing schedule based on an informal implementation plan. This schedule established five routes to serve USAFE main operating bases in the United Kingdom, Germany, the Netherlands, and Spain. One C-23A was also available to respond to unpredictable movement requirements. Two additional routes were anticipated to cover Italy, according to USAFE. As of August 1986, a firm EDS route structure still had not been established. In commenting on a draft of this report, DOD said that the Air Force's Operational Test and Evaluation Center was developing a model to assess the EDS wartime support system.

Effect of Aircraft Range on EDS Operations

The Air Force's ability to serve all of Europe daily with 18 aircraft is questionable. With a payload of 2,800 pounds, the C-23A has a maximum range of 789 nautical miles, allowing it to connect most, but not

all, of USAFE's operating locations without refueling. The bases in Greece and Turkey can be served by the C-23A from other locations in the southern region (e.g., Spain or Italy) only if the aircraft makes frequent refueling stops.

Some Air Force officials expressed concern that the range of the C-23A is inadequate for the southern region. In a June 1981 EDS planning conference, USAFE, AFLC, MAC, and Headquarters Air Force representatives generally agreed that 18 aircraft would probably not be sufficient to support an entire European war but could serve the central region. Distances to be traveled in the southern region were identified as a problem. A November 1981 internal MAC memorandum, written by the director of the Requirements, Movements and Reports Directorate in the Air Transportation group, also questioned the EDS aircraft's geographic coverage capability. This memorandum cited the need for a second aircraft type with greater speed, range, and cargo capacity.

In November 1982, the USAFE official who coauthored the EDS Statement of Operational Need and established the EDS program office at AFLC, informed USAFE and Headquarters Air Force that, because of funding constraints, the EDS aircraft range and payload criteria were tailored to satisfy only the most critical needs of the central region. In recognizing potential EDS shortfalls, he stated:

"I have no problem with the possibility of acquiring two sizes of the EDSA [EDS aircraft]. One for the short-haul missions in the central region and one for the longer legs required to connect the regions and to support the longer legs needed in other theaters in the future ...In my briefings I have always said that we would only use the EDSA to fly the long legs in the southern region if there was no other way to get the job done. But, that such a use of the EDSA would require frequent stops to refuel and extended response times so that routings over mostly land could be planned..." (Underscoring provided.)

This conclusion parallels an earlier Rand conclusion that "It might be more effective to employ a mix of aircraft—large aircraft for long and small aircraft for short networks..."

Finally, in a June 1984 position paper on the use of EDS in the southern region, USAFE's project director said that while the C-23A performance is adequate in northern and central Europe, the southern region could be more effectively served by an aircraft with greater range and speed. He also said that the Air Force must work to acquire a more capable aircraft for that region. Other USAFE officials, however, said that these comments represented only the opinion of the previous project director

and did not represent a command position. They stated that no plans exist to buy a longer range aircraft for EDS.

DOD advised us in April 1986, that a "more capable means of movement than the C-23A aircraft" is needed to serve some of the bases in southern Europe because of the distances involved. These bases will be served by interconnecting existing strategic and tactical airlift resources (e.g., C-130 and C-141 MAC flights), according to DOD.

EDS Engine-Carrying Capability Is Limited

The C-23A aircraft was selected for EDS, in part, because of its ability to carry tactical aircraft spare engines. However, its capability to perform that mission is limited. Although the C-23A can carry some aircraft engines, its use for this purpose may normally be impractical as the safe loading of any tactical aircraft engine on the C-23A requires a minimum of three skilled people and involves very close tolerances. Also, engine-loading tests indicate that the C-23A cannot carry some engines when they are configured for quick installation as required by USAFE, and trailers required to move engines on the ground may be unavailable at many EDS sites.

In October 1984, Air Force loading demonstrations of the C-23A showed its ability to carry the A-10, F-4, and F-15/F-16 engines. The F-111 engine could not be loaded during the test because it was heavier and was configured differently than the C-23A contractor was told it would be. Loading of the A-7 engine was not demonstrated because one was not available. According to the C-23A program manager, however, both F-111 and A-7 engines have subsequently been loaded and moved on the C-23A.

The C-23A engine loading test report concluded that, while selected tactical aircraft engines can be carried on the C-23A, routine use of the aircraft for this purpose is impractical. To illustrate, some engines had clearances of 1 inch or less as they were being loaded, which made loading extremely difficult. The test report further stated that comprehensive initial and continuing training must be implemented and should emphasize that the loading must be done slowly and clearances checked often. The report also observed that (1) the weights and configurations of the engines to be moved should be standardized since small variations in configuration could prevent loading on a C-23A, and (2) the F-111 engine would not fit in the C-23A in the quick engine change configuration.

Another drawback to moving engines with the C-23A is that an engine represents the maximum payload of a C-23A, which therefore effectively limits its availability for the other spare parts distribution mission. Moving an engine also cuts the range of the C-23A to about half of its long range mission capability, from 789 to 406 nautical miles. Further, with an engine on board, the C-23A cannot carry the support equipment or maintenance personnel that may be needed to change an engine. Therefore, two aircraft would be required to move an engine if support equipment or maintenance personnel must also be moved.

The trailer on which the engine is positioned for loading will not fit in the C-23A. Therefore, these trailers must be prepositioned at all sites where the engines will be loaded and unloaded. Air Force officials said these trailers will be available at the necessary sites in wartime. However, as of December 1984, USAFE had only 135 of the 174 trailers authorized. All but 9 of the 135 were located at 14 of the 23 main operating bases in Europe. Since EDS was planned to serve about 100 bases with critical spare parts including engines in wartime, the Air Force will need to either buy additional trailers or reposition the existing trailers as necessary with other than the C-23A.

Forward Stockage Issues Need to Be Resolved

EDS' spare parts forward stockage plan may result in inappropriate items and quantities being stocked in Europe. The EDS storage sites were intended to contain high-priority aircraft parts that would remain under wholesale level management control until requisitioned. However, AFLC, DLA, and GSA—the wholesale agencies responsible for selecting and supplying items—used different criteria to select the consumable items[2] and to determine the quantities for EDS storage at the Kemble warehouse. No decision had been made concerning which reparable items[3] would be stocked there at the time of our fieldwork concerning this issue.

Data on shipments through September 1985 showed that many of the items selected for forward stockage were not the high priority repair parts EDS was expected to carry. Also, based on past USAFE demands, over a 3-year in-theater supply was being stocked on 47 percent (40 of the 85) of the items we reviewed. Finally, the Air Force's stated need to have three forward stockage sites—a decision that was not supported by a detailed analysis—could create unnecessary EDS warehouse space,

[2]Consumable items are nonreparable items that are discarded when they malfunction.

[3]Reparable items are items that can be reconditioned or repaired for reuse when they become unserviceable.

because the Air Force had not determined analytically that it needed that much space.

Item Selection Criteria

AFLC decided to stock only consumable items at the EDS storage sites at the beginning so that system problems could be corrected before the higher priced reparable items were put in forward stockage. The EDS program office's initial criteria for selecting items were that (1) the items must have experienced 5 or more demands,[4] from USAFE bases in the previous 12 months and (2) at least one of the demands must have been high priority (i.e., a demand for an item that had grounded an aircraft). However, AFLC, DLA, and GSA varied from these criteria in selecting items for forward stockage.

AFLC revised the criterion of 5 or more demands in the past 12 months to 10 or more demands over the past 24 months because its computer records covered a 2-year history of such activity. When the computer program to select items was written, demands were translated into quantities demanded rather than number of requisitions received. We brought this matter to AFLC officials' attention in April 1985. Shortly thereafter AFLC stopped additional shipments of items to the Kemble air base storage site in the United Kingdom until it could correct the computer program to select items based on the number of requisitions received. In July 1985, AFLC told its air logistics centers to implement the corrected computer program.

DLA initially selected items having 5 demands over the previous 12 months. However, because DLA already had an automated program for identifying items with 6 demands, the criterion was changed to 6 demands in 12 months. DLA did not require the selected items to have experienced high-priority demands.

GSA selected items having 5 demands over the past 12 months. However, GSA selected items without regard to whether any high-priority requirements existed for the items, just as DLA had done.

In planning for the initial shipments to Kemble of items meeting the selection criteria, AFLC decided to initially send only those items for which USAFE high-priority requisitions represented 5 percent or more of

[4]A demand, for EDS stockage, is defined as a requisition for an item without regard to the quantity needed. For example, 10 requisitions for 10 each of an item would be counted as 10 demands and not 100 demands, as the selection criterion might suggest (i.e., 10X10=100).

the total worldwide requisitions and for which there were 10 or more demands in the last 24 months. However, application of this criterion resulted in fewer spare parts than the Air Force wanted to ship to more fully utilize the warehouse. Therefore, the high-priority criterion was lowered to 1 percent of total worldwide requisitions so that a larger number of items could qualify for European stockage. We reviewed the consumable items selected for EDS with 10 or more European requisitions filled from the Warner Robins and Oklahoma City Air Logistics Centers. At both centers the number of items qualifying for EDS forward stockage more than doubled when the high-priority criterion was lowered from 5 to 1 percent. The number of Warner Robins items qualifying increased from 438 (at 5 percent) to 1,053 (at 1 percent). Similarly, 154 Oklahoma City items met the 5-percent criterion and 475 met the 1-percent criterion.

Storage Quantity Criteria

The Air Force initially intended to limit items stored at EDS warehouses to quantities representing high-priority needs and to build up these stocks slowly by having items shipped directly to Europe from contractors. However, this method proved too slow for early EDS operations. To speed up the forward stockage process, Warner Robins was directed in November 1984 to select 50 items from on-hand stock and ship them to Kemble. In February 1985, AFLC directed each of its other four centers to select 200 items from stock and Warner Robins to select an additional 150 items for shipment to Kemble. It is not clear what, if any, further guidance was provided for the selection of these additional items.

We reviewed the initial 53 items selected by Warner Robins. As of March 21, 1985, Warner Robins had shipped 45 of these items, which were valued at about $110,000. More than a 3-year supply of stock (based on USAFE's past 2-year demand history) was shipped to Kemble for 17 (or 38 percent) of the 45 items. More than a 10-year supply was shipped for 8 of these 17 items.

For its items, DLA computed the percentage of total worldwide usage represented by USAFE requirements during the previous 12 months and then used this percentage to compute the quantity of worldwide wholesale stock of the items to be relocated to Kemble. One DLA center used additional criteria. At this center each item was required to have a minimum shipment quantity of five or a total value of at least $14.00. The center also set a policy of shipping at least 10 percent of its worldwide demand quantities to Kemble when the item was selected for forward

stockage and when the USAFE percentage of worldwide usage had been less than 10 percent.

In reviewing random samples of 20 of the 280 items shipped from the Defense Construction Supply Center and 20 of the 219 items shipped from the Defense Electronics Supply Center, we found that 23 of these 40 items had more than a 3-year supply of stock sent to Kemble based on previous USAFE demands.

GSA, which identified only 61 items for forward stockage, is shipping a 1-month supply each month to Kemble. Many of GSA's items have a 6-month shelf life, so only limited stock is being sent.

USAFE officials advised that the Air Force holds semiannual meetings to discuss and resolve EDS forward stockage problems such as those discussed above. It was too early to evaluate the effectiveness of this mechanism at the time of our fieldwork.

Small Percentage of Actual Shipments Supports EDS Mission

According to Air Force data, a relatively small percentage of the initial shipments of forward stocked repair parts met the high-priority requirements that EDS was intended to satisfy. For example, through September 1985, repair parts had been shipped from the Kemble forward-stockage location to fill 11,180 customer requisitions. However, only 18 percent of these requisitions represented the high priorities (i.e., priorities 01 through 03) associated with the urgent requirement (i.e., to repair inoperable tactical aircraft) for which EDS was justified. While we did not fully analyze these shipment data, this small percentage of high-priority shipments casts further doubt on the adequacy of the criteria used to select items to be stocked in EDS forward locations.

Warehousing Requirements Questionable

The Air Force plans to build an EDS warehouse at Zweibruecken, Germany, but AFLC has not demonstrated that the warehouse is needed and has not fully assessed the advantages and disadvantages of building versus using existing leased warehouse space.

Air Force officials said that the establishment of three warehouses was based on a "consensus" from the beginning of the program—one warehouse in each region in the European theater. However, no study or analysis existed that documented the total storage space required. For example, the Air Force could not document its need for the planned 60,000 square feet of storage space at the three locations, explaining

that the storage space requirements were based on the number of EDS items to be sent to Europe. However, the size was decided before AFLC knew the number and quantity of items it would be shipping to the forward stockage locations and AFLC has not yet decided how to select and stock reparable items for the three warehouses.

The Air Force included $1.15 million in its fiscal year 1986 military construction funding request for the Zweibruecken warehouse even though sufficient space was available in a nearby USAFE-leased commercial warehouse. JCS Publication 3 requires that maximum use be made of existing facilities in lieu of acquiring a new facility. However, AFLC does not want to use the leased facility because

- the lessor can terminate the lease with only a 6-month notice, and if the lease was canceled, there would not be warehouse space for EDS stock and USAFE would not have the manpower necessary to move its stock to another location.
- USAFE would have to spend from $30,000 to $50,000 to put a computer room in the leased facility.

The former concern is inconsistent with USAFE's use of part of the currently leased warehouse for its war reserves and base supplies and the computer facility would be built in either the leased or newly constructed warehouse.

During congressional deliberations on the Air Force's fiscal year 1986 military construction authorization and appropriation requests, the House Committees on Armed Services and Appropriations recommended against providing funds for the EDS warehouse at Zweibruecken because Air Force-leased warehouse space is already available at that location. The Armed Services Committees of both houses agreed in conference (H. Conf. Rep. No. 366, 99th Cong., 1st Sess. p. 107 (1985)) not to authorize funds for this project. The Air Force again requested funds for this warehouse in its 1987 appropriation. We do not believe the Air Force should construct the warehouse in Zweibruecken until the total EDS storage requirement is reassessed and the existing leased commercial facility there is fully evaluated in the context of total warehouse needs, including its use for base stocks, war reserves, and EDS stocks.

EDS Logistics Command, Control, and Communications Requirements Cannot Be Met Without Additional Funding

USAFE's requirement for an automated LOG C^3 system to serve wartime European locations will not be met without additional funding. Current funding provides only for peacetime locations and, according to DOD, at least an additional $51 million would be needed to provide the wartime capability. Also, the current software interface between the LOG C^3 and the standard base supply system prevents the system from being fully automated.

EDS LOG C^3 Requirements

The September 1981 USAFE Statement of Operational Need stipulated that LOG C^3 systems to facilitate repair parts distribution decisions are needed in both peacetime and wartime to achieve the anticipated results from EDS' air transportation and forward-stockage functions. This document stated the EDS LOG C^3 should provide assured communications between the control point (i.e., USAFE's readiness center) and all Air Force European logistics support points, including the main operating bases, colocated operating bases, forward operating locations, EDS forward-storage sites, and aerial ports of debarkation. It further stated that the EDS aircraft, forward-storage locations, and the LOG C^3 systems should be developed and acquired simultaneously to achieve the required improvements in tactical air support.

The March 1982 Headquarters Air Force Program Management Directive, which provided guidance and direction for planning and developing the program, did not provide for the wartime capability required by the USAFE Statement of Operational Need. Rather, it provided LOG C^3 guidance and direction only for EDS' initial operational capability, linking the USAFE Logistics Readiness Center, all main operating bases, and the peacetime forward operating locations. This provides operational capability at only 26 percent of USAFE's anticipated wartime locations, although EDS was intended to be a wartime system. DOD attributes this shortfall in capability to fiscal constraints. We believe, however, that the shortfall could and should have been recognized in the budget justification at the beginning of the program.

AFLC proposed an additional expenditure of funds during fiscal years 1986-90 to expand the EDS LOG C^3 system to cover all wartime locations, but DOD did not approve the proposal. In November 1984, USAFE prepared a request for funds to cover fiscal years 1987-91 to cover the LOG C^3 wartime capability. This request totaled $75.5 million for procurement, operation, and maintenance of the LOG C^3 system components. It

would have expanded the LOG C^3 system to the two additional forward storage locations, colocated operating bases, additional forward operating locations, dispersed operating locations (e.g., alternative airfields), mobile tactical air control systems, and the 18 C-23A aircraft. In August 1985, Air Force officials advised us that Headquarters Air Force had approved $63.3 million for fiscal years 1987-91 for the LOG C^3 full operational capability. However, in April 1986, DOD informed us that at least $51 million additional funding will be needed to achieve the needed wartime LOG C^3 capability. At that time, DOD also commented that the LOG C^3 system had not yet been fully developed due to funding constraints and the complexity of the system. According to DOD, current technology, communications, limited European base space, and host nation approvals dictated that the system first be made operational at the main operating bases before being expanded to other locations.

LOG C^3 System Capability

The Air Force planned for the EDS LOG C^3 system to be fully automated in locating necessary repair parts. At the time of our review, however, the system required a manual interface with the standard base supply system. As originally envisioned, the EDS LOG C^3 system would automatically inquire about spare parts availability through the standard base supply system. While the Air Force told the LOG C^3 contractor that the system could interface with the standard base supply computer system through seven different software programs, the base system will allow this interface for only one of these seven programs. In the other six, an operator must determine the stock levels and must manually input data to the EDS LOG C^3 system.

The Air Force plans to modify the standard base supply system to interface with the EDS LOG C^3 system. The modification will also benefit numerous other Air Force systems that need to interface with the base supply system.

DOD Comments and Our Evaluation

DOD agreed that EDS cannot yet effectively and efficiently accomplish its originally intended mission. DOD cited some specific examples further supporting this conclusion, although it considered them normal and justified by the complex, evolutionary nature of the system being developed.

DOD stated that EDS planning was sufficient to properly use all elements of the system in accordance with its design, a design which has evolved since the late 1970s. DOD referred to the Rand and MAC studies discussed

in appendix II to support its position. However, these studies were not definitive enough to be considered sufficient planning support for the EDS concept justified to the Congress, the Air Force did not have firm operating plans showing the geographic coverage that would be provided by the EDS aircraft, and the LOG C^3 system still was not fully operable.

The Rand study defined the general need for quicker USAFE access to tactical aircraft spare parts in wartime and developed justification for instituting a system to assure the availability of those spare parts when and where needed during a European-wide conflict. Rand also set forth some design criteria. However, Rand cautioned that its criteria were not sufficiently detailed from a transportation planner's point of view and suggested it would be premature to select a specific assured distribution (i.e., EDS) method at the time of its study.

The MAC study was a mathematical analysis to assist in selecting EDS operating locations and routes interconnecting those locations in certain hypothetical scenarios in Europe, given 84 NATO bases to be served by 18 C-23A-like aircraft. The study showed that such a mission could be theoretically achieved only if (1) duty crews operated 16-hour days, (2) none of the aircraft became unavailable due to repair and maintenance, unfriendly fire, or accident, or (3) there were no delays during loading, unloading, or refueling. These are not reasonable assumptions on which to build a wartime operating plan.

Neither the Rand nor the MAC study addressed issues such as whether the EDS aircraft should be USAFE-dedicated or part of MAC's common user system, the specific types and quantities of spare parts to be added to existing stocks in Europe, or the warehouse space needed to make EDS work efficiently and effectively. Also, neither study said much about the LOG C^3 needs, although Rand commented that the system "must operate with minimal command and control, since communications are frequently inadequate in wartime environments." Throughout its analysis, Rand assumed USAFE had sufficient visibility of the quantity and location of spare parts and repair capability in Europe to allow mutual support among air bases.

While we agree that USAFE, as well as other activities in Europe, can get much use out of the EDS aircraft and the warehouse stocks, this does not support a conclusion, even for those two components, that planning was sufficient. As for the LOG C^3, DOD concurred that the current system cannot operate as intended because of inadequate software.

DOD views the planning issues discussed in this report as "challenges inherent in a complex evolutionary program." However, we continue to view them as planning problems because they logically could and should have been resolved during the EDS planning process.

DOD does not agree that EDS will vary significantly from what was planned and presented to the Congress, although it concedes that the program has changed over the past 5 years. We disagree. We believe, for example, that the reclassification of the EDS aircraft from "operational support airlift" (which would be available for multiservice use) to dedicated USAFE use, discussed in chapter 3, and a 63-percent cost growth ($75.5 million for fiscal years 1983-87) discussed in chapter 4, are both significant changes. Another variation relates to the geographic coverage. EDS was justified to the Congress partly on the basis that it would serve over 100 bases and locations in northern, central, and southern Europe. DOD now explains that this coverage will be achieved by EDS aircraft "in combination with other strategic and tactical airlift resources." While we agree that some information relating to program variations ultimately was presented to the Congress, many of the variations discussed in this report were not explained to the Congress until after we started our review and a responsible congressional committee, after being briefed by us, requested such information. We question whether some of these issues have yet been fully explained since the plans are not complete and design problems, such as the LOG C^3 software, have not been solved.

Potential Opportunities for Expanded Use of EDS Aircraft Should Be Explored

Although DOD policies and procedures support multiservice or common-use systems and DOD has stated that a need exists for increased wartime intratheater airlift in Europe, the Air Force has not planned for EDS to serve other potential U.S. or allied users. According to a Rand Corporation estimate, a squadron of 18 EDS light-cargo aircraft dedicated to serve only USAFE would normally operate at about 50 percent of cargo capacity. During peacetime and wartime EDS aircraft will fly in and out of many locations that are at or close to other service and allied activities. Increased cooperation among the services and with the allies regarding use of EDS airlift could benefit all participants and result in more efficient and effective EDS operations.

Defense Transportation Policies Require Interservice Cooperation

Various DOD, Joint Chiefs of Staff (JCS), service, and command regulations provide policy guidance on designing and using defense transportation systems. These guidelines require that a service (1) select systems that effectively and efficiently serve its particular operational requirements and (2) cooperate with other organizations in designing and using those systems where practical.

Operational Support Airlift

The Air Force justified the EDS aircraft to the Congress as an operational support airlift (OSA) requirement, and the Congress appropriated funds for the system on that basis. As an OSA system, EDS aircraft use is subject to explicit DOD and Air Force policies. DOD Directive 4500.43 defines OSA as

"all airlift transportation of passengers or cargo using DOD-owned or controlled aircraft in support of command, installation, or management functions."

The directive requires each DOD component to assign OSA coordinators, sets out specific duties for them regarding OSA intratheater operation based on a uniform-priority system, and requires these coordinators to develop and implement procedures for OSA missions with other DOD components.

We were advised in early 1985 that the Air Force had requested that EDS aircraft be reclassified as non-OSA aircraft on the basis that they will serve an Air Force-unique mission like the Navy's carrier-on-board delivery aircraft, which are considered to have a mission unique to the Navy. However, unlike the Navy aircraft, EDS aircraft will serve many locations near other service installations (e.g., Army air defense) that

need to receive high-priority, light cargo that is capable of being carried on EDS.

DOD and Air Force Policy Requirements Concerning Authority for Airlifting

Pursuant to an "Implementation Plan for the Consolidation of DOD Airlift Resources" (September 20, 1977), MAC became the single manager for airlift, including intratheater airlift, within DOD. MAC has two major areas of responsibility: (1) planning and executing airlift during crises in support of unified commands and (2) coordinating and developing airlift doctrine, strategy, and operational plans under JCS direction. However, according to DOD regulations, the U.S. European Command (USEUCOM) controls all airlift in Europe in wartime. In peacetime, MAC maintains combat readiness and provides transportation for DOD and other government agencies.

Air Force Regulation 57-1 requires that, in analyzing the need for a new system, the responsible planning organizations must consider existing and planned capabilities (exploring other DOD and allied capabilities meant to perform similar tasks), and whether the planned system should interface or interoperate with other systems or capabilities. Other related service and North Atlantic Treaty Organization (NATO) missions and capabilities should be described in the organization's analysis.

JCS and USEUCOM Intratheater Transportation Guidance

JCS and USEUCOM guidance require DOD activities to establish cost-effective transportation procedures. JCS Publication 3, Volume 1; JCS Publication 15; and European Command Directive 64-1 applicable to USEUCOM, USAFE, and U.S. Army, Europe (USAREUR) and their subordinate operations generally require that transportation resources be organized and managed to ensure optimum responsiveness, efficiency, and economy. The service that is the principal or dominant user will normally provide the transportation for all users. The USEUCOM commander may direct access to the various theater transportation resources as necessary, and the transportation mode selected should meet the requirement at the lowest cost, according to these regulations.

EDS Departs From Normal Military Transportation Policies and Practices

The Air Force has not followed certain of its own and DOD-wide policies in justifying a dedicated EDS on the basis that MAC's common-user airlift would probably be devoted to higher-priority cargo—primarily bulk shipments—and, thus, would be unavailable to promptly move critical USAFE spare parts in wartime. While the policy and guidance discussed previously emphasize coordination and cooperation with other DOD components, the Air Force neither investigated nor solicited alternative uses of EDS. Instead, the Air Force planned from the beginning to dedicate EDS to moving only Air Force spare parts and engines. If the Army, or more specifically USAREUR, had been involved in this planning process, selected Army organizations (e.g., 32d Army Air Defense Command) may have expressed the need for EDS access.

The Air Force's concern that common-user airlift would not be available to move critical USAFE spare parts in wartime was expressed in a letter to JCS in May 1979, which requested JCS to support wartime airlift priority of spare parts to ensure mission capability of fighter aircraft units in Europe. The Air Force stated that this JCS support would eliminate further deliberation by the Air Force for other means of satisfying the daily supply needs. The JCS response to the Air Force letter, dated July 1979, states:

"We share your concern for the scarcity of theater airlift capability to support wartime intratheater movement requirements. USCINCEUR [the Commander-in-Chief of the U.S. European Command] is examining various alternatives to overcome theater airlift inadequacies such as higher C-130 wartime utilization rates and the potential use of US and allied short-ranged civil aircraft. Implementation of these and other programs will partially offset the lack of theater airlift capability.

"Assignment of priorities to each theater airlift requirement, such as to insure mission capability of Air Force fighter units, would facilitate the adjudication process of assigning airlift to higher priority lift requirements but will not solve the problem of inadequate airlift within the theater. Assigning a high priority to A-10 or F-16 airlift channel requirements does not guarantee continued support. Priorities change as the battlefield situations change.

"Based on the foregoing, we feel the Air Staff should continue deliberation on all possible means of assuring support for the Air Force combat mission. Support of the various programs to insure adequate theater airlift is available to satisfy all high-priority lift requirements appears to be the optimum solution. USCINCEUR feels that the airlift capability already in the European theater, or arriving early, and operating at optimum wartime utilization rates will be responsive to lift requirements of all service combat units." (Underscoring provided.)

Thus, JCS shared the Air Force's concern for the scarcity of theater airlift to support overall wartime intratheater movements. However, it not

only declined to grant the Air Force's request for an increase in priority for access to airlift to move its tactical aircraft spare parts, but also raised a question concerning the need for additional airlift for this limited purpose. EDS aircraft could help alleviate the reported intratheater shortfall where essential light cargo must be moved along EDS routes.

MAC does not actually perform its normal airlift single manager role in relation to EDS. MAC manages most Army, Air Force, and Navy airlift throughout the world. However, in regard to EDS, as currently operated, MAC only flies the aircraft while USAFE exercises all operational control over them.

EDS, because it is dedicated to the Air Force use, also departs from the USEUCOM policy that establishes the principal or dominant user as the transportation provider. Implicit in this policy is that transportation sources, such as EDS, are to be available to other users. In Europe, surface transportation is provided for all services by the principal or dominant user. For example, in Germany, the Army's 4th Transportation Command handles the surface transportation needs of both USAREUR and USAFE. Prior to EDS, this service extended to the distribution/redistribution of tactical aircraft spare parts.

Other Transportation Needs Could Benefit by Access to EDS Aircraft

The anticipated cargo loads for EDS aircraft indicate that if the Air Force maintains EDS as a dedicated system, it will not meet JCS or USEUCOM requirements for ensuring the lowest cost airlift possible. Rand estimated that dedicated EDS aircraft will, on average, be flying at about half-full capacity in wartime. According to recent studies, the combined services expect to experience a 50 percent shortfall in needed wartime intratheater airlift capacity. Thus, the EDS aircraft would have space available to compensate for some of this shortfall.

In view of the anticipated wartime airlift shortage throughout the European Command and the space available on EDS aircraft, we discussed with various officials the potential for expanding EDS use to several Army commands having critical missions in Europe. The results of our meetings with representatives of these commands and with DOD Headquarters staff familiar with U.S./allied cooperative airlift arrangements in Europe, are summarized below.

Army Air Defense Mission in Europe

Access to EDS could benefit USAREUR's air defense missile system, which protects key U.S. facilities and activities, including air bases, throughout Germany against air attack. USAREUR's air defense mission is carried out by the 32d Army Air Defense Command headquartered at Darmstadt. Many Air Defense Command units are located at or near USAFE airbases in Germany and Army air defense officials believe that a majority of their units could benefit from access to EDS airlift without causing the aircraft to deviate from the normal EDS routes.

Table 3.1 shows the general composition of the 32d Army Air Defense Command, the headquarters locations of its battalions, and EDS locations that could be used to redistribute critically needed repair parts between these units.

Table 3.1: 32d Army Air Defense Command Units and Nearby EDS Locations That Could Be Used by the Command

Number/type of unit	Headquarters location	EDS location
5 Hawk missile battalions	Grafhenwehr Wildflicken Giessen Spangdahlem Neubruche	Rhein Main Rhein Main Rhein Main Spangdahlem Ramstein
2 Patriot missile battalions	Giessen Hanau	Rhein Main Rhein Main
2 Chapparal/Vulcan missile battalions	Bitburg Kaiserslautern	Bitburg Ramstein or Sembach
1 Signal battalion	Darmstadt	Rhein Main
1 Maintenance company (ground support)	Miseau	Ramstein

Each of the missile battalions has assigned to it several batteries located near its headquarters. A direct support unit receives and redistributes parts and supplies for the missiles with a great deal of parts movement taking place between the direct support units and the Army's 9th Logistics Center at Kaiserslautern.

The air defense systems include radar equipment, command and control equipment, launchers, and ground-support equipment. The weights of parts and supplies for these components range from 3 ounces to 40 pounds with most being very small (e.g., circuit cards). Access to EDS in wartime could supplement the Air Defense Command's existing distribution system, which includes

- USAREUR's 4th Transportation Command trucks to handle normal replenishment parts arriving from the United States through the aerial ports in Germany,
- Air Defense Command trucks used to redistribute parts between support units,
- USAREUR's 70th Transportation Battalion's 56th Aviation Company helicopter airlift used on an emergency basis, and
- a van delivery service (leased from a German company) to deliver parts between the battalions' direct support units and the repair depot at Miseau as well as between the direct support units and the logistics center at Kaiserslautern.

Air Defense Command officials were concerned that the leased van system might be unable to continue its service in wartime and suggested that access to the EDS airlift might make continued use of the private van service unnecessary.

In wartime many air defense equipment repair parts would have to be moved several hundred miles from the logistics center at Kaiserslautern and the repair depot at Miseau to the forward areas. Roads would be heavily guarded and truck drivers would be frequently stopped, checked, and asked for passes and passwords. Use of EDS aircraft would avoid such delays. Air Defense officials commented that flying a critical spare part to within 30 land-minutes of its destination would often be easier and faster than transporting it over land the entire distance. EDS delivery would address the time-sensitive nature of the spare parts delivery requirements to support the air defense mission. Both Rand and 32d Army Air Defense Command officials agreed that as more technical and classified systems are brought into the theater, access to such a system as EDS could become increasingly important.

At our meetings with DOD officials in the United States and Europe during this review, we expressed concern that dedication of EDS aircraft solely to Air Force use would not seem to be an efficient use of scarce airlift resources. In August 1985, USEUCOM, USAFE, and USAREUR officials agreed to explore the feasibility of EDS aircraft transporting some other high-priority, light cargo (e.g., Army air defense spare parts and supplies). More recently, Senate Committee on Appropriations Report 99-176, dated November 6, 1985, expressed a similar concern and directed USEUCOM to examine how EDS aircraft could be used by all the services and to report the results to the committee (S. Rep. No. 176, 99th Cong., 1st Sess., p. 68 (1985)).

Cooperative U.S./Allied Airlift

Top military officials believe that the success of an airlift system in supporting ground forces during the early critical days of a NATO/Warsaw Pact war will depend largely on preparation, especially for allocation of airlift resources to those elements contributing most to the battle. A good airlift system must be carefully managed, fully recognizing current airlift limitations. Full cooperation, not only among U.S. services, but also between the United States and its allies, can optimize the chance of success.

The United States and certain of its NATO allies have made some progress in discussing more extensive airlift cooperation. For example, USAFE, USAREUR, and their German military counterparts met recently to exchange information on their respective logistics distribution systems. In addition, the U.S. and German governments have drafted a cooperative military airlift agreement similar to those the United States has had with two other NATO allies—the United Kingdom and Canada—for many years, and France has expressed an interest in entering into such an agreement. A DOD official observed that EDS-type missions could be ideal candidates for cooperative airlift. Cooperative airlift is authorized under section 2213, title 10, United States Code, which was enacted to permit the Secretary of Defense to enter into agreements with allies for the transportation of military personnel and cargo. In supporting the enactment of this legislation, the Air Force specifically stated that cooperative airlift was desirable because it facilitated the movement, on a "frequency rather than tonnage" basis, of high value spare parts—precisely what the EDS is intended to do.

Individual agreements between the United States and its NATO allies have also resulted in a colocated operating base program, whereby U.S. tactical fighter units deployed from the continental United States share the facilities of host NATO units, many of which use the same types of aircraft (e.g., F-4 and F-16) and air defense systems (e.g., Rapier and Roland) to defend key facilities against air strikes. Not only will U.S. units fly and fight from these allied bases under the NATO command umbrella, U.S. and allied aircraft may also fly missions together. Many joint U.S./allied activities at these bases would result due to the proximity of forces there, according to an Air Force headquarters planning official. EDS aircraft would be capable of transporting critical repair parts for host country tactical fighter aircraft and air defense systems. The Air Force is increasing its storage of munitions at the colocated operating bases. EDS aircraft could be used to transport certain lightweight or small munitions components (e.g., bomb fuses and missile guidance/control assemblies).

A recent Rand Corporation study[5] also supports the concept of U.S./allied cooperation concerning EDS-type airlift. For example, it observed that

"we must create a rapid and assured lateral support system. This would strengthen a theater commander's ability to use all his resources in responding to unexpected events and extraordinary needs at some bases ... The European Distribution System is a promising development in this regard, but the expansion of lateral supply and repair capabilities to encompass allied combat forces and support assets in the theater of operations holds substantial additional promise." (Underscoring provided.)

Air Force officials indicated that they would be amenable to assisting allies by transporting needed aircraft spare parts to them in an emergency. However, the Air Force prefers to keep EDS dedicated to its own needs, even though the United States and allies normally borrow and loan tactical aircraft spare parts when necessary.

DOD Comments and Our Evaluation

DOD said that its EDS planning "involved extensive coordination and cooperation of many Air Force, DOD and other government agencies, both foreign and domestic." However, a year earlier the Subcommittee on Defense, House Committee on Appropriations, asked the Air Force to answer the following question for the record.

"Why did DOD and the Air Force not consult the Army and Navy when planning for the EDS to determine whether they also had light cargo airlift needs that could be effectively served by the EDS?

The Air Force answered that

"With respect to prior consultation with the Army and Navy when planning the EDS, none was necessary as the EDS, like the Army's organic fleet...and Navy's cargo fleet..., [is] intended for service unique logistics support needs." (Underscoring provided.)

We believe this lack of Army and Navy consultation concerning their possible need also to use EDS demonstrates inadequate coordination and cooperation on the part of the Air Force in planning and designing the EDS.

DOD advised us that

[5]Rand Corporation report entitled Improving U.S. Air Force Readiness and Sustainability (R-3113/1-AF, April 1984, p. 27).

"The EDS was designed and sized to provide air transport over Air Force lines of communication (LOC), which for the most part differ from the LOCs of the other Services. For these reasons EDS aircraft are exempted from common use and the Department's policies governing the use of operational support aircraft."

Nevertheless, DOD stated that (1) procedures already exist for USEUCOM components to request space available airlift on EDS aircraft and a multipurpose role for the EDS aircraft will be discussed with the Army and Navy during a current congressionally directed review and (2) eventual study might show that combat effectiveness shortfalls can be addressed by sharing transportation and other support assets among allies.

We recognize that the EDS aircraft has limitations due to its narrowly defined purpose as an intratheater airlifter and that the planned routes emphasize USAFE lines of communication. However, we believe that there are still opportunities for enhancing theater readiness and transportation efficiencies by extending EDS airlift service to other U.S. and allied users. We also believe that expanded use will contribute to the support flexibility that both The Rand Corporation and the Air Force have emphasized in their analyses of readiness support needs.

EDS Cost Growth

The Air Force's early cost estimate for EDS was significantly lower than the likely cost of the system as currently planned. For example, the Air Force's estimate of costs to be incurred during fiscal years 1983-87 increased about 63 percent between 1982 and 1985—from $120 million to $196 million—with the aircraft, LOG C^3, and operation and maintenance costs contributing to the rising expense. These increases caused DOD to reprogram $19.9 million from other programs. The reprogramming was accomplished through two simultaneous actions, which were both less than the $10 million level that would have required congressional consent. DOD did not develop the life-cycle cost estimate of $1.3 billion until we requested it.

Comparison of EDS Estimates

Two EDS cost estimates for the period 1983-87 are compared in table 4.1. The May 1982 estimate was prepared by Headquarters Air Force and given to the Congress in support of the EDS funding request. The other, dated January 1985, was provided by AFLC at our request and represents its estimate of all the funds needed to accomplish EDS objectives through fiscal year 1987.

Table 4.1: EDS Cost Estimates for Fiscal Years 1983-87

Millions of then-year dollars

	Estimated costs as of		
Cost element	**May 1982**	**January 1985**	**Increase (decrease)**
Development	$2.6	$1.4	$(1.2)
Aircraft procurement	38.9	56.6	17.7
Initial spares	4.6	8.6	4.0
Log C^3	5.9	18.7	12.8
Contractor logistics support	20.8	27.5	6.7
Military construction	8.6	8.8	.2
Military personnel	32.0	39.3	7.3
Operation and maintenance	6.9	34.0	27.1
Support equipment	0	.9	.9
Total	**$120.3**	**$195.8**	**$75.5**

As shown in table 4.1, the Air Force estimate of EDS costs increased from about $120 million to about $196 million, a 63-percent increase in less than 3 years. In addition, at least $51 million more will be needed to provide a wartime LOG C^3 capability, making the total increased cost estimate about $127 million. The reasons for large increases in some of the cost elements are discussed below.

One of the largest contributors to the increased estimate was the procurement cost of the aircraft. The Air Force initially planned to spend about $44 million for 18 aircraft and initial spares; these items ultimately cost about $65 million, or $21 million more than initially estimated. Air Force officials said the earlier estimate was based on its buying a smaller aircraft, but when firm performance requirements were established the Air Force determined that the smaller aircraft could not meet the engine-carrying requirement. Therefore, the Air Force purchased the larger, more expensive aircraft.

Operation and maintenance costs increased the most after the May 1982 estimate. The earlier estimate had omitted not only the costs of operating the EDS program office and forward storage sites but also the cost of computers for the latter. The cost of operating and maintaining the EDS aircraft was initially considerably underestimated, increasing from $6.5 million in May 1982 to $21.7 million by the January 1985 estimate. In all, the operation and maintenance cost estimate increased by $27.1 million.

Air Force officials said the May 1982 estimate represented items needed to achieve initial operational capability and the January 1985 estimate included an additional $13.2 million for LOG C^3 items to achieve full operational capability. This amount was slightly offset by other estimated procurement reductions for a net increase of $12.8 million. According to Air Force officials, the cost of the wartime or fully operational capability for the LOG C^3 system was not included in the earlier estimate because the Air Force was not sure of the technology on the LOG C^3 and adopted a conservative approach until the technology was proven. As explained on pages 21 and 22, only 26 percent of USAFE's wartime locations will be covered by the LOG C^3 without additional funding. In August 1985, Air Force officials said Headquarters Air Force had approved an additional $63.3 million for the EDS LOG C^3 wartime capability. However, in April 1986, DOD commented that full, theater-wide capability can be achieved for about another $51.4 million.

Military personnel costs also were initially underestimated by over $7 million because the estimate did not include an allowance for salary increases. The contractor logistics support costs were also initially underestimated—by $5.5 million for the aircraft and $1.2 million for the LOG C^3 system.

Reprogramming Actions

As a result of cost increases related to the EDS aircraft, the Air Force reprogrammed $19.85 million from other systems, including $9.95 million in fiscal year 1983 funds and $9.90 million in fiscal year 1984 funds. Under DOD regulations, DOD was not required to obtain congressional consent for individual reprogramming actions that are under $10 million. However, such individual reprogramming actions must be reported semiannually to the House and Senate Committees on Appropriations and Armed Services. These reprogramming actions were included in DOD's required reports to these committees.

The Air Force received funding of $5.0 million in fiscal year 1983 and $32.6 million in fiscal year 1984 to purchase 18 EDS aircraft. However, since the aircraft cost more than expected, additional funds were needed and DOD subsequently reprogrammed $19.85 million to procure EDS aircraft in two reprogramming actions—$9.95 million of fiscal year 1983 funds from the Airborne Warning and Control System aircraft (E-3A) procurement program and $7.4 million and $2.5 million of fiscal year 1984 funds from the KC-10 and C-5B aircraft procurement programs, respectively. Since these individual actions were less than $10 million each from one year's appropriation, DOD did not require congressional consent for the reprogramming under DOD regulations. However, it is interesting to note that both fiscal years' reprogramming actions were approved on the same day, January 16, 1984, by the Deputy Assistant Secretary of Defense (Program/Budget), Comptroller, and January 13, 1984, by the Under Secretary of Defense for Research and Engineering.[6]

DOD Comments and Our Evaluation

DOD, in commenting on a draft on this report in April 1986, agreed that EDS experienced cost growth on the order described in this report. DOD attributed this growth to "fiscal realities" that we "did not recognize" and stated that the increases had been explained to the Congress.

We agree that EDS cost growth increments were identified to the Congress to the extent that they affected current annual budget submissions. However, EDS was initially justified to the Congress as a low-cost system. As explained in this chapter, the Air Force provided cost estimates for the first 5 years (i.e., 1983-87) totaling about $120 million, to the Congress as part of its EDS budget submission. In less than 2 years,

[6]A more in-depth discussion of DOD's reprogramming requirements is set forth in a GAO Briefing Report to the Honorable David Pryor, United States Senate, entitled BUDGET REPROGRAMMING, Department of Defense Process for Reprogramming Funds, GAO/NSIAD-86-164BR, July 1986.

Air Force estimates for EDS for the 5-year period totaled about $196 million, a 63 percent increase. Some of the increase was not reported to the Congress until the House Committee on Appropriations, after a briefing from us, requested further explanation for the increase. In addition, we believe that this was the first time the Congress was made aware of the total EDS life-cycle cost of $1.3 billion, which, in our opinion is not consistent with the Air Force's characterization of EDS as a low-cost system.

DOD also took exception to our statement that it did not develop the EDS life-cycle cost estimate of $1.3 billion (i.e., one EDS life-cycle cost) until we requested it, although DOD agreed with the approximate costs. In doing so, DOD referred to a series of estimates for the three EDS elements and for the system as a whole; however, these estimates did not cover the entire life-cycle of EDS. DOD said these requirements are estimated 7 years beyond the current year, which would have covered a period through 1992 at the time of our review, many years less than the life-cycle (i.e., through 2002) provided to us by the EDS program office.

Conclusions, Recommendations, and DOD Comments and Our Evaluation

Conclusions

The capability of EDS, as currently planned and funded, will probably vary significantly from what was initially expected, although EDS should increase the USEUCOM's overall combat capability by making available in-theater additional tactical aircraft spare parts and transportation resources. The extent of that benefit, however, will depend on how various EDS planning and system problems are resolved.

The Air Force did not effectively plan EDS. It now needs to complete the development of EDS operating plans. However, before doing so, certain aspects of both the system's design and its intended uses need to be thoroughly reevaluated.

The Air Force justified a dedicated EDS on the basis of a critical and unique transportation mission. The EDS was designed and sized to provide air transportation over Air Force lines of communication but not those of the other services.

However, other military officials believe that the movement of high-priority aircraft spare parts, while critical, is no more critical or unique than certain other high-priority movements. Air defense equipment spare parts, for example, are relatively small and are often transported to and from locations near the currently proposed EDS routes. This and other opportunities for expanded use of EDS aircraft, including U.S./allied cooperative airlift arrangements with host-country military organizations, should be considered.

Once EDS users and their needs are defined, the Air Force will be in a better position to comprehensively reexamine the system design and operational issues, including EDS' geographic coverage, forward stockage criteria, warehouse space needs, and relationship to and interaction with the standard base supply system. After the reevaluation is completed, the Air Force will also be in a better position to provide the Congress with a realistic analysis of EDS, its peacetime and wartime roles, what it can achieve with existing funding, and how much additional funding may be needed.

The EDS program cost has increased substantially since the system was initially presented to and approved by the Congress, primarily because

- the type of aircraft purchased was larger and more expensive than originally planned,
- the initial operation and maintenance cost estimate omitted several relevant costs,

- the initial cost estimate excluded the cost of implementing the wartime LOG C^3 system, and
- military personnel costs were underestimated.

As a result, recent estimates are that about $127 million more will be required to develop and implement EDS with a wartime capability as intended.

As mentioned previously, EDS is the first of a number of dedicated distribution systems envisioned by the Air Force. For example, a Pacific Distribution System is currently being developed and other commands have expressed interest in acquiring such systems. EDS, therefore, can provide "lessons learned" that could be helpful in planning and developing similar systems in the future. If these programs have undocumented and uncoordinated requirements, as the EDS program did, U.S. defense capabilities and readiness may not achieve the results that would otherwise be possible. Proposed systems of the EDS type should be carefully reviewed to resolve these kinds of problems before the systems are approved for implementation.

Recommendations

We recommend that the Secretary of Defense direct JCS and the Air Force to require their respective subordinate commands (i.e., USEUCOM and USAFE) to complete EDS wartime, as well as peacetime, operating plans and integrate them into theater-wide plans after fully assessing

- the system's potential to serve the high-priority needs of all potential U.S. and allied users and
- the system's requirements and limitations related to its aircraft; its forward stockage criteria; and the size and location of its warehouses.

We also recommend that the Secretary of Defense direct the Secretary of the Air Force to thoroughly justify and properly plan other EDS-like systems considered in the future before proposing that funds for developing them be requested from the Congress. The justification and planning of such systems should consider the needs of all potential users and be directed toward preventing the types of problems encountered by EDS.

DOD Comments and Our Evaluation

DOD agreed with the intent of our recommendation that the Secretary of Defense direct the Secretary of the Air Force to thoroughly justify and properly plan other EDS-like systems considered in the future before

requesting funds from the Congress to develop them. However, DOD believes that the "development challenges inherent in a complex evolutionary program such as EDS" should not be viewed as problems caused by inadequate planning. We agree that an EDS-like program is a major change from normal DOD policy and traditional practices concerning the supply and transportation of spare parts from centralized depots and base stocks. Although we recognize that there may have been other contributing factors, we believe that most problems in this report could and should have been more completely addressed during the EDS planning phase before entering into long-term system commitments that ultimately will cost hundreds of millions of dollars.

DOD did not agree with our recommendation that the Secretary of Defense direct JCS and the Air Force to require their respective commands (i.e., USEUCOM and USAFE) to complete EDS operating plans and integrate them with theater-wide plans, after first fully assessing the system's potential to serve U.S. and allied theater-wide needs and other features and aspects of the system. DOD believes no further departmental direction is required. However, it did advise that detailed inclusion of EDS in appropriate war plans and a wartime concept of operations are proceeding on schedule. No such schedule existed at the time of our fieldwork.

We continue to believe that timely and complete implementation of our recommendation is critical to the success of EDS as a wartime system and is consistent with the views of the House and Senate Committees on Appropriations conferees[7] concerning EDS operations. The conferees stated that they believe, at least in peacetime and on a space available basis, EDS should be available for use by U.S. components in the European theater. In this same regard, the Senate Committee on Appropriations directed USEUCOM to examine the possible use of EDS by all services at least on a space available basis and report those results to the committee.[8] USEUCOM is complying with this direction. We believe that this is an important first step toward achieving a more efficient and effective EDS, and further believe that the lessons learned in peacetime will demonstrate a vital wartime application that the planners and leaders of some affected, non-USAFE organizations will want to incorporate into their operations. Finally, we believe that EDS should be considered in

[7]H. Conf. Rep. No. 450, 99th Cong., 1st Sess., p. 170 (1985) on House Joint Resolution 465, Further Continuing Appropriations For Fiscal Year 1986.

[8]S. Rep. No. 176, 99th Cong., 1st Sess., p. 68, on House Resolution 3629 making appropriation for the Department of Defense for fiscal year ending September 30, 1986.

future U.S./allied cooperative efforts, especially since many of the spare parts being moved and bases being served by EDS are already part of such efforts.

DOD also commented on various other observations and conclusions set forth in a draft of this report. Such comments, for the most part, expand upon or further emphasize the circumstances surrounding the planning and development of EDS. We have incorporated and analyzed these comments in the appropriate sections of the report. In some instances, these comments suggested a need for additions or alternatives in the report, which we made. In other instances, DOD disagreed with our interpretation or presentation of the data collected and apparently would have us limit our focus to the challenges of designing, planning, and implementing a system to meet the Air Force-only requirements in Europe. While we understand the Air Force concern for its own wartime operations, we believe an independent analysis of any new program, such as EDS, must consider broader (at least theater-wide) implications and concerns.

Agencies Contacted and Locations Visited

Washington, D.C., and Vicinity

Department of Defense

Office of the Secretary of Defense

Joint Chiefs of Staff

Defense Communications Agency

Defense Logistics Agency

U.S. Air Force Headquarters

U.S. Army Headquarters

U.S. Navy Headquarters

General Services Administration

Other Department of Defense Organizations in the United States

Aeronautical Systems Division of the Air Force Systems Command, Wright-Patterson Air Force Base, Ohio

Warner Robins Air Logistics Center, Robins Air Force Base, Georgia

Defense Construction Supply Center, Columbus, Ohio

Defense Electronics Supply Center, Dayton, Ohio

Defense General Supply Center, Richmond, Virginia

Defense Industrial Supply Center, Philadelphia, Pennsylvania

Headquarters, Air Force Logistics Command, Wright-Patterson Air Force Base, Ohio

Headquarters, Military Airlift Command, Scott Air Force Base, Illinois

Headquarters, Strategic Air Command, Offutt Air Force Base, Nebraska

Headquarters, Tactical Air Command, Langley Air Force Base, Virginia

Department of Defense Organizations in Europe

U.S. European Command, Stuttgart, Germany

Headquarters, U.S. Air Forces in Europe, Ramstein, Germany

86th Tactical Fighter Wing, Ramstein, Germany
26th Tactical Reconnaissance Wing, Zweibruecken, Germany

Military Airlift Command units

322nd Airlift Division, Ramstein, Germany
608th Military Airlift Group, Ramstein, Germany
10th Military Airlift Squadron, Zweibruecken, Germany

Headquarters, U.S. Army, Europe, Heidelberg, Germany

Headquarters, V Corp, Frankfurt, Germany
4th Transportation Command, Oberussel, Germany
32d Army Air Defense Command, Darmstadt, Germany
7th Medical Command, Heidelberg, Germany
21st Support Command, Kaiserslautern, Germany

U.S. Naval Forces, Europe, London, England

5th Signal Corps, Worms, Germany

Contractors

The Rand Corporation, Santa Monica, California

Shorts Brothers EDS maintenance facility, Zweibruecken, Germany

Relationships Between Operational Concepts and Aircraft Quantities

There have been three principal reports concerning the need for and the use of the C-23A aircraft. The EDS strategies and requirements can be better understood by seeing the relationships between operational concepts and related aircraft quantities set out in these reports.

The earliest report, issued by The Rand Corporation in December 1981, is entitled Combat Benefits of a Responsive Logistics Transportation System for the European Theater. This study provided the overall Air Force justification for developing EDS and included data on the types and number of bases that should be served by such a system.

The second report, issued by MAC on September 3, 1984, and entitled USAF EDSA Routing and Operating Location Selection Study, was primarily a mathematical study to help select EDS operating locations and routes interconnecting those locations in hypothetical wartime scenarios.

The third report, issued by USAFE on January 23, 1985, and entitled Systems Operational Concept for the EDS, describes EDS elements, the desired mission, and the pertinent characteristics of the C-23A. This report represents the Air Force's intended employment, deployment, and support of the system (primarily in wartime); identifies variables in the system; and provides guidance to the forces that will operate it. Unlike the other two reports, it is not an "analysis" and does not involve models.

Envisioned Mission—Base Coverage, Route Connections, and Ground and Flight Times

One measure of the support capability provided by the C-23A is indicated by the number and types of bases that it can serve in a given period. All three reports consider one visit per base per day, although MAC reported that, with a 16-hour crew day, two visits per day may be achieved. Table II.1 shows the coverage discussed in the three reports.

Table II.1: EDS Base Coverage Assumed by Rand, MAC, and USAFE Reports

	Number of bases covered, by report		
Base types	**Rand, 1981**	**MAC, 1984**	**USAFE, 1985**
Main operating bases	10	Covers 16 on USAFE list	21
Colocated operating bases	34	Covers 30 on Rand list	Yes, but not identified
Forward operating locations	0	Unclear	5 listed
Dispersed operating locations	0	Unclear	Yes, but not identified
Aerial ports of debarkation (note a)	3	5	7
EDS storage sites (note a)	1	2	3
Other	0	Many	Some
Total cited	44	84	Not stated

[a]Also included in main or colocated operating bases.

Rand focused on main and colocated operating bases for fighters that would be deployed in the first 30 days, with a total of 44 bases to be served from one central EDS operating base. The MAC analysis covered 84 bases, including Spain, and defined five central EDS operating bases. The USAFE system operational concept did not identify the total number of bases to be served. However, a November 1984 budget document prepared by USAFE to expand the LOG C^3 capability requests log C equipment for about 100 locations.

The Air Force also wants the C-23A to connect with intertheater transport from the United States (at aerial ports of debarkation). It would also be reasonable to include the three EDS storage sites. However, one other type of connection would be essential. The January 1985 system operational concept states that EDS must be able to move the critical spare parts within a European region within 18 hours, between adjacent regions within 24 hours, and between the northern and southern regions within 36 hours. By having only one central EDS operating location for its 44 bases, the Rand approach would meet the requirement. On the other hand, the MAC study did not allow for connection between the five central operating locations.

The number of routes and aircraft needed partially depends on the assumed ground and flight times. The studies allowed 30 minutes for a cargo stop and 60 minutes for a refueling stop, assuming that all support systems at each stop are in place and working well. For main and colocated operating bases where the loads might be small (except when an engine is moved), the chosen times seem reasonable in peacetime. However, a MAC official said that stops at the aerial ports of debarkation and

the three EDS storage sites could take longer because of larger loading operations there.

Both Rand and MAC essentially assumed "straight-line" flights between bases; this may be unrealistic because aircraft normally fly according to air traffic control requirements and therefore may have to avoid certain locations. Also, aircraft may have to alter their routes to refuel or avoid airspace over neutral countries (e.g., Switzerland and Austria), thereby increasing air miles and time. Furthermore, no allowances were made for wind or weather. As the MAC report noted, "For the 84-base test case, virtually no slack time exists to absorb any delays enroute or during ground operations." Hence, compensating for such delays could require more aircraft.

How Many Operating Aircraft Will Be Required?

How many aircraft would be needed to perform the missions envisioned by the three studies? Since the system operational concept report was not a complete analysis, this question was not addressed there. However, Rand and MAC gave a range of answers in their reports. Each looked at a primary route and then at some variations to explore the impacts that certain factors could have on the primary route analysis as shown in table II.2.

Primary Routes and Variations Considered

Rand's primary route required 11 EDS aircraft for the 44 bases. Rand noted that the number could vary from 3 to 11 depending on the type of fighter aircraft to be supported, the volume of spare parts to be carried, F-15 engine movement, and the geographical coverage.

MAC's primary route covered 84 bases and required 13 operational aircraft using a 16-hour crew day. MAC investigated numbers of bases varying from 53 to 84, with accompanying increases in central EDS operating locations from 1 to 5 to compensate for the aircraft's range limitation. The resulting number of operating aircraft varied from 6 to 13.

Two other factors impact on the number of aircraft needed. First, adding a route to Spain would require one more aircraft. Second, 6 more EDS aircraft would be needed to bring the Rand coverage up to 84 bases, using MAC's rationale. Thus the total number of operating aircraft using the Rand method could approach 21.

Rand started with 11 EDS aircraft for 44 bases, including the movement of F-15 engines. Neither Rand nor MAC estimated for the F-16 engines,

although Rand observed that the F-16 engine failure rate might be about half that of the F-15 rate, because it has one engine while the F-15 has two. However, since the F-16s will be deployed to bases from Norway to Turkey, the distances to be covered are far greater than for F-15s. Thus, two more C-23As might be needed for the F-16 engine requirement. Adding one C-23A to recognize the possibility of indirect routes and minimum ground times, the needed quantity becomes 14.

In addition, the MAC study did not include carrying engines for either the F-15 or the F-16, nor did it allow for connection between the routes. Two additional aircraft would be needed to handle the F-15 engines, based on data from the Rand report, and two more for the F-16 engine movements.

MAC's assumptions concerning loading times at aerial ports of debarkation and EDS storage sites, and on flight transit times may be optimistic. Also, to connect EDS central operating locations would require recalculation of the route structure. These factors could require one or two additional aircraft.

Another MAC variation considered the impact of cutting the maximum crew flying time from 16 hours to 12 hours, a proposal that could increase the number of aircraft needed. For 56 bases and two central operating locations, the C-23A requirement changed from 8 to 11. For 84 bases, including 5 central operating locations, at least 20 aircraft would be needed, compared to 12 aircraft if 16 crew hours were permitted. Thus, if the crew limitation for 30 days for combat was set at 12 hours per day, another 3 to 8 C-23As would be needed. The 12-hour crew day for this type of activity was proven during the Vietnam conflict to be more realistic in terms of operational safety.[9]

Other factors that might increase the number of operating aircraft needed to serve 84 bases included peacetime operational factors, wartime availability, and wartime attrition. For example, extra aircraft—referred to as backup-aircraft authorized—are often purchased to allow for adequate quantities over a 20-year life. The system operational concept states that 18 C-23As will be procured, two (or 11 percent) of which are considered backup aircraft. The 16 remaining are termed primary-aircraft-authorized. However, not all of the primary aircraft in a

[9]Bowers, Ray L., The United States Air Force in Southeast Asia, TACTICAL AIRLIFT, Office of Air Force History, United States Air Force, Washington, D.C., 1983, p. 199.

squadron are operational at any one time. The system operational concept uses a figure of 80 percent for fully-mission-capable aircraft during sustained wartime operations. Neither the system operational concept nor the MAC study commented specifically on wartime attrition (i.e., losses in combat due to unfriendly fire or to accidents). Rand, noting the severity of combat expected in the first 30 days, stated that an attrition factor of 20 percent should be used, based on Air Force planning documents and combat studies.

Having considered the various factors influencing the quantity of aircraft that might be needed for the EDS mission using Rand and MAC criteria, the results can be used in two ways. One way is to add up the number of aircraft attributable to the relevant factors determined above for the 84-base mission to estimate how many aircraft would have to be procured to provide the capability envisioned. Using this method, the total C-23A purchase would be about 33 or 34 aircraft summarized in table II.2.

Table II.2: GAO Analysis of Relationships Between Mission Concepts and Quantities of Operational EDS Aircraft

Mission concept	Estimated quantities required using Rand approach	Estimated quantities required using MAC approach
Operating aircraft:		
Primary route coverage	11	13
Add route to Spain	1	Included
Increase to serve 84 bases	6	Included
Increase to move engines		
For the F-15	Included	2
For the F-16	2	2
Flight procedures		
Allowance for wartime time delays	1	1
Interconnect hubs	•	1
Limit crew to 12 hours	•	3
	21	**22**
Other factors:		
Backup aircraft	3	3
Aircraft not available	5	5
Wartime attrition	4	4
	12	**12**
Estimated number of aircraft that could be required for an 84-base mission in three regions	**33**	**34**

Another way to use these factors is to start with the available 18 C-23As and apply the backup aircraft, nonmission-capable aircraft, and attrition percentages as reduction factors to determine the number of operational aircraft that would be available for wartime operations. This calculation, which would estimate two C-23As for backup, three as nonmission-capable, and three for attrition, leaves 10 operating aircraft that may be assigned reliably.

Consequently, if 84 bases are to be supported, about 33 or 34 C-23As would have to be acquired; more would be needed if 100 bases are to be served as currently planned. This would add further to the cost growth discussed in chapter 4. On the other hand, if, as we have been told by Air Force officials, no additional aircraft are to be procured, the number of operational aircraft currently available would be effectively reduced to about 10 C-23As, which would not be able to support the 100 bases in the way envisioned by the Air Force. Therefore, some reduction in desired capability would have to be accepted, which could include reduced geographic coverage (e.g., part or all of the southern region) or reduced mission (e.g., less frequent service or omitting the carrying of engines on the C-23A aircraft).

Comments From the Assistant Secretary of Defense, Acquisition and Logistics

Note: GAO comments supplementing those in the report text appear at the end of this appendix.

ASSISTANT SECRETARY OF DEFENSE

WASHINGTON, D.C. 20301-8000

1 APR 1986

ACQUISITION AND LOGISTICS

Mr. Frank C. Conahan
Director, National Security and
International Affairs Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Conahan:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report, "TACTICAL AIRLIFT: Air Force European Distribution System: Lessons Learned," dated January 15, 1986 (GAO Code 392032) - OSD Case 6923.

The European Distribution System (EDS) effectively became operational in March 1985, with the delivery of the sixth of eighteen C-23A aircraft, one storage site and logistics command, control and communication (LOG C^3) between two sites. The GAO draft report takes issue, primarily, with the lack of common use of the C-23As among other Services and our allies. It overlooks the basic purpose of the system and the interrelated nature of the aircraft with in-theater storage of critical parts and with the required LOG C^3.

The EDS was developed to satisfy an Air Force need for assured and responsive distribution of needed parts for its tactical aircraft during wartime. The GAO draft report points out that surface transportation in Europe will be delayed during wartime due to heavily guarded roads and frequent stops. Use of the EDS aircraft will avoid such delays. The EDS was designed and sized to provide air transport over Air Force lines of communication (LOC), which for the most part differ from the LOCs of the other Services. For these reasons EDS aircraft are exempted from common use and the Department's policies governing the use of operational support aircraft.

Nevertheless, as directed by the Senate Appropriations Committee, the Joint Chiefs of Staff are currently exploring the potential of the EDS to satisfy a multi-user role in Europe.

Specific responses to individual findings and recommendations contained in the draft report are enclosed.

Sincerely,

James P. Wade, Jr.

GAO DRAFT REPORT - DATED JANUARY 15, 1986
(GAO CODE 392032) - OSD CASE 6923

"TACTICAL AIRLIFT: AIR FORCE EUROPEAN DISTRIBUTION SYSTEM: LESSON LEARNED"

* * * * *

FINDINGS

FINDING A: System Planning Not Thorough. The GAO reported that the U.S. Air Force plans to spend an estimated $1.3 billion on the development, acquisition and operation of the European Distribution System (EDS) for tactical aircraft spare parts. The GAO further reported that EDS evolved out of the Air Force's determination that it needed increased assurance of spare parts availability at specific bases to keep U.S. tactical aircraft in Europe operational. The EDS uses aircraft, spare parts storage warehouses, and an automated logistics command, control, and communications (LOG C^3) system to carry out its purpose. The GAO found that the Air Force began implementing the EDS without sufficient planning for (1) how the system should operate in peacetime and wartime, (2) the number of aircraft needed, (3) the extent to which the aircraft should transport engines, (4) the spare parts to be stocked in EDS warehouses, and (5) the size and number of warehouses needed. Further, GAO found, as of August 1985, that no peacetime EDS route structure was available. The GAO concluded that the capability of EDS, as currently planned and funded, will probably vary significantly from what was initially expected and justified to the Congress. The GAO also concluded that EDS should increase the U.S. European Command's (USEUCOM) overall combat capability by making additional tactical aircraft spare parts and transportation resources available in theater. The GAO further concluded that the extent of that benefit, however, will depend on how various EDS planning and system problems are resolved. (pp. ii, Executive Summary, pp. 1, 6, 8, 37, GAO Draft Report)

Now on pp. 3, 8, 12-15, and 40.

DOD POSITION: Partially Concur. The Department agrees with the approximate life cycle costs, with what constitutes EDS and its benefits, and with the final two conclusions. The Department disagrees, however, that the EDS planning was not thorough, and with the tenor and tone of this finding. The fact that the EDS is an evolving complex program relates to the nature of the program, not to inadequate planning. Planning for the development, beddown and operation of EDS was sufficient to properly use the capabilities of all three elements. The planning and integration involved extensive coordination and cooperation of many Air Force, DoD and other government agencies, both foreign and domestic. Beddown planning was extensive and included support facilities, manpower and workload to adequately accommodate the flying unit, forward stockage locations and LOG C^3 installations. Peacetime implementation was managed under the System Operational

Concept (23 Jan 85) and internal implementation plans based on a 1982 Program Management Directive. Detailed inclusion of the EDS in appropriate war plans and a wartime concept of operations are proceeding on schedule now that capabilities of the C-23A are a known quantity.

The Air Force did sufficiently plan for the number of aircraft needed. The draft report cites two studies, one by Rand and one by Headquarters Military Airlift Command (HQ MAC). The Rand study stated a significant increase in TACAIR combat capability would be realized if the Air Force could eliminate European theater supply imbalances. This study estimated that up to 300 fighter aircraft could be grounded each day during the first 30 days of a conflict resulting in a loss of 600-800 sorties. A major issue of this supply imbalance was the malpositioning of spares and lack of a responsive logistics system to identify needed spares, locate required assets, and rapidly transport them to desired locations. Key to the solution was the EDS and its aircraft as the dedicated transportation link. The system was and is based on a wartime requirement with an operational LOG C^3 and forward stockage of wholesale spares. Based on the accepted and validated concept that the aircraft would provide a system of interconnecting "hub-spoke" routes and that the aircraft would deploy in self-sufficient sets to service TACAIR bases, MAC modeled the airlift system based on a given set of NATO wartime bases and standard airlift planning factors. Using a variation of a Massachusetts Institute of Technology procedure to model the NATO environment, the best model solution found a 7.49 average flying-hour utilization for 18 primary aircraft authorization. If crew duty day was reduced from a standard 16 hours to 12 hours, the number of aircraft increased to 30. When budget limitations were placed on the program, the 18 aircraft option was adopted, since it would meet the requirements for wartime service. Because there is evidence that additional aircraft may be required to meet unrestrained wartime missions, the Air Force Operational Test and Evaluation Center is developing a model to assess the EDS wartime support system.

See comment 1.

Table II.2 of Appendix II of the draft report attached a label of "Rand Approach" to a set of numbers that were not developed by Rand, but by the GAO. That approach added six aircraft to deal with servicing 40 additional bases. The actual number would depend on the coincidence of current and proposed routes. Attempting to get a total number of aircraft based on various non-availability figures probably over stated the true need.

See comment 2.

The draft report further finds little, if any, justification for, "the extent to which the aircraft should transport engines." The GAO, again, does not consider the effects of either funding limitations or theater commander expressed priority needs to transport the F-100 engine. Attempting to procure an aircraft capable of transporting all fighter and fighter bomber engines with their trailers would have driven the program into procuring

See comment 3.

an aircraft at approximately six times the cost. The aircraft does carry fighter aircraft engines in peacetime and will do so between established units in war. This is designed into the cargo handling capability of the aircraft, has been exercised, and is included in the wartime concept of operations.

Forward stockage item selection was based upon calculated theater consumption rates and was stocked dependent upon worldwide availability. Initial stocks were for currently assigned, theater weapon systems and have been validated through continuous demands at a rate of more than 100 shipments per day from RAF Kemble. This has resulted in a significant reduction in requisition to delivery times and reduced transportation costs. Additional locations in Spain and Germany will provide stocks even closer to the point of intended use and further reduce delivery times and demands upon the intra-theater airlift system. This matches precisely the wartime concept of operations. Space and manpower at RAF Kemble were provided to accommodate the regional requirements of the UK with only occasional support to other regions anticipated. The operation of EDS with only one forward stockage location has placed a heavy burden upon that single site. Peacetime demands have validated the EDS forward stockage concept even though we have only partially reached our stockage objective at RAF Kemble.

See comment 4.

Neither the LOG C^3 nor the forward stockage warehouse portions of the EDS are completed. It is premature to judge the performance of the existing aircraft and EDS without the developed LOG C^3 or forward stockage elements. The Department does not agree that EDS will vary significantly from what was planned and presented to the Congress. As stated previously, however, the EDS is an evolving, complex system. The Congress has been informed of the program changes and the reasons for the changes over the past five years.

As to the availability of a peacetime route structure, the Department understands that a GAO working paper was presented to USAFE on July 29, 1985 in which a notional route structure was recognized. The first schedule was established in April, 1985 after delivery of the first aircraft and has been revised as more aircraft became available.

FINDING B: Anticipated Geographic Scope of European Distribution System (EDS) May Not Be Achievable. The GAO found that firm wartime and peacetime EDS operating plans to define the system's actual geographic scope are incomplete. GAO also found that the U.S. Air Force in Europe (USAFE) current concept, as reported to Congress (daily service to 100 locations from 6 central sites using 18 C-23A aircraft), differs from that of RAND and the Military Airlift Command (MAC). GAO further found that the purchase of the 18 aircraft was not supported by a detailed analysis of operational need. Noting that the C-23A has a range of only 789 nautical miles, GAO questioned the Air Force's ability to serve all of Europe daily with the aircraft--bases in Greece and Turkey could only be reached with frequent refueling stops. GAO pointed out that Air Force officials also share those concerns, noting the coauthor of the EDS Statement of Operational Need had informed USAFE and Headquarters, Air Force that because of funding constraints, the aircraft range and payload criteria were tailored to satisfy only the most critical needs of the central region. GAO also questioned the need for EDS to serve Torrejon, Spain, as the Air Force does not plan to operate fighters from Spain during the early period of a conflict. The GAO concluded that if USAFE does not develop a wartime operating plan for EDS that is coordinated with all potential users and fully integrated into theater-wide plans, commanders will have little basis for effectively practicing wartime operations for the system. (pp.6-10, GAO Draft Report)

Now on pp. 12-15.

DOD POSITION: Partially Concur. As noted in the DoD response to Finding A, detailed inclusion of the EDS in appropriate war plans and a wartime concept of operations are proceeding on schedule. The planning process is not a static activity. Plans are shaped and reshaped over time to manage shortfalls to best accomplish specific military missions. Essentially, plans are always being improved upon as mission statements are adjusted to meet operational requirements. New or enhanced capability in wartime is the reason logistics systems are procured; the peacetime by-product of a wartime capability is strictly a by-product that keeps the system functional until wartime or contingency requires the system be activated. As a result, primary planning emphasis is placed on the wartime mission. To refine and improve upon wartime plans, peacetime exercises are used to develop recommended changes or revisions to existing logistics systems. In the case of EDS, peacetime exercises highlighted the need to develop the system, and follow on exercises, now that the system is in place, will be used to refine the system. With a constantly changing threat and a continual review of requirements ongoing, all the indications with regard to fighter aircraft readiness in Europe show a need to improve the potential for air superiority by any means possible.

The EDS was designed with accepted fiscal constraints; the system's intended design is to support the greatest logistics need/shortfall and allow existing systems to continue to perform as required. With regard to the Southern Flank in Europe, the distances demand a more capable means of movement than a C-23A aircraft. Not all requirements will be met by the EDS and those requirements that go unmet will depend upon existing systems. It is immateriel as to whether fighters will be operating out of Torrejon. The Torrejon storage site is designed to support the southern region.

There are approximately 106 Air Force operating bases or locations that will require assured delivery on at least a daily basis in wartime. The present concept of operations envisions the deployment of three C-23A aircraft to each of the five regional locations. From these bases, interconnecting routes will allow for theater coverage in combination with other strategic and tactical airlift resources. There is no intent to provide airlift to all possible users and all of Europe with one C-23A squadron. The Air Force intends to fill the short haul, small cargo requirement gap presently left by the larger cargo aircraft. The comments referred to in the report were the opinion of a single individual and not this Air Force concept of operations. The Department understands that the GAO team was briefed on this and agreed to delete references to this memo at the European outbrief. Specific plans for providing theater-wide service will require coordination with all levels responsible for logistics support. The Air Force has already operated the aircraft into the Northern-most flank of NATO during Force Deployment exercises and expects to exercise its capability into the Southern region in Fiscal Year (FY) 1986. Recent FY 1986 congressional funding reductions and the resulting flying hour decrease, however, may preclude participation in such exercises. Support concepts exercised in the Central region can only simulate actual conditions encountered in places such as Turkey. Wartime taskings would direct the aircraft to service bases within their area of operations and connect with other "hub-spoke" networks. Peacetime operation of the aircraft across expanded regions does not invalidate the concept and is a peacetime use of the aircraft to train pilots in the European theater as well as exercise the aircraft within the airlift system.

See comment 5.

5

Now on pp. 15-16.

FINDING C: EDS Engine-Carrying Capability Is Limited. The GAO found that the safe loading of any engine on the C-23A involves a minimum of three skilled people and very close tolerances. Further, GAO found that engine-loading tests indicate the C-23A cannot carry some engines when they are configured for quick installation as required by USAFE. GAO additionally found that trailers required to move engines on the ground may be unavailable at many EDS sites--normally, engines and trailers are moved as a unit, but such a unit will not fit on a C-23A. The GAO also found that an engine represents the maximum payload of a C-23A effectively limiting its availability for the spare parts distribution mission and cutting the aircraft's range by about half. Further, GAO found, with an engine on board, the C-23A cannot carry the support equipment or maintenance personnel that may be needed to change an engine. The GAO concluded that although the C-23A can carry some aircraft engines, for it to do so routinely may be impractical. The GAO also concluded that the Air Force needs to complete the development of EDS operating plans; however, before doing so, certain aspects of both the System's design and its intended uses, i.e., the extent to which the C-23A should carry engines, need to be thoroughly reevaluated. (pp. 10-12, GAO Draft Report)

DOD POSITION: Nonconcur. Routine transportation of engines is not the primary mission of the C-23A. It is an ancillary mission. High-tech and high value spares that are critical to first line fighter operations are the critical spares that the C-23A needs to move on a priority basis and are the primary mission.

The C-23A engine movement requirement was not fully understood by GAO. The requirement is to move aircraft engines between established or deployed fighter aircraft units within a regional area in wartime. These units, in their deployment locations, have the material and personnel resources available to load, unload and install all of the engines specified as required capability of the C-23A. Normally, enough engines are provided to each unit for the unit to accomplish its sortie commitments. However, should an imbalance occur through higher than predicted failure rates or enemy action, redistribution of available resources would be imperative. The C-23A was procured precisely for this purpose and can perform this mission well.

The DoD acknowledges that, in one case, during the engine loading test, the J-79 engine (for the F-4 series aircraft) weight exceeded that originally provided to the C-23A contractor. As a result, an additional engineering study was required. This study determined that the rail system could accommodate the increased weight of these engines. All engines that can be carried also allow room for two passengers.

6

FINDING D: Three Forward Stockage Sites May Create Unnecessary EDS Warehouse Space. The GAO found that (1) the Air Force plans to build an EDS warehouse at Zweibruecken, Germany, and (2) that Air Force Logistics Command (AFLC) has not demonstrated the warehouse is needed, has not systematically determined the number and quantity of spare parts to be stocked, and has not assessed the advantages and disadvantages of building versus using existing leased warehouse space. The GAO also found that the Air Force included $1.15 million in its FY 1986 military construction funding request for the Zweibruecken warehouse even though sufficient space is currently available in a nearby USAFE-leased commercial warehouse. GAO noted that during deliberations on the Air Force's request, the House Armed Services and Appropriations Committees recommended against providing funds for the EDS warehouse at Zweibruecken. The GAO concluded that the Air Force's stated need to have three forward stockage sites--a decision that was not supported by a detailed analysis--could create unnecessary EDS warehouse space. The GAO further concluded that the Air Force should not further consider construction of a warehouse in Zweibruecken until the need for a third EDS warehouse is demonstrated and the existing leased commercial facility there is fully evaluated in the context of total warehouse needs, including its use for base stock, war reserves, and EDS stocks. (pp. 16-18, GAO Draft Report)

Now on pp. 19-20.

DOD POSITION: Partially concur. Peacetime activity at the only activated forward stockage location has validated the requirement for additional forward stockage warehouse locations and space (see discussion under finding A). The EDS forward stockage plan called for three 20,000 square foot warehouses at RAF Kemble, UK; Torrejon AB, Spain, and at Zweibrucken, Germany. RAF Kemble presently uses more than 70,000 square feet of warehouse space which was obtained without the requirement for construction funds and the 20,000 square foot warehouse at Torrejon is under construction. Providing the additional warehouse at Zweibrucken will allow EDS to regionally stock items and reduce the possibility of losing all stocks to natural causes or enemy action. Reduced delivery times and survivability are the primary reasons for establishing three locations. What is of importance is the early establishment of this function in a stable environment to service Air Force needs.

See comment 4.

AFLC assessed advantages and disadvantages of building versus leasing warehouse space. Leased facilities at fourteen sites in Europe (seven in the Central European region) were considered for forward stockage. Lease versus construction cost as well as the terms of the lease were of major importance. Other factors such as security, fire protection, availability of communications and, support for personnel and dependents were also evaluated. As a result of this analysis AFLC and USAFE concurred with pursuing MILCON funding for Zweibrucken.

See comment 6.

FINDING E: Forward Stockage Issues Need To Be Resolved. The GAO reported that AFLC, the Defense Logistics Agency (DLA) and the General Services Administration (GSA)--the wholesale agencies responsible for selecting and supplying items--use different criteria to select the items and to determine the quantities for storage. The GAO found that AFLC, DLA, and GSA collectively had selected about 7,000 consumable items to stock at the Kemble warehouse while no decision had been made specifically concerning which reparable items would be stocked there. The GAO further found that based on past demands, over a 3-year supply was being stocked on 44 percent of the items reviewed. The GAO also found that, while EDS storage sites are intended to contain high-priority aircraft parts that will remain under wholesale management control until requisitioned, only a relatively small percentage of the initial shipments of forward stocked repair parts met the high-priority requirements EDS was intended to satisfy. The GAO, therefore, questioned the adequacy of the criteria used to select items to be stocked in EDS forward locations. The GAO concluded that the EDS spare parts forward stockage plan may result in inappropriate items and quantities being stocked in Europe and these forward stockage issues need to be resolved. (pp. 12-18, GAO Draft Report)

Now on pp. 16-20.

DOD POSITION: Partially concur. The original candidate list of items was prepared by the EDS program office based on demand data obtained directly from each base supply in Europe. Only aircraft items were reviewed. A criteria of five demands in one year was used as the baseline. The list was furnished to AFLC, DLA and GSA. GSA accepted the list as presented. DLA made only a minor change, requiring six demands in lieu of five. AFLC expanded the criteria even further by increasing the history period to two years and ten demands versus the one year and five demands.

In November 1985, AFLC began to stock limited investment items at RAF Kemble. Since these assets are normally high dollar items, they were deliberately held back until the system was capable of maintaining adequate accountability and control. The number of investment items in forward stockage will increase in the future. EDS stockage decisions were based on historical demand patterns. The stockage criteria may have initially created excessive quantities of some items, but the assets remain under full inventory manager control and can be moved world-wide when needed. Additionally, excess quantities will be moved out through stock replenishment requirements. AFLC, DLA, and GSA continue to improve criteria, procedures, management and accountability of forward stockage in support of the European theater.

See comment 7.

With the first year of operation completed and approximately 6,000 line items in stock, there were over 19,000 shipments made from RAF Kemble. During the period of July to December 1985, RAF Kemble shipped 13,449 lines of which 11,307 were USAFE requirements. Fifty-two percent of these were high priority USAFE shipments. This does not include high priority shipments to other DoD customers in Europe. This is evidence that the EDS forward stockage program is a viable system and proper items were selected.

Now on pp. 21-22.

FINDING F: EDS Logistics Command, Control, and Communications (LOG C^3) Requirements Cannot Be Met Without Additional Funding. The GAO reported that the September 1981 Statement of Operational Need stipulated the LOG C^3 systems are needed in both peacetime and wartime to achieve the anticipated results from EDS' air transportation and forward-stockage functions. The GAO found that the March 1982, Headquarters Air Force Program Management Directive (PMD) did not provide for the required wartime capability, it only provided LOG C^3 guidance and direction for 26 percent of USAFE's anticipated wartime locations. The GAO noted that the Air Force had approved $63.3 million for FY 1987 - FY 1991 for the LOG C^3 full operational capability; however, GAO did not know the amount of funding DoD would approve. GAO concluded that at least an additional $63 million would be required to provide the wartime capability. (pp. 18, 19, GAO Draft Report)

DOD POSITION: Partially concur. The original PMD required development of LOG C^3 only through Initial Operational Capability (IOC). Because of the complexity of LOG C^3 with regard to current technology, communications, limited European base space, host nation approvals, etc., an IOC was planned at the main operating bases before expanding the system to deployed locations. The PMD also required planning for Full Operational Capability (FOC) while implementing IOC but the LOG C^3 budget provided funding for IOC only. As the program developed, it became plausible to continue through FOC. USAFE submitted a program decision package (PDP) during the FY 1987-1991 Program Objective Memorandum (POM) process for FOC. This funding strategy was necessary to provide system integration and program continuity while meeting budget cycle lead times. However, due to budget restraints, the Air Force did not support the funding in the FY 1987-1991 POM, but did support the FOC concept.

See comments 8 and 12.

The current LOG C^3 program covers a total of 36 European sites which represents USAFE peacetime occupied, wartime locations and is approximately 26 percent of the total wartime locations. Four sites are presently installed with the remainder to be completed by August 1986. To enable EDS LOG C^3 to provide the full, theater-wide capability to source, direct shipment, and track the movement of extremely critical lateral support items will cost approximately $51.4 million more, not $63 million as reported by the GAO.

Now on pp. 21-22.

FINDING G: LOG C^3 System Capability Not Fully Automated. GAO reported that the EDS LOG C^3 system was planned to be fully automated for locating necessary repair parts. The GAO found that the current software interface with the standard base supply system prevents the LOG C^3 system from being fully automated. Noting that the Air Force plans to modify the standard base supply system (SBSS) to interface with the EDS LOG C^3 system, GAO concluded that this modification (ready for testing in January 1986) will benefit numerous other Air Force systems that need to interface with the base supply systems. (pp. 19, 20, GAO Draft Report)

DOD POSITION: Concur. There appears to be a misinterpretation of terminology in the LOG C^3 system capability section of the report. The reference to seven different software programs interfacing with the SBSS should be the seven different protocols accepted by the Sperry S1100/60 computer system. Also, SBSS is referred to as a computer system. It is instead application software running on the Sperry S1100/60 computer system.

Full automation of the interface between the EDS LOG C^3 was planned to eliminate as many human interfaces as possible. The SBSS interface is the most complex challenge the LOG C^3 program had to overcome. Two modifications have been completed, one by the Air Force Data System Design Office (DSDO) and one by Sperry. At the EDS SPO's request, DSDO modified the SBSS software to accommodate an inquiry from the EDS LOG C^3 system. At the Air Force's request, Sperry modified the DCP-40, a front-end processor to the S1100/60 to accept TTY protocols when the actual physical connection is made between the DCP-40 and the EDS LOG C^3 system. Both modifications were released to S1100/60 bases in January 1986. It is too early to determine the benefit of the above mentioned modifications on other Air Force systems' ability to interface with the SBSS.

FINDING H: Potential Opportunities For Expanded Use of EDS Should Be Explored. The GAO reported that various DoD, Joint Chiefs of Staff (JCS), and command regulations provide policy guidance on designing and using defense transportation systems and require a Service to (1) select systems that effectively and efficiently serve particular operational requirements, and (2) cooperate with other organizations in designing and using those systems where practical. The GAO found, however, that although DoD policies and procedures support multiservice and common-use systems and DoD has stated that a need exists for increased wartime intra-theater airlift in Europe, the Air Force has not planned for EDS to serve other potential U.S. or allied users. Specifically, GAO found, (1) the Air Force has not followed its own and DOD policies by justifying a dedicated EDS on the basis that MAC's common-user airlift would probably be devoted to higher-priority cargo and, thus, would be unavailable to promptly move critical USAFE spare parts in wartime, (2) the Air Force neither investigated nor solicited alternative uses of EDS, and (3) the Air Force planned from the beginning to dedicate EDS to moving only Air Force spare parts--thus, EDS departs from normal military transportation policies and practices. The GAO further found that (1) the anticipated cargo loads for EDS aircraft indicate that if EDS is maintained as a dedicated system, it will not meet the MAC or USEUCOM requirements for ensuring the lowest cost airlift possible, (2) Rand estimated that dedicated EDS aircraft will, on the average, be flying at about half-full in wartime, and (3) according to recent studies, the Services expect to experience a combined 50 percent shortfall in needed wartime intra-theater airlift capacity. Since EDS aircraft will fly in and out of many locations at or close to other Service and allied activities during wartime, the GAO concluded that other transportation needs could benefit by access to EDS aircraft. The Air Force justified a dedicated EDS on the basis of a critical and unique transportation mission; however, the GAO concluded, along with other military officials, the movement of high-priority aircraft spare parts, while critical, is no more critical or unique than certain other high-priority movements. GAO noted that Air Defense spare parts, for example, are relatively small and are often transported to and from locations near the currently proposed EDS routes. Therefore, the GAO further concluded, this and other opportunities for expanded use of EDS aircraft, including U.S. allied cooperative airlift arrangements with host country military organizations, should be considered. (pp. 23-32, 37, GAO Draft Report)

Now on pp. 27-34 and 40.

DOD POSITION: Nonconcur. The EDS was designed, developed and funded to satisfy an Air Force need for assured and responsive in-theater distribution of needed parts for its tactical aircraft during wartime. The GAO draft report points out that surface transportation in Europe will be delayed during wartime due to heavily guarded roads and frequent stops. Use of the EDS aircraft will avoid such delays. The EDS will provide air transport over Air Force lines of communication (LOC), which for the most part differ from the LOCs of the other Services. For

these reasons EDS aircraft are exempted from common-use and the Department's policies governing the use of operational support aircraft.

Wartime assured distribution demands two factors: reliability and frequency of service. Direct air service provides an assurance of arrival; however, at least daily service is required to ensure consistent movement of critical items. Although regular service encourages use of the available transportation and reduces intransit times, utilization rates tend to be low and some space is available on most missions. This is particularly true in peacetime when fighter sortie rates do not generate high volumes of MICAP parts requirements. This does not lessen the requirement to serve these locations on a frequent basis, which requires the commitment of all available airframes and flying hours to accomplish the USAFE wartime movement mission. In peacetime, the proficiency of EDS air and ground personnel are directly dependent upon the judicious use of available training flying hours. The Department maintains this proficiency by frequently routing missions through active bases and serving deployed units when they are in-place. Current flying hour limitations do not allow for adequate proficiency training at all of our bases.

The Rand 50 percent fill estimate of aircraft maximum payload capacity is a rough estimate. It is rough because, among other things, it is an average of averages. Depending on wartime outcomes (e.g., variation in scenarios, variation in damage to logistics infrastructure, and wartime variation in demand rates) the actual daily payload between bases could vary greatly. The Rand study pointed out this variability and never used an average fill value as a criterion. The average fill value is too inaccurate for apportioning EDS among users. More important, the key criterion used in the Rand study was combat aircraft availability, which depends on service time, not on percentage of cargo carrier filled. The DoD must be more interested in boosting total combat system capability than in sub-optimizing the usage of the EDS transport or any other individual support resource. Holding the transport or diverting them to increase the fill rate would reduce responsiveness and thus combat aircraft availability.

See comment 9.

The Department is unsure of the usefulness of the implied comparison between potential excess EDS capacity and the potential offset to shortfalls in European intra-theater airlift capability. It seems implausible that the lightweight EDS aircraft can make any appreciable difference in reducing the shortfall, but in its designed role, they can greatly affect combat aircraft availability. Additionally, tactical transports rarely exceed eighty percent of design maximum payload (AFR 76-2), and the Rand load computations did not include shipments of missile components or critical sortie-producing support equipment, which are likely to occur. These would further enhance the effect of the EDS on the production of effective sorties.

Now on p. 33.

See comment 10.

The Rand report referred to on page 32 (R-3133/1-AF) is a conceptual paper. That particular reference lays the groundwork for studies underway. Indeed, eventual study results might show that combat effectiveness shortfalls can be addressed by sharing transportation and other support assets among allies, but that usage might require increments to the current EDS program to prevent degrading the combat gains that so far have only been calculated for U.S. air forces. In short, the passage GAO selected describes a hypothesis being tested, not a conclusion derived from complete analysis.

It should be noted that procedures do exist for USEUCOM components to request space available airlift on EDS aircraft. We do not expect this to be a large volume, as both Army and Navy lines of communication differ considerably from those of the Air Force. A multi-purpose role for the C-23A will be discussed with the Army and Navy during a Congressionally directed review.

Finally, the Department does not agree with the GAO statement that the Joint Chiefs of Staff (JCS) questioned the need for additional airlift to support the Air Force wartime requirements. In fact, paragraph 2 to the quoted July 20, 1979 JCS letter stated concern for the scarcity of theater airlift capability. In addition, the portions of the letter quoted, but not underscored, advises the Air Force to continue deliberations on all possible means of assuring support for the Air Force combat mission. The EDS is designed to provide improved wartime support.

See comment 11.

Now on pp. 36-38 and 40-41.

FINDING I: EDS Cost Growth. The GAO found that the Air Force's early cost estimate for EDS was significantly lower than the likely cost of the system as currently planned; for example, the Air Force estimate of EDS costs increased from about $120 million to about $196 million, a 63 percent increase in less than three years. The GAO further found that reasons for the large increase included: (1) the procurement cost of the aircraft--the Air Force initially planned to spend about $44 million for 18 aircraft and initial spares, which ultimately cost about $65 million, (2) operation and maintenance costs increased, as earlier estimates had omitted not only the costs of operating the EDS program office and forward storage sites, but also omitted the cost of computers for the latter, (3) the cost of wartime or fully operational capability for the LOG C^3 system was not included in either estimate, and (4) military personnel costs also were initially underestimated by over $7 million because the estimate did not include an allowance for salary increases. The GAO also found that these increases caused DoD not only to ask the Congress for about $56 million more, but also to reprogram $19.9 million from other programs, which was accomplished through two simultaneous actions, both just under the $10 million level that would have required prior congressional approval. In addition, the GAO noted that DoD did not develop the life-cycle cost estimate of $1.3 million until GAO requested it. The GAO concluded that the EDS program cost has increased substantially since the system was initially approved by the Congress--the Air Force estimates it will require at least an additional $139 million to develop and implement EDS. The GAO further concluded since EDS is the first of a number of dedicated distribution systems proposed or being considered, its problems have provided "lessons learned" that could be helpful in planning and developing similar systems in the future. The GAO finally concluded that proposed systems of the EDS type should be carefully reviewed to resolve these kinds of problems before the systems are approved for implementation. (pp. 33-36, 38-39, GAO Draft Report)

DOD POSITION: Partially concur. In pointing out cost increases in the program, the GAO apparently did not recognize the effect of fiscal realities on the Air Force, and did not include the Air Force rationale for the increases, which was provided to Congress, and implied that reprogramming actions were improper when they were in fact clearly within the budget flexibility provided by Congress and were properly reported. The system did experience cost growth for various reasons. As shortfalls were identified, the Air Force identified the requirements to Congress through annual budget submissions and acquired additional funding.

The GAO stated that the DoD had not developed life-cycle cost estimates. This is incorrect. A key element in the aircraft source selection was total life-cycle cost. The EDS program office develops and updates cost estimates for all three elements and the system as a whole on a continuous basis. Budget

estimates are developed from data contained in the cost estimates. The cost estimates provide cost data for the annual POM submissions, a five year programming document, which addresses mid-range program requirements seven years beyond the current fiscal year.

The costs to complete development and implement EDS are not $139 million, nor is this figure an Air Force estimate. The Air Force estimates these costs to be approximately $57 million.

See comment 12.

16

RECOMMENDATIONS

RECOMMENDATION 1. The GAO recommended that the Secretary of Defense direct JCS and the Air Force to require their respective commands (i.e., USEUCOM and USAFE) to complete EDS peacetime and wartime operating plans and integrate them into theater-wide plans, after fully assessing: (1) the system's potential to serve the high-priority needs of all potential U.S. and allied users, and (2) the system's requirements and limitations related to its aircraft, its forward stockage criteria, and the number, size and location of its warehouses. (p. 39, GAO Draft Report)

Now on p. 41.

DOD POSITION: Nonconcur. The planning for EDS wartime and peacetime operations has been thorough and complete, and does not require further Departmental direction. The EDS potential to serve other users is minimal. The Air Force has already demonstrated that, although unused cargo space may exist on some missions operated in support of USAFE weapon systems, additional capability to operate dedicated missions specifically for the other components does not exist. The planned goal was to provide daily service to each USAFE base. Limitations of airframes and flying hours precluded the Air Force from doing that in peacetime. The EDS was not designed or justified to be compatible with the other components' supply systems; the aircraft was sized to USAFE-unique mission and the forward stockage element is an Air Force wholesale supply operation. Procedures do exist for USEUCOM components to request space available airlift on EDS aircraft. The Department does not expect this to be a large volume as both Army and Navy lines of communication differ considerably from those of the Air Force. However, Congress has directed that the matter of a peacetime U.S. Component multi-user role for the EDS be reviewed and DoD will comply with that request.

RECOMMENDATION 2. The GAO recommended that the Secretary of Defense direct the Secretary of the Air Force to thoroughly justify and properly plan other EDS-like systems considered in the future before proposing that funds for developing them be requested from the Congress. The justification and planning of such systems should consider the needs of all potential users and be directed toward preventing the types of problems encountered by EDS, as discussed in this report. (p. 39, GAO Draft Report)

Now on p. 41.

DOD POSITION: Partially concur. The Department endorses the intent of the recommendation. However, the development challenges inherent in a complex evolutionary program such as EDS must not be defined as problems caused by inadequate planning.

The following are GAO's comments on the Assistant Secretary of Defense, Acquisition and Logistic's letter dated April 1, 1986.

GAO Comments

1. We found no evidence that the Air Force decision to purchase 18 aircraft was related to the MAC study. An Air Force official told us that the Air Force initially wanted 24 C-23A type aircraft for EDS, but budget constraints prevented it from obtaining more than 18. The decision to purchase the 18 aircraft was made about 1981 in preparation for the 1983 budget. The MAC study was published in September 1984.

2. We did not base our estimates on "non-availability figures," but on Rand, MAC, and other Air Force organizations' criteria used to calculate aircraft needs. We agree that the estimates are imprecise (i.e., they could be a few over or under actual needs). However, we believe our estimates are within a relevant range of actual needs, based on the planned scope of the program.

3. We have not questioned the need for the Air Force to move aircraft engines in wartime, only the need or the practicality of adding such a capability to the design of a light cargo aircraft to be used in an assured distribution system such as EDS. We believe that adding such a capability placed unnecessary constraints on the EDS aircraft decision process, thereby precluding the purchase of an American aircraft, raising the price of the aircraft to be purchased, causing the system to sacrifice range and speed, and creating the need for specially trained personnel to load engines. Also, some Air Force officials believe that the capability would rarely be used.

4. This is further evidence of our point that the warehousing requirement was not fully assessed. As explained on page 59 of this report, the EDS forward stockage plan called for three 20,000-square foot warehouses, totaling 60,000 square feet. Since the first warehouse at Kemble presently uses more than 70,000 square feet and the Air Force has only partially reached its stockage objective there, apparently the total warehouse requirement also will vary from the initial stockage plan. Other variances from the initial EDS plan are discussed in chapter 2 of this report.

5. This statement refers to the USAFE end-of- assignment briefing. In this report we note that this was the position of the former EDS program officer, not an official command position, and the Air Force had no plans to buy a longer range aircraft for EDS. In addition, we note that DOD also

believes that "a more capable means of movement than a C-23A aircraft" is needed in Southern Europe.

6. These comments do not address our point, which is that the leased facility at Zweibruecken could be used for EDS. We believe the AFLC and USAFE decision to pursue military construction funding for the EDS warehouse at Zweibruecken was based on USAFE's desire to have both the existing leased warehouse and a new EDS warehouse to provide still more storage space, and not on an analysis showing the leased facility to be inadequate for EDS needs.

7. The statistical data are related to the information on page 19. However, DOD did not indicate whether or to what extent the material issued was (1) needed for inoperable USAFE tactical fighter aircraft, or (2) transported by EDS aircraft. Therefore, we cannot evaluate their direct applicability. However, they further demonstrate that EDS has some capability to serve non-USAFE units in Europe.

8. This is the third such estimate provided to us during this assignment. We did not evaluate the validity of these estimates because of the remaining uncertainties concerning the LOG C^3 scope and operation.

9. We are not suggesting that this average fill estimate be used as a criterion for apportioning EDS among users. We referred to the 50-percent fill rate, estimated by Rand, to illustrate that EDS aircraft will often have unused capacity.

10. The section of the Rand report in which this passage appeared was entitled "IMPLICATIONS FOR RESOURCE MANAGEMENT." It describes several major hypotheses under investigation at Rand concerning both current shortcomings and potential solutions; the authors said this section draws heavily on unpublished research by various Rand representatives. Earlier in the report, in its summary of conclusions, the authors concluded that "Forward combat forces should be streamlined to operate with fewer resources...to permit enhanced lateral support (even among different allied Air Forces)..." (Underscoring provided.) DOD calls this report a "conceptual paper," and it addresses various concepts. However, the authors of the document refer to it as a "report" 11 times in the document, but not once as a "conceptual paper."

11. The $1.3 million figure should be $1.3 billion.

12. At the time of our review, the Air Force estimated that it would need $139 million more than the $120 million initially estimated to develop and implement EDS. This increase includes an additional $75.5 million resulting from the revised Air Force estimates for fiscal years 1983-87, shown on page 21, plus an additional $63.3 million to achieve an EDS LOG C^3 wartime capability—a total of $138.8 million. If the $63.3 million is reduced to $51.4 million, the total additional funds needed to achieve a full EDS wartime capability would then be about $127 million. This amount is now noted on pages 35 and 39.

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