

GAO

Report to the Chairman, Subcommittee
on Military Readiness, Committee on
Armed Services, House of
Representatives

April 1999

AIR FORCE SUPPLY

Management Actions Create Spare Parts Shortages and Operational Problems





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

**National Security and
International Affairs Division**

B-280237

April 29, 1999

The Honorable Herbert H. Bateman
Chairman, Subcommittee on Military Readiness
Committee on Armed Services
House of Representatives

Dear Mr. Chairman:

This is the second report in response to your request that we review financial management and operational issues related to the Supply Management Activity Group of the Air Force Working Capital Fund. Our June 1998 report¹ discussed the (1) long-standing problems that the Department of Defense (DOD), including the Air Force, had in preparing accurate financial reports on its working capital fund operations, (2) difficulties that the Air Force had in developing prices that the Supply Management Activity Group charged customers, and (3) problems that the Air Force Working Capital Fund and the Supply Management Activity Group had in managing cash, including the practice of advance billing customers to maintain an adequate cash balance. This second report discusses the effectiveness of the Supply Management Activity Group in providing inventory items to its customers.

We are sending copies of this report to Representative Solomon P. Ortiz, Ranking Minority Member, Subcommittee on Military Readiness, House Committee on Armed Services; Senator John Warner, Chairman, and Senator Carl Levin, Ranking Minority Member, Senate Committee on Armed Services; Senator Ted Stevens, Chairman, and Senator Daniel K. Inouye, Ranking Minority Member, Subcommittee on Defense, Senate Committee on Appropriations; Representative Jerry Lewis, Chairman, and Representative John P. Murtha, Ranking Minority Member, Subcommittee on Defense, House Committee on Appropriations. We are also sending copies of this report to the Honorable William S. Cohen, Secretary of Defense, and the Honorable F. Whitten Peters, Acting Secretary of the Air Force.

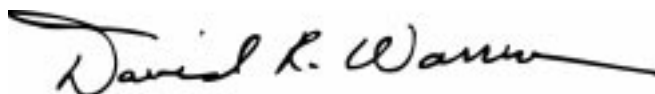
¹Air Force Supply Management: Analysis of Activity Group's Financial Reports, Prices, and Cash Management (GAO/AIMD/NSIAD-98-118, June 8, 1998).

Copies will also be made available to others upon request. If you have any questions about this report, please call Mr. Greg Pugnetti, Assistant Director, at (202) 512-6240. Other major contributors to this report are listed in appendix III.

Sincerely yours,

A handwritten signature in black ink, appearing to read "J. Brock, Jr.", with a stylized, cursive script.

Jack L. Brock, Jr.
Director, Governmentwide and Defense Information Systems
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A handwritten signature in black ink, appearing to read "David R. Warren", with a cursive script.

David R. Warren
Director, Defense Management Issues
National Security and International Affairs Division

Executive Summary

Purpose

Congressional committees, as well as Air Force officials, have expressed concerns about reported spare parts shortages and the possibility that these shortages are causing readiness problems. This report responds to a request from the Chairman, Subcommittee on Military Readiness, House Armed Services Committee, asking GAO to review the effectiveness of the Air Force Supply Management Activity Group in meeting its military customers needs. Specifically, the report discusses (1) the extent and impact of military customers not receiving aircraft spare parts when needed and (2) the reasons why parts were not always available when needed.

Background

The Supply Management Activity Group is part of the Air Force Working Capital Fund, a revolving fund that relies on sales revenue, rather than direct appropriations, to finance its operations. The wholesale division¹ of this group obligated a reported \$3.4 billion in fiscal year 1998 to buy new inventory items or pay for the repair of existing items. Working capital funds are expected to (1) generate sufficient revenue to cover the full costs of their operations and (2) operate on a break-even basis over time—that is, not make a profit nor incur a loss. Customers primarily use Operations and Maintenance appropriations to pay for inventory items. Payments from customers replenish the cash balance in the Air Force Working Capital Fund, which is used to finance ongoing operations, such as purchasing new items or paying for the repair of broken items. The Air Force Materiel Command oversees the operations of the Supply Management Activity Group through inventory control points located at its five Air Logistics Centers.

The Air Force is working to improve the efficiency of its logistics systems and as part of that effort is making a fundamental shift in the way it manages inventory under a program called Agile Logistics.² In the past, the inventory moved through a long, slow process where broken items went from bases to storage depots to repair depots and, once repaired, back again to the bases. The current concept calls for expedited transportation to move broken items from bases to repair depots. Once the items arrive at

¹Items in the wholesale division are managed by the Air Force and generally support aircraft and other weapon systems. These include items such as transmitters and landing gears.

²GAO will report separately on the implementation of the Agile Logistics program.

the repair depot, they are to be promptly fixed and sent back to the bases quickly. Under this concept, the Air Force wants to achieve more timely processing and repair of broken items so it can reduce the amount of inventory it needs to purchase and store.

Results in Brief

Over the last several years, the effectiveness of the supply activity group in meeting customer needs has declined. Key Air Force indicator reports used to monitor supply effectiveness showed that major aircraft not mission capable due to supply problems increased from 6.4 percent in fiscal year 1990 to 13.9 percent in fiscal year 1998. GAO specifically reviewed B-1B, F-16, and C-5 aircraft supply problems and found that these problems were causing inefficient maintenance actions, excessive use of spares designated to support deployed operations, and aircrews to be not fully trained. For example:

- At two major commands, significant personnel resources were used to remove parts from B-1B, F-16, and C-5 aircraft and to put those same parts on other aircraft in order to keep them mission capable. While the total magnitude of the problem is not known, records at two Air Force commands showed maintenance personnel time involved in this practice equated to about 43 people working 8 hours a day, 5 days a week for 2 years.
- Spares packages purchased to support deployed operations were being used to meet day-to-day operational needs. This was particularly the case for the C-5 and B-1B aircraft where usage of items from the packages increased by 14.2 and 13.5 percent, respectively, over a 2-year period.
- B-1B and F-16 reports show that only 83 percent of their peacetime flying hour training program was accomplished and Air Force officials cited supply and maintenance problems as major causes. As a result, one squadron reported that some of its aircraft commanders, pilots, and weapons system officers were not combat mission ready.

GAO also analyzed selected parts that were most frequently causing supply problems for the B-1B, F-16, and C-5 aircraft. The key reasons contributing to supply problems were (1) weaknesses in forecasting inventory requirements and executing inventory procurement and repair budgets, (2) not achieving Agile Logistics goals, and (3) untimely repair by depot maintenance activities. The inventory forecasting error caused a \$500 million shortfall in funding in the fiscal year 1997 supply activity group's budget. The Air Force also reduced the supply activity group's

budget by \$948 million between fiscal year 1997 and 1999 to reflect Agile Logistics efficiency goals. However, since these efficiency goals were not achieved, fewer items than projected were available for sale to customers. As a result of these actions, even though military units had funds to purchase spare parts, the supply group did not always have sufficient funds to buy new parts or pay for the repair of broken parts that customers needed.

The Air Force has studies underway to improve supply effectiveness and has increased funding for the purchase and repair of spares. GAO is making a recommendation to the Secretary of the Air Force to improve the availability of items needed by military units.

Principal Findings

Inventory Problems Adversely Affected Customers' Operations

Performance data that the Air Force uses to monitor the performance of its Supply Management Activity Group indicate increased instances of aircraft not being mission capable due to supply problems. This situation contributed to several problems for operational units. These included (1) usable parts being removed from one aircraft to keep other aircraft mission capable, (2) mobility readiness spares packages being used to meet day-to-day supply needs, and (3) aircrews not completing annual training requirements. Also, Air Force officials stated that the parts shortage problem could potentially impede their ability to effectively accomplish contingency missions, particularly if several squadrons were required to deploy at the same time.

Due primarily to a shortage of spare parts, Air Force aircraft mission capability rates³ have declined in recent years from 84.6 percent in fiscal year 1990 to 74.3 percent in fiscal year 1998.⁴ As shown in table 1, in fiscal year 1998, major aircraft that were reported not mission capable due to supply problems about doubled the percentage reported in fiscal year 1990.

³The mission capability rate is based on all aircraft that are in a unit's possession at a specific point in time. On the other hand, the Status of Resources and Training System (SORTS) identifies the current level of selected resources and training status of a unit—that is, its ability to undertake its wartime mission. As a result, a unit could have a low mission capability rate but still be considered able to accomplish its wartime mission.

⁴Reported mission capable rates for major Air Force aircraft do not include data on helicopters, training aircraft such as the T-37, and some low density aircraft such as the SR-71.

Table 1: Reported Total Not Mission Capable Rates Due to Supply Problems for Air Force Major Aircraft

Fiscal year	Percent of aircraft not mission capable due to supply problems
1990	6.4
1991	8.6
1992	9.5
1993	10.2
1994	10.3
1995	10.8
1996	11.0
1997	12.6
1998	13.9

Source: The Air Force's Multi-Echelon Resource and Logistics Information Network and the Reliability and Maintainability Information System.

The lack of needed inventory items raised the following concerns:

- Maintenance personnel were performing double work, in some cases, by removing parts from one aircraft and then putting them on another. The total magnitude of this practice is not known because time spent in performing required operational checks was not always reflected in base reports. However, Air Combat Command and Air Mobility Command records showed that from October 1, 1996, through September 1998 maintenance personnel spent about 178,000 hours removing inventory items on the B-1B, F-16, and C-5 aircraft to replace broken items on other aircraft. This equates to about 43 people working 8 hours a day, 5 days a week for 2 years. In addition, it took maintenance personnel weeks and, in some cases, months to put an aircraft back together once parts were removed from the aircraft.
- Mobility readiness spares packages are air transportable supplies to support deployed operations. While items from these packages can be used to meet unit supply shortages, Air Force officials cautioned that the packages need to contain sufficient items to support deployments. The percentage of items used from the C-5 and B-1B packages increased by 14.2 and 13.5 percent, respectively, between fiscal year 1996 and 1998.
- Training missions were also impacted by supply and maintenance problems. According to Air Combat Command records, B-1B and F-16 customers flew 79,267 hours, or 83 percent, of their total flying hour program dedicated to pilot and aircrew training during fiscal year 1998.

This is a decrease from the previous year when the Air Combat Command flew about 90 percent of the flying hours available for training. Supply and maintenance problems were identified as the key reasons for this reduction in flying hours due to the lack of aircraft availability. Further, one B-1B squadron official explained that supply shortages were a major contributor to (1) 6 of 30 aircraft commanders, (2) 2 of 13 pilots, and (3) 5 of 41 weapons system officers not meeting annual training requirements.

Budgeting, Agile Logistics, and Inventory Repair Problems Were Major Causes of Parts Shortages

GAO judgmentally selected and reviewed B-1B, F-16, or C-5 spare parts that were causing aircraft to be not mission capable or were potential supply problem items. As shown in table 2, for the 155 items reviewed, the key factors causing the support problems can be generally categorized as weaknesses in forecasting inventory requirements and execution in procurement and repair budgets; not achieving inventory management improvements under the Agile Logistics program; and untimely depot repairs.⁵ Because of the integrated nature of the supply system there is a general interrelationship among these causes.

Table 2: Primary Reasons Why Problem Items Were Not Available as of September 1997 and September 1998

Cause category	September 1997		September 1998	
	Number	Percent	Number	Percent
Forecasting and budgeting	57	36.8	0	0.0
Agile Logistics	31	20.0	26	27.1
Untimely repair	53	34.2	63	65.6
Other ^a	14	9.0	7	7.3
Total	155	100.0	96	100.0

^aPrimarily technical problems that affect the reliability of an item.

Inventory Requirements Forecasting and Budgeting Problems

Problems related to the forecasting of inventory requirements and the execution of the Supply Management Activity Group's fiscal year 1997 budget resulted in a funding shortfall for 57 of the items reviewed. This severely limited the group's ability to buy and repair the items needed by its

⁵In our analysis, we considered an item to still be a problem in September 1998 if it caused aircraft to be not mission capable for more than 100 hours during that month.

customers. Air Force records show that the primary cause of this funding shortfall was an inaccurate inventory requirement forecast. As a result, the fiscal year 1997 budget was about \$500 million less than needed to buy new inventory items and pay for the repair of broken items. Because of funding shortfalls that resulted from these problems, activity group officials took action to optimize the use of available funds. The actions included directing that high priority be given to items that were causing aircraft to be not mission capable. The effect of this policy was that the number of usable items available at the base and wholesale levels declined resulting in shortages of different inventory items, which caused aircraft to be not mission capable. The Air Force is in process of studying the requirements forecasting problem and plans to report on its findings in May 1999.

Overly Optimistic Agile Logistics Goals

The Air Force reduced its supply group's budget in anticipation of savings from the implementation of new logistics processes as part of its Agile Logistics program. However, for 31 of the 155 items reviewed, supply problems occurred principally because Agile Logistics process improvement goals were not achieved. These goals related to improving processes such as the timely return of broken items to depots and reducing the time it takes to receive an item once it is ordered by a unit. These and other process improvements were the basis for a \$948-million reduction over a 3-year period in the Supply Management Activity Group's budget. Since these goals were not achieved, the supply group had less funding than needed to meet customers needs. Consequently, even though customers had funds to purchase items, the supply group could not provide them. As a result, units relied on uneconomical maintenance actions to meet supply needs. These actions included taking parts off of one aircraft and putting them on another aircraft and using supplies designated for deployments.

Untimely Repair of Broken Inventory Items

The other major cause of parts shortages in September 1997 was the depot maintenance activities' inability to accomplish timely repair for 53 items reviewed. A major reason for this situation was the shortages of component parts to fix broken repairable items and repair shop personnel. Although component part shortages have been a long-standing and well-documented problem, the Air Force Materiel Command has not yet developed an effective plan to correct the problem. Further, although manpower shortages were frequently a major constraint, maintenance activities were being asked to repair the items that were breaking on a daily basis, as well as, to reduce the reported backlog of work from prior years. This situation also contributed to Agile Logistics goals not being met.

Recommendation

Since GAO is reporting separately on the Agile Logistics program implementation and the Air Force is in the process of reviewing the requirements forecasting process, GAO is making no recommendations on these issues in this report. However, in order for the supply group to provide more timely and responsive support to its customers, the Air Force must resolve the component parts shortage problem. GAO recommends that the Secretary of the Air Force direct the Commander of the Air Force Materiel Command to address this problem by developing (1) a strategy for identifying and correcting the underlying causes of the problem, (2) a systematic process for identifying and focusing management attention on the most critical awaiting parts problem items, (3) a standardized approach that item managers can use to obtain and analyze data on awaiting parts problems, and (4) more reliable data on the number and type of component parts that will be needed to repair broken repairable items.

Agency Comments

In its comments on a draft of this report, DOD concurred with GAO's recommendation and identified two studies underway that should help the Department identify areas for improvement. Further, additional funding has been provided to purchase additional spare parts critical to future operations. DOD further stated that the above actions plus the implementation of GAO's recommendation should improve the reliability and accuracy of the Air Force's supply activity group's operations.

DOD's comments also stipulated that despite shortfalls in the Agile Logistics program, it has helped the Air Force reduce its supply pipeline from 67 days in fiscal year 1994 to 52 days in 1998. GAO recognizes that the Air Force has initiated numerous process improvements attempting to reduce its processing time, and its fiscal year 1998 budget was predicated on an average pipeline time frame of 52 days. The Air Force reduced its budget based on these predicated savings. Data available to GAO indicated that the supply group's average actual pipeline time for the fourth quarter of fiscal year 1998 was 87.5 days. GAO noted in this report the Air Force's inability to achieve the 52-day goal was due largely to a shortage of component parts and items on backorder. The pipeline time associated with a shortage of component parts and backorders accounted for 37.1 of the 87.5 days. DOD's comments are included in appendix II.

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Abbreviations

ACC	Air Combat Command
AFMC	Air Force Materiel Command
ALC	Air Logistics Center
AMC	Air Mobility Command
AWP	Awaiting parts
DLA	Defense Logistics Agency
DOD	Department of Defense
GAO	General Accounting Office

Introduction

The Chairman, Subcommittee on Military Readiness, House Committee on Armed Services, requested that we conduct a series of reviews on the financial operations and effectiveness of Defense business operations. As part of this series, we reported on the Air Force Supply Management Activity Group's financial operations in June 1998.¹ This report discusses the supply group's ability to effectively provide inventory items to its customers. Ineffective or inefficient operations in these activities can adversely affect readiness and the use of operations and maintenance and other Defense appropriated dollars.

The Air Force Supply Management Activity Group helps to maintain combat readiness and sustainability by supplying the Air Force with items necessary to support troops, weapon systems, aircraft, communications systems, and other military equipment. In doing so, the group is responsible for about two million items, ranging from weapon system spare parts, to fuels, medical and dental supplies and equipment, and uniforms. The Department of Defense (DOD) reported that the supply group generated \$10.2 billion in revenue during fiscal year 1998 and had \$27.6 billion in inventory at the end of fiscal year 1998.

Process for Providing Aircraft Spare Parts to Air Force Units

The supply group's operations are financed as part of the Air Force Working Capital Fund. The supply group operates under the revolving fund concept of breaking even over time by charging customers the full costs of goods and services provided to them as currently defined in DOD's Financial Management Regulation, Volume 11B, Reimbursable Operations, Policy and Procedures—Defense Business Operations Fund. The supply group receives orders from customers to purchase inventory items. Customers use appropriated funds, primarily operations and maintenance appropriations, to finance these orders. The supply group uses payments from customers to replenish the inventory sold to customers by (1) ordering repair services of existing inventory from industry and DOD depot maintenance activities or (2) buying new inventory items.

The supply group procures critical material and makes repair parts available to its customers through five inventory control points: Ogden Air Logistics Center (ALC), Ogden, Utah; Oklahoma City ALC, Oklahoma City, Oklahoma; Sacramento ALC, Sacramento, California; San Antonio ALC, San Antonio, Texas; and Warner Robins ALC, Warner Robins, Georgia. The

¹Appendix I provides a listing of the reports issued in this series.

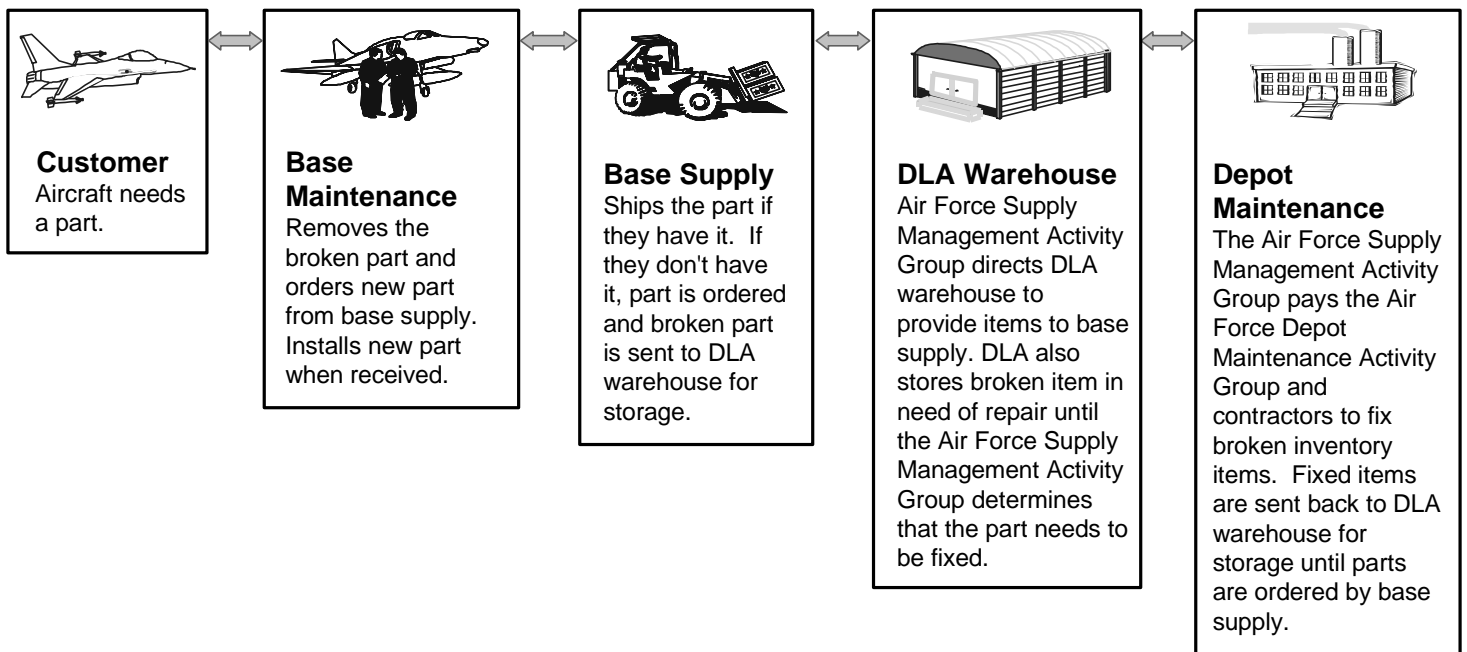
Air Force is in the process of closing the Sacramento and San Antonio ALCs based on the 1995 Base Realignment and Closure recommendations. The five ALCs report to the Air Force Materiel Command (AFMC), located at Dayton, Ohio.

Air Force spare parts are classified as either consumables or repairables, and are procured in order to support either peacetime or wartime operations. Consumable items, which are mostly managed by the Defense Logistics Agency (DLA), are those items that are discarded when they fail. Repairable items, managed by the Air Force Supply Management Activity Group, are those items that can be cost effectively repaired. Peacetime operating spares are those items that are bought to support peacetime training and to ensure an adequate force is available for initial wartime operations (readiness). Mobility readiness spares packages (these packages replaced the war reserve spares kits) are air transportable packages of repair parts and maintenance supplies required to support planned deployed operations until resupply can begin.

The process used to repair failed repairable items begins when unit maintenance personnel at an Air Force base removes a failed item from the aircraft. At this point, base maintenance attempts to either repair the item or obtain a serviceable replacement from base supply. However, if base maintenance cannot repair the item and a suitable replacement item is not available, the base must (1) return the broken item to a maintenance depot² for repair and (2) request a replacement from the appropriate inventory control point. The inventory control point, in turn, attempts to find a replacement in its existing wholesale inventory. If a replacement is not available, the inventory control point must either acquire a new one or repair a broken one. This process is illustrated in figure 1.1.

²Some items are repaired by contractor repair facilities.

Figure 1.1: Process of Providing Spare Parts to Customers



Air Force Is Changing Its Approach to Managing Inventory

To improve the operations of its logistical activities, including the management of inventory, the Air Force is implementing a program called Agile Logistics. This program focuses on reengineering the old “batch processing” approach where repair requirements were determined once a quarter. The new program is based on a repair-on-demand concept where decisions are made daily to repair only those items that have been requisitioned by customers. Under this program, the Air Force plans to (1) reduce the time required to repair inventory items, (2) reduce inventory levels, (3) match the repair of items with the demand from customers, and (4) rapidly move items to and from customers.

Objective, Scope, and Methodology

The objective of our review was to evaluate the effectiveness of the Supply Management Activity Group. Specifically, this report addresses (1) the extent to which military customers are receiving aircraft spare parts when needed to ensure that aircraft are available and capable of carrying out their assigned mission and (2) the reasons why parts were not always available to customers when they needed them. This review is a

continuation of our work on the activity group's financial reports, prices, and cash management practices (GAO/AIMD/NSIAD-98-118, June 8, 1998).

To assess whether the group was providing effective support to its customers, we obtained and analyzed trend data on the group's performance indicators that included (1) mission capable rates for major Air Force aircraft (the percentage of major aircraft that were capable of accomplishing their mission), (2) total not mission capable supply rates for major Air Force aircraft (the percentage of aircraft that were not capable of accomplishing their mission because of parts problems), (3) cannibalization rates (the number of times per 100 sorties that a serviceable part was removed from one aircraft and put on another), (4) the use of inventory items in the mobility readiness spares packages to keep aircraft mission capable so they could perform peacetime missions, and (5) issue effectiveness rates (the percentage of time that the group was able to satisfy customer requests with stock on hand in base supply).

The data on mission capable rates and total not mission capable supply rates were originally collected in various logistical systems and consolidated in the Air Force's Multi-Echelon Resource and Logistics Information Network. We did not independently verify this data. However, we (1) compared the data available at Air Force headquarters, major commands, and bases to determine if it was consistent and (2) discussed the accuracy and usefulness of the data with officials and/or managers at Air Force headquarters, major commands, and bases. We determined that (1) the data were consistent at the multiple locations that we visited, (2) Air Force officials and managers use these data to monitor readiness and make key funding decisions, and (3) these officials consider the data to be reliable.

To determine why inventory items were not available to customers, we reviewed 155 individual inventory items for the B-1B, F-16, and C-5 aircraft that were not available to customers as of September 1997. We selected these aircraft because they represented different types of aircraft (bomber, fighter, and cargo) which had lower-than-average mission capable rates for the respective aircraft types in September 1997. We also reviewed Air Force reports on the Supply Management Activity Group's effectiveness and discussed the group's support problems with cognizant officials and managers at the Air Force headquarters, AFMC headquarters, and ALC levels.

The inventory items selected for review included the following for each type of aircraft: (1) the 25 items that caused aircraft to be grounded the most hours during September 1997, (2) the 25 items that had the most incidents grounding an aircraft (number of times a certain inventory item grounded an aircraft) during September 1997, (3) the 15 items that were cannibalized the most frequently during the fourth quarter of fiscal year 1997, (4) the 35 items that the major command considered to be the biggest problems, and (5) the 9 to 10 items that the major commands identified as likely sustainability problems in the event of a major contingency. Many of the items we reviewed were included in two or more of the above categories.

For each of the 155 inventory items, we obtained the views of cognizant ALC officials and/or item managers on the reasons why items were not available as of September 1997 and, if an item caused aircraft to be grounded more than 100 hours in September 1998, the primary cause as of then. We also obtained documentation on the items' usage and repair history. In selecting the items to be reviewed, we focused on items directly managed by the Supply Management Activity Group's wholesale division.³ We did not review items managed by DLA since this review focused on the effectiveness of the Air Force Supply Management Activity Group.

To determine if B-1B, F-16, and C-5 customers could obtain the inventory items they needed from the Supply Management Activity Group and, if not, the impact on the customers' operations, we obtained and analyzed information on (1) inventory items cannibalized or removed from aircraft to determine the number of items cannibalized from aircraft as well as the number of hours involved in removing the inventory items from one aircraft and installing the items on another aircraft, (2) training received by aircrews to determine if the lack of aircraft due to inventory shortages prevented aircrews from receiving planned training, and (3) revenue lost by the Transportation Working Capital Fund because aircraft were not available, due to inventory shortages, to perform missions in support of customers.

We did not perform a review of Air Force's readiness and the impact parts shortages would have on contingency missions. However, we interviewed Air Force wing commanders as well as other officials at Air Force bases to

³The supply group's retail inventory operations encompass items that are managed by the other services, defense agencies, or government agencies. These non-Air Force entities are the inventory control points for these items, not the Air Force Supply Management Activity Group.

determine the impact of the low-mission capability rates due to inventory and maintenance problems on the Air Force's ability to accomplish its wartime mission in the event of two major theater wars.

We performed our review at the

- Headquarters, Office of the Under Secretary of Defense (Comptroller) and Air Force, Washington, D.C.;
- Air Force Materiel Command, Wright-Patterson Air Force Base, Ohio;
- Oklahoma City Air Logistics Center, Tinker Air Force Base, Oklahoma;
- Ogden Air Logistics Center, Hill Air Force Base, Utah;
- San Antonio Air Logistics Center, Kelly Air Force Base, Texas;
- Sacramento Air Logistics Center, McClellan Air Force Base, California;
- Warner Robins Air Logistics Center, Robins Air Force Base, Georgia;
- Air Combat Command, Langley Air Force Base, Virginia;
- Air Mobility Command, Scott Air Force Base, Illinois;
- Dover Air Force Base, Delaware;
- Dyess Air Force Base, Texas;
- Ellsworth Air Force Base, South Dakota;
- Moody Air Force Base, Georgia;
- Shaw Air Force Base, South Carolina; and
- Travis Air Force Base, California.

Our review was performed from May 1998 through February 1999 in accordance with generally accepted government auditing standards.

Inventory Problems Adversely Affected Customer Operations

Key performance data on supply operations indicate that the Air Force Supply Management Activity Group's effectiveness has declined steadily since the early 1990s. Detailed review of supply problems being experienced for the C-5, B-1B, and F-16 aircraft showed negative trends for such things as mission capability, removing usable parts from one aircraft for use on another, and excessive use of spares that are purchased to support deployed operations. Further, some C-5, B-1B, and F-16 units experienced operational problems related to completing required training or accomplishing airlift mission goals. Officials also noted that supply problems could potentially adversely affect their ability to meet contingency operations.

Performance Data Indicate a Steady Decline in the Supply Management Activity Group's Effectiveness

Performance data that the Air Force uses to monitor the performance of its Supply Management Activity Group indicate a negative trend. Specifically, Air Force performance data indicate increased instances of (1) aircraft not being mission capable, which was primarily due to supply problems, (2) usable parts being removed from one aircraft to keep other aircraft mission capable, and (3) mobility readiness spares package assets used to keep aircraft mission capable. The performance data also indicate that the supply group frequently did not have the parts that customers needed.

Reported Mission Capability Rates for Major Aircraft Have Declined Since the Early 1990s

The Air Force measures the availability of aircraft through the use of mission capable rates that represent the reported percent of unit aircraft¹ that are capable of performing at least one of their assigned missions. Aircraft that are not capable of accomplishing any of the missions are classified as (1) not mission capable supply if they cannot accomplish the missions because of parts shortages, (2) not mission capable maintenance if they cannot accomplish the missions because of required base-level maintenance, or (3) not mission capable both if both parts problems and required base-level maintenance are preventing the aircraft from accomplishing the missions.

¹The mission capability rate is based on all aircraft that are in a unit's possession at a specific point in time. Aircraft that are not available to a unit, such as those that are at a depot undergoing programmed depot maintenance, are not included in mission capable rates. On the other hand, the Status of Resources and Training System (SORTS) identifies the current level of selected resources and training status of a unit—that is, its ability to undertake its wartime mission. As a result, a unit could have a low-mission capability rate but still be considered able to accomplish its wartime mission.

As summarized in table 2.1, data provided by Air Force headquarters indicate that the average mission capable rate for Air Force major aircraft² declined steadily from 84.6 percent in fiscal year 1990 to 74.3 percent in fiscal year 1998.

Table 2.1: Reported Average Mission Capable Rates for Air Force Major Aircraft

Figures expressed as a percentage

Fiscal year	Mission capable rates for major aircraft
1990	84.6
1991	83.4
1992	82.7
1993	80.8
1994	79.3
1995	78.7
1996	78.5
1997	76.6
1998	74.3

Source: The Air Force's Multi-Echelon Resource and Logistics Information Network and the Reliability and Maintainability Information System.

While Air Force major aircraft experienced a decline in mission capable rates from fiscal year 1990 through fiscal year 1998, most of that decline was attributed to supply problems. Specifically, as summarized in table 2.2, the reported total not mission capable supply rates for Air Force major aircraft more than doubled from 6.4 percent in fiscal year 1990 to 13.9 percent in fiscal year 1998.

²Reported mission capable rates for the Air Force major aircraft do not include data on (1) helicopters, (2) training aircraft such as T-37, and (3) some low density aircraft such as the SR-71.

Table 2.2: Reported Total Not Mission Capable Supply Rates for Air Force Major Aircraft

Figures expressed as a percentage

Fiscal year	Total not mission capable supply rates for major aircraft
1990	6.4
1991	8.6
1992	9.5
1993	10.2
1994	10.3
1995	10.8
1996	11.0
1997	12.6
1998	13.9

Source: The Air Force's Multi-Echelon Resource and Logistics Information Network and the Reliability and Maintainability Information System.

Customers Were Frequently Removing Good Parts From Aircraft to Keep Other Aircraft Mission Capable

Because mission capable rates for major aircraft have steadily declined since 1990, we selected three aircraft—the B-1B, F-16, and C-5—to obtain additional indicators on the performance of the Supply Management Activity Group. We selected these aircraft because they represented different types of aircraft (bomber, fighter, and cargo) which had lower-than-average mission capable rates for their respective aircraft types in September 1997.

We found that in the last several years, there has been an increase in the removal of usable parts from these aircraft to replace broken parts on other, like aircraft to keep them mission capable. The Air Force refers to this practice as cannibalizing parts. The Air Force performance indicator for this practice is called the cannibalization rate, which is the average number of cannibalization actions per 100 sorties flown. In many cases, a part is cannibalized when base supply cannot deliver a good part when needed and mission requirements demand the aircraft be returned to a mission capable status. Even though bases were cannibalizing parts more frequently in recent years, the aircraft mission capable rates have continued to decline as shown in table 2.1. As table 2.3 shows, the cannibalization rate for Air Combat Command's (ACC) F-16s and B-1Bs and the Air Mobility Command's (AMC) C-5 aircraft have increased over the last several years but especially from fiscal year 1995 to fiscal year 1998.

Table 2.3: Reported Number of Cannibalizations Per 100 Sorties for the F-16, B-1B, and C-5 Aircraft

Figures represent average cannibalization actions per 100 sorties flown

Fiscal year	F-16	B-1B	C-5
1993	5.3	55.7	37.9
1994	7.8	61.1	30.9
1995	8.4	53.5	40.5
1996	10.0	66.9	41.4
1997	12.8	93.9	45.9
1998	12.1	96.3	54.0

Source: Air Combat Command and Air Mobility Command.

Table 2.3 also shows that (1) the cannibalization rate for the F-16 has more than doubled from fiscal year 1993 through fiscal year 1998, (2) for B-1B aircraft, maintenance personnel were cannibalizing a part from an aircraft for almost every one sortie flown during fiscal year 1998, and (3) for C-5 aircraft, maintenance personnel were cannibalizing a part from an aircraft every time two sorties were flown during fiscal year 1998. While cannibalizing parts from aircraft is considered a normal part of the maintenance process and is used as a maintenance tool to work around parts shortages, maintenance personnel expended a large amount of time cannibalizing parts. Table 2.4 shows the hours spent in fiscal years 1997 and 1998 by ACC and AMC maintenance personnel cannibalizing B-1B, F-16, and C-5 parts.

Table 2.4: Reported Cannibalization Hours for ACC and AMC B-1B, F-16, and C-5 Aircraft for Fiscal Years 1997 and 1998

Type of aircraft	Cannibalization hours	
	Fiscal year 1997	Fiscal year 1998
F-16	35,472	43,431
B-1B	31,377	29,342
C-5	19,123	19,271
Total hours	85,972	92,044

Source: Air Combat Command and Air Mobility Command.

As the above table shows, ACC and AMC expended about 178,000 hours removing usable parts from one aircraft and putting those same parts on other aircraft in order to keep them mission capable during fiscal

years 1997 and 1998. This equates to about 43 people working 8 hours a day, 5 days a week for the entire 2 fiscal years. However, the total magnitude of the number of hours spent removing parts from aircraft and putting them on other aircraft is not known. For example, the amount of time spent in performing required operational checks to determine if cannibalized parts were working properly once they were installed was not always reflected in base reports on cannibalizations.

Cannibalization actions resulting from parts shortages also doubled the workload for these personnel since they had to take parts off of one aircraft and put them on another aircraft. In addition, it took maintenance personnel weeks and, in some cases, months to put an aircraft back together once parts were removed from the aircraft. For example, every time Dover Air Force Base rotated its C-5 aircraft used for cannibalization—about 8 times a year—10 to 15 maintenance personnel worked 12 hour shifts for 10 to 14 days in order to take good parts off the new cannibalization aircraft and rebuild the old cannibalization aircraft. Maintenance personnel at a Dyess Air Force Base B-1B squadron usually worked two, 10-hour shifts to rotate cannibalization aircraft. Data provided by Dyess showed that for the five most recent cannibalized aircraft, it took the squadron anywhere from 10 to 66 days, for an average of 39 days, to rebuild the aircraft. The rebuild time for the squadron at Dyess does not include the time it took to take the parts that were used to rebuild the old cannibalization aircraft off the new cannibalization aircraft—because Dyess did not track this type of information.

**Mobility Readiness Spares
Package Assets Used to
Keep Aircraft Mission
Capable**

Another indication of supply problems is the use of mobility readiness spares package assets to satisfy peacetime requirements. Mobility readiness spares packages are air transportable packages of repair parts and maintenance supplies required to support planned deployed operations until resupply can begin. However, the Air Force is using these assets to satisfy peacetime critical parts shortages as shown in table 2.5.

Table 2.5: Use of Mobility Readiness Spares Packages to Satisfy Parts Shortages for B-1B, C-5, and F-16 Aircraft That Were Not Mission Capable

Fiscal year	B-1B		C-5		F-16	
	Number of parts	Percent of total	Number of parts	Percent of total	Number of parts	Percent of total
1996	147	1.5	809	3.8	3,613	6.4
1997	780	6.2	3,156	15.1	3,600	5.5
1998	2,006	15.0	4,308	18.0	3,783	5.6

Source: Weapon System Management Information System.

As shown in table 2.5, the use of mobility reserve spares package assets to sustain aircraft mission capability has increased over the last several years for the B-1B and C-5. Specifically, the use of such assets to satisfy parts shortages has worsened for the B-1B and C-5 from fiscal year 1996 through fiscal year 1998, while the use of the mobility readiness spares package assets has remained about the same for the F-16 during the same time period. While DOD policy allows this practice and there are no restrictions on the number of assets that can be used to support peacetime operations, Air Force headquarters officials stated that it is imperative that the packages be maintained at sufficient levels to sustain operations. The practice of using mobility readiness spares package assets is another indication that the Supply Management Activity Group is encountering problems in meeting the needs of its customers. This practice, in effect, trades off the Air Force's ability to sustain its forces during wartime for the ability to prepare its peacetime forces for war.

Base Supply Frequently Did Not Have the Parts That Customers Needed

Another indicator measuring the effectiveness of the Supply Management Activity Group is the supply issue effectiveness rate, which is the percent of time that base supply will have a part in stock when a maintenance organization needs the part for repairing an aircraft. This indicator is used to measure how well the customer is supported by the supply group since base supply cannot possibly stock every part. A high issue effectiveness rate reflects success in anticipating customer needs while a low rate reflects poor forecasting of customer needs.

As table 2.6 shows, ACC and AMC data indicate that the supply effectiveness rate has declined for the (1) B-1B and F-16 from fiscal year 1994 through fiscal year 1998 and (2) C-5 from fiscal year 1996 through

fiscal year 1998. Further, the actual rate has been below the standard set by the two major commands for fiscal years 1996 and 1997.

Table 2.6: Supply Issue Effectiveness Rates for the B-1B, F-16, and C-5 for Fiscal Years 1994 Through 1998

Figures expressed as a percentage

Fiscal year	B-1B		F-16		C-5	
	Actual	Standard	Actual	Standard	Actual	Standard
1994	67.4	62	74.9	64	a	a
1995	66.7	70	74.6	74	a	a
1996	65.3	70	71.8	74	71.2	75
1997	63.2	70	70.2	74	69.5	75
1998	59.1	b	71.6	b	69.5	75

^aInformation was not available.

^bStandards were not established for fiscal year 1998.

Source: Air Combat Command and Air Mobility Command.

The table combines consumable items, which are primarily managed by DLA, and repairable items, which are managed by the supply group. When looking just at repairable items, we found that the issue effectiveness rate was 46.7 percent and 41.3 percent for the B-1B and 49.3 percent and 48.7 percent for the F-16 in fiscal years 1997 and 1998, respectively. These figures indicate that bases only have one out of every two repairable items in stock when maintenance personnel need them to repair aircraft.

Lack of Parts Hindered Peacetime Missions

We also selected the B-1B, F-16, and C-5 aircraft to assess the impact of parts shortages on customers' operations. Because aircraft were not always available due to spare parts shortage problems as well as other problems, such as aircraft maintenance and deployments, Air Force units were not able to perform all of their peacetime missions. Specifically, the lack of spare parts prevented (1) some units from accomplishing all of their pilot and/or aircrew training and (2) AMC from performing all customer requested airlift services. Lastly, officials indicated that the shortage of spare parts has the potential to adversely affect contingency operations, particularly if several squadrons were required to deploy at the same time.

Air Force Customers Unable to Perform All Training Missions

Because aircraft were not available for flying sorties due to supply problems and other problems such as aircraft maintenance and deployments, some Air Force customers were unable to perform all of their required training missions. Training is an essential part of Air Force customers' operations because it provides pilots and other aircrew members with the necessary training to be (1) qualified to fly certain types of aircraft such as the B-1B and (2) proficient at performing certain tasks such as midair refueling at night, following terrain at night, and releasing or firing aircraft weapons as necessary during deployment missions. Table 2.7 shows that during fiscal year 1998, B-1B and F-16 customers only flew 79,267 hours, or 83 percent, of their total flying hours available for pilot and aircrew training.

Table 2.7: ACC Flying Hours That Were Available and Used for Pilot and Aircrew Training in Fiscal Year 1998

Description	F-16	B-1B	Totals	Percent of total
Available training hours	76,546	19,343	95,889	100
Training hours used	63,112	16,155	79,267	83
Training hours not used	13,434	3,188	16,622	17

Source: Air Combat Command information.

At Air Force bases we visited, officials confirmed that, in some cases, aircraft were not available for training sorties because of supply problems. For example, at one B-1B squadron, parts shortage problems were cited as a major contributor to aircraft not being available for training. Due to the lack of available aircraft, some aircrew members could not meet their annual training sortie requirements during the training year from July 1, 1997, through June 30, 1998. Specifically, aircrew members were not classified as combat mission ready as follows: (1) 6 out of 30 aircraft commanders, or 20 percent, (2) 2 out of 13 pilots, or 15 percent, and (3) 5 out of 41 weapons system officers, or 12 percent. According to the squadron commander, these crew members could not be used on combat missions until they accomplished the required training.

Air Force officials at another B-1B base also cited the lack of parts, as well as maintenance problems, as reasons why aircraft were not available and why aircrews did not receive all their needed training. For example, because of unavailable aircraft, the base did not have sufficient B-1Bs to provide aircrews training in tactical formation flying that requires the use

of two aircraft flying close together in formation. Only four personnel at the base were qualified in tactical formation flying. Officials said that in the event of a wartime mission, the aircrews not qualified in tactical formation flying would have to fly their aircraft so as to maintain a certain distance from the nearest B-1B, a situation that was described as dangerous in wartime conditions. Further, this base is also tasked four times a year to provide four of its aircraft to a B-1B weapons training school at another base. However, for such a deployment during October 1998, the base could only send two of the four required aircraft—the other two aircraft had to be sent from other B-1B bases. According to an Air Force official, the lack of spare parts was a major reason why the base could not send two of its aircraft to the weapons training school.

Parts Shortages Cited as a Major Contributor to an Estimated \$64 Million in Lost Revenue

An important mission of the transportation activity group, which is part of the Air Force's Working Capital Fund, is to provide strategic airlift services by moving cargo and passengers worldwide for wartime deployments of fighting forces and peacetime missions to include humanitarian efforts. These airlift services are provided by the Air Force's AMC, which, like other working capital fund activities, relies on sales revenue from services provided to customers to finance its operations. We found, however, that because some C-5, C-17, and C-141 aircraft were not available, AMC did not perform customer airlift services as shown in table 2.8. Although these aircraft were not mission capable for a variety of reasons such as maintenance problems, AMC cited parts shortages as a major contributor as to why the aircraft were not available to perform airlift services.

Table 2.8: AMC Estimated Loss of Revenue From Declined Missions for Its C-5, C-17, and C-141 Aircraft From September 1, 1997, Through August 31, 1998

Type aircraft	Missions declined	Estimated flying hours per mission	Revenue per flying hour	Estimated lost revenue
C-5	167	20.2	\$12,605	\$42,521,707
C-17	25	15.8	7,025	2,774,875
C-141	183	19.1	5,349	18,696,359
Total	375	NA	NA	\$63,992,941

Source: Air Mobility Command.

NA—Not applicable.

Table 2.8 shows that from September 1, 1997, to August 31, 1998, AMC declined 375 requests from customers to perform airlift services because of unavailable aircraft. Since aircraft were not available to meet these requests, AMC estimated that it lost at least \$64 million in revenue. A Mobility Command official stated that they used a conservative estimate of the flying hours per mission to calculate the lost revenue and, therefore, the estimated revenue not earned due to unavailable aircraft is probably understated.

Parts Shortages Also Have Potential Adverse Impact on Contingency Missions

Although we did not perform a review of Air Force's readiness in terms of contingency deployments, we found indications at the bases we visited that parts shortages have the potential to adversely impact their ability to effectively accomplish contingency missions. Air Force base officials said the impact that parts shortages would have on contingency deployments is difficult to determine and depended on a variety of factors, including the (1) number of squadrons a base would be required to deploy, (2) number of aircraft to be taken, (3) number of sorties to be flown and the duration of the sorties, and (4) location of the deployment. At some bases, officials stated that sending one squadron would not present much of a problem, but that sending two or more would be more difficult to do. Officials at one base stated that parts shortages have a definite impact on their ability to respond to contingency missions. Similarly, officials at another base stated that parts shortages were their most significant problem regarding readiness.

Conclusions

Mission capability rates reported for major Air Force aircraft have declined significantly over the last 8 years. Further, more specific analysis on three aircraft—the B-1B, F-16, and C-5—shows similar trends as well as significant increases in cannibalization rates and the use of supplies intended to support deployed operations. At some Air Force bases, this situation has adversely affected maintenance operations as well as aircrew training programs. Further, based on discussions with Air Force officials, there are indications these problems could potentially impact contingency missions.

Budget, Inventory Management, and Repair Problems Were Primary Causes of Spare Parts Shortages

To assess the reasons why spare shortages existed, we judgmentally selected and reviewed B-1B, F-16, or C-5 inventory items. The 155 items we selected were (1) causing aircraft to be not mission capable and/or (2) considered actual or potential problem items by ACC or AMC. This analysis identified three key factors causing support problems that generally can be categorized as weaknesses in (1) forecasting inventory requirements and executing inventory procurement and repair budgets, (2) not achieving Agile Logistics goals, and (3) repairing items when needed by customers. Because of the integrated nature of the supply systems there is a general interrelationship among these causes.

Table 3.1 shows the results of our analysis for the 155 items that were not available as of September 1997 and for 96 of the 155 items that were still causing support problems as of September 1998.¹

Table 3.1: Primary Reasons Why Problem Items Were Not Available as of September 1997 and September 1998

Cause category	September 1997		September 1998	
	Number	Percent	Number	Percent
Forecasting and budgeting	57	36.8	0	0.0
Agile Logistics	31	20.0	26	27.1
Untimely repair	53	34.2	63	65.6
Other ^a	14	9.0	7	7.3
Total	155	100.0	96	100.0

^aPrimarily technical problems that affect the reliability of an item.

Inventory Requirements Forecasting and Budget Problems

For 57 of the 155 items we reviewed, problems related to the forecasting of inventory requirements used in developing the supply budget were cited as the reason why the Supply Management Activity Group could not meet its customers' needs as of September 1997. This happened primarily because inventory requirements were understated by 18 percent. Some minor problems related to obligating funds and the timely receipt of obligation data also contributed to the problems. The Air Force is in the process of reviewing possible corrective actions.

¹In our analysis, we considered an item to still be a problem in September 1998 if it caused aircraft to be not mission capable for more than 100 hours during that month.

**Underestimation of
Customers' Inventory
Requirements Resulted in
Support Problems**

Air Force records indicate that the Supply Management Activity Group received about \$2.5 billion in fiscal year 1997 obligation authority even though inventory requirements (purchase of new items and repair of broken items) were estimated at \$3 billion. This clearly limited the supply group's ability to buy and repair the items its customers needed and was the primary cause of spare parts shortages, as of September 1997, for the 155 items we reviewed. It also caused (1) the number of serviceable items available at the base and wholesale levels to decline because items were used but not replenished during fiscal year 1997 and (2) a large backlog of procurement and repair requirements to carry over from fiscal year 1997 to fiscal year 1998.

Air Force headquarters officials identified two primary reasons for the differences between the budget estimate and the requirements for fiscal year 1997. First, because of a computer interface problem, about \$200 million in procurement and repair requirements were inadvertently left out of the inventory requirements estimate. Second, Air Force officials estimate that the group's inventory requirements increased by about \$300 million between March 1995, when they initially determined their fiscal year 1997 inventory requirements, and March 1996, when the Air Force updated its inventory requirements. For example, documentation provided by Air Force headquarters showed that force structure changes resulted in an expansion in the overhaul program for B-52 engines. This expansion increased the group's fiscal year 1997 inventory requirements by \$26 million which was to be used for the repair of struts and the replacement of inventory items that could no longer be repaired.

Because of the differences between the budget and the actual funding needed, supply officials took action in January 1997—less than 4 months into the fiscal year—to ensure the most effective possible use of their available obligation authority. Specifically, they attempted to optimize their obligation authority by directing activities to

- repair only high priority requirements, such as items that were causing aircraft to be not mission capable;
- repair items on an as-needed basis to avoid repairing unneeded items; and
- severely limit the procurement of new repairable items because they believed that repairing items and procuring the component parts needed to accomplish the repairs would have a more positive near-term effect on aircraft mission capable rates.

This approach limited the likelihood that scarce resources would be wasted on the repair or procurement of unneeded items, but it also created supply shortages at the base level. Since repairs were generally limited to high priority requirements, relatively low priority requirements such as replenishing base stockage levels were generally not satisfied. As a result, base supply activities were less likely to have items in stock when units needed them. Further, because repairs were accomplished as the needs arose rather than in anticipation of the needs, it frequently took the supply group longer to provide the items that were needed by units. These factors and the resulting base-level shortages were reasons why, as discussed in chapter 2, the supply group's issue effectiveness rates were low during fiscal year 1997. Moreover, because these shortages were carried into the next year,² they also contributed to the low issue effectiveness rates that continued during fiscal year 1998.

Budget Execution Problems
Also Contributed to Supply
Group's Fiscal Year 1997
Support Problems

To a minor extent, budget execution problems also prevented supply group managers from fully using their available obligation authority. For example, the supply group's wholesale division was given about \$3.2 billion of obligation authority in fiscal year 1997,³ but the group reported obligations of about \$3.15 billion—a \$50-million difference. While the \$50 million represents only 1.5 percent of the supply group's obligation authority, obligating this money would have made more inventory items available to customers. According to an Air Force budget official, since the Defense Finance and Accounting Service's accounting systems did not provide September obligation data until 6 or more weeks after the end of the month, supply managers did not know that additional obligation authority was available until after the end of the fiscal year.

Similarly, the Air Force would have been in a position to request additional obligation authority if the supply group had timely sales data from the Defense Finance and Accounting Service. Specifically, because (1) DOD established the group's obligation authority based on projected sales⁴ and

²AFMC officials estimate that, as of September 1997, the supply group needed about \$427 million to buy and/or fund the repair of items that were (1) causing aircraft to be not mission capable and (2) needed to fill bases' authorized stockage levels.

³This obligation authority was available to not only purchase new items and repair broken items but also to finance the supply group's operating costs, such as the salaries of item managers.

⁴The Office of the Under Secretary of Defense (Comptroller) established the supply group's fiscal year 1997 wholesale budget based on a unit cost target of \$0.959, which meant that it was authorized to obligate \$0.959 for every \$1.00 of projected sales.

(2) the supply group's actual fiscal year 1997 wholesale sales were about \$188 million higher than expected, the Air Force could have used the higher sales level and the customer support problems discussed previously as a basis for requesting additional obligation authority from the Office of the Under Secretary of Defense (Comptroller). However, Air Force headquarters officials stated that managers did not receive timely sales data from the Defense Finance and Accounting Service systems and, therefore, did not know until sometime in fiscal year 1998 that their fiscal year 1997 sales were higher than the budget estimate. As a result, this option was not even considered.

DOD Directed the Air Force to Address Its Forecasting Problems

In its fiscal year 2000 budget document for the supply group, the Office of the Under Secretary of Defense (Comptroller) raised concerns about the readiness of all military services and cited a lack of spare parts as a major contributor to a decline in the mission capability of aircraft. To help improve readiness, about \$141 million in obligation authority was added to the supply group's fiscal year 2000 budget to buy and repair additional inventory items. However, the budget document raised concerns about the Air Force's ability to use this additional obligation authority to purchase the correct inventory items. Accordingly, the Deputy Secretary of Defense directed AFMC to conduct a review of the process it uses to determine the inventory requirements of its customers.

AFMC's review, which is currently underway, is to identify the underlying causes of the forecasting problems. In doing so, it is to comprehensively evaluate the procedures, methodologies, and practices that the supply group uses to forecast its customers' requirements. The AFMC Commander is required to provide a report on the review's findings, conclusions, and any recommendations to both Air Force headquarters and the Office of the Under Secretary of Defense (Comptroller) by May 15, 1999.

Overly Optimistic Agile Logistics Goals

The Air Force reduced its supply group's budget by \$948 million over a 3-year period in anticipation of savings resulting from process improvements related to the Agile Logistics program. However, for 31 of the 155 items we reviewed, problems occurred because of inventory management weaknesses, including the Air Force's inability to achieve the Agile Logistics reduced processing time goals. Further, the Air Force's inability to achieve the reduced processing time goals was a contributing factor for many other problem items. The ultimate result of not achieving these goals was that the supply group had less funding than required to

meet customer inventory needs. This situation is in addition to the requirements forecasting problem discussed in the prior section.

Air Force Reduced Supply Group's Budget in Anticipation of Savings

The Air Force's Agile Logistics program is consistent with DOD's goals for improving logistics support⁵ and is based on three key assumptions: (1) reduced logistics response time,⁶ (2) seamless logistics systems, and (3) streamlined logistics infrastructure. It also assumes that the use of current and future technologies will allow units to order spare parts virtually "real time" and that more efficient commercial and military transportation alternatives will make large inventories unnecessary.

The Air Force used anticipated Agile Logistics improvements as a basis for reducing the supply group's buy and repair funding by about \$948 million over a 3-year period. Specifically, the Air Force reduced the supply group's fiscal year 1997 budget by \$336 million based on the assumption that total pipeline and logistics response time could be reduced to 57 days (from a fiscal year 1994 baseline of 67 days); reduced it an additional \$289 million in fiscal year 1998 based on the assumption that the total time could be reduced to 52 days; and reduced it another \$323 million in fiscal year 1999 based on the assumption that the total time could be reduced to 41 days. This means, for example, that the activity group's fiscal year 1997 requirement would have been about \$336 million higher had it been based on a total pipeline and logistics response time of 67 days (the fiscal year 1994 baseline) rather than the Agile Logistics goal of 57 days.

New Supply Support Goals Were Not Achieved

Data we obtained showed that Agile Logistics goals were not being achieved. For example, one ALC indicated that the total pipeline time for the items it managed was about 68 days during fiscal year 1998 (compared to a standard of 52 days) and AFMC headquarters indicated that the Command's average logistics response time for repairable items during fiscal year 1998 was 44.7 days (compared to a budget goal of 9 days).

⁵DOD's conceptual framework for the future of the United States Armed Forces calls for the military services to fuse information, logistics, and transportation technologies in a manner that will allow them to (1) provide rapid crisis response, (2) track and shift assets, even while enroute, (3) deliver tailored logistics packages when and where needed, and (4) ensure the availability of spare parts and other items needed to sustain combat operations. Under this "Focused Logistics" concept, operational units can reduce their logistical "tails" because it is assumed that they will receive timely, continuous, and flexible support from wholesale supply activities.

⁶Logistics response time begins when a unit requests an item that is not available in base supply and that must, therefore, be requisitioned from the wholesale storage activity. It ends when the base receives the item. In this report, when we refer to pipeline times it includes logistics response times.

Consequently, although we found some problems with the accuracy and completeness of the data used to monitor actual pipeline times, (1) the results of our review of the 155 problem items, (2) our discussions with cognizant Air Force logistics officials, and (3) the relative consistency of the data that we obtained from Air Force headquarters, AFMC, and the ALCs, indicate that the untimely processing of repairable items is a problem that warrants close management attention.

Air Force headquarters officials agree that the untimely processing of repairable items is a serious problem that has adversely affected the mission capability of aircraft. Specifically, they stated that the inability to achieve their depot repair time goal was due largely to a shortage of component parts needed to repair broken items—a condition called Awaiting Parts (AWP). Similarly, they stated that the inability to achieve the logistics response time goal was due primarily to backorder time.⁷ They also stated that DOD policy, which they agree with, precludes them from considering AWP and backorder time when determining funding requirements. Air Force and DOD officials said that the AWP problem and backorders are both indications that the supply system is not working as intended and once the underlying cause(s) of these problems are fixed, any inventory purchased to support the longer pipeline would become excessive.

The Air Force's ability to effectively support its units in the future will depend, to a large extent, on whether logistics managers throughout the service are able to do a better job of identifying and correcting the problems that have prevented them from achieving their Agile Logistics goals. This is unlikely to happen until (1) accurate and complete data on pipeline processing times are developed and analyzed consistently throughout the Air Force, (2) individuals responsible for managing the various pipeline segments are clearly identified and held accountable, and (3) commanders and managers throughout the Air Force periodically monitor the progress that is being made in achieving Agile Logistics goals. In those instances where goals appear unrealistic or unattainable, budget estimates must be adjusted accordingly.

We are reporting separately on the Air Force's problems in implementing the Agile Logistics program. The report will detail specific implementation

⁷When an item requested by a customer is not available at the wholesale level, it is placed on backorder until it can be obtained by repairing a broken item or by some other means.

issues the Air Force needs to address and actions the Air Force plans to take.

Untimely Repairs Were a Major Cause of Supply Support Problems

Because it significantly reduces the amount of usable inventory available at the wholesale level, the Air Force's Agile Logistics program significantly increases the importance of depot maintenance activities' role in providing timely and effective support to supply group customers. In many instances, how quickly the supply group can support its customers now depends primarily on how quickly depot maintenance activities can complete repairs on broken items. At the same time, because the Agile Logistics program changed depot repair operations from a batch-oriented process where repair requirements were determined once a quarter to a repair-on-demand approach where repair decisions are made daily, it also makes it much more difficult for these maintenance activities to plan their work and operate efficiently.

AFMC officials knew in advance that Agile Logistics could adversely affect the efficiency of their depot maintenance operations as previously configured, but believed this potential disadvantage would be more than offset by improved processing times and lower inventory levels. Specifically, they assumed that (1) the shift from a batch repair concept to a repair-on-demand concept would allow them to reduce shop flow times and (2) these and other process improvements would reduce the supply group's inventory requirements by \$948 million.

However, as discussed previously, the Air Force has not achieved the Agile Logistics goals. As a result, the budgeted Agile Logistics savings reduced the supply group's funding, but the effect of these "savings" has been less timely and effective support to customers. The next sections discuss two key factors that have limited depot maintenance activities' ability to achieve anticipated reductions in their repair times: (1) shortages of component parts and (2) personnel skill limitations. Table 3.2, which is a further breakout of the repair problem cause category shown in table 3.1, shows the extent to which these factors are contributing to untimely repairs.

**Chapter 3
Budget, Inventory Management, and Repair
Problems Were Primary Causes of Spare
Parts Shortages**

Table 3.2: Primary Causes of Repair Problems as of September 1997 and September 1998

Cause category	September 1997		September 1998	
	Number	Percent of total problem	Number	Percent of total problem
Component parts shortages	38	71.7	34	54.0
Personnel/Skills constraints	8	15.1	21	33.3
Other ^a	7	13.2	8	12.7
Total	53	100.0	63	100.0

^aIncludes problems related to test equipment.

**Component Parts Shortages
Have Been a Major
Impediment to Timely
Repairs**

A shortage of the component parts needed to repair broken items—a condition that, as noted previously, the Air Force refers to as AWP—was the most frequent cause of untimely repairs for the items we reviewed. This AWP problem adversely affected the supply group’s ability to support its customers because it increased the number of broken items in the supply pipeline which, in turn, limited the number of usable items that could be provided to customers.

Our work showed that AWP is a pervasive problem that adversely affected repairs at both the depot and base levels. For example, one of the biggest readiness problems for the B-1B bomber during fiscal year 1998 was the Band 8 Transmitter that was experiencing significant AWP problems. Specifically, the Air Force’s spares inventory for this item was more than \$40 million (64 items at \$644,237 each), but the item nevertheless caused B-1B aircraft to be not mission capable for a total of 59,925 hours during fiscal year 1998⁸ because much of this inventory was in an AWP status at both the depot and base levels. For example, as of July 1998, 26 Band 8 Transmitters were at the repair contractor in an AWP status—16 of which had been in that status for more than a year. Additionally, 19 transmitters were in an AWP status at base level, had been in that status for an average of 139 days, and were awaiting an average of 5.5 component parts each. Some of the needed component parts were managed by DLA but most were managed by the Air Force supply group.

⁸At any given time more than one part may be causing an aircraft to be not mission capable.

Similarly, the Band 7 Transmitter used on the B-1B, which caused B-1B aircraft to be not mission capable for about 36,400 hours in fiscal year 1998, was also a problem because of untimely depot repairs, in general, and a shortage of the component parts needed to accomplish the repairs, in particular. For example, as of October 1998, 15 of these ALC-repaired items were in an AWP status at the depot level, 12 were in an AWP status for more than a year, and all but three needed more than one component part. In addition, although 10 additional Band 7 Transmitters were in the shop undergoing repairs, 55 component parts were needed in order to complete repairs on them. As was the case with the Band 8 Transmitters, most of the needed component parts were managed by the Air Force supply group.

Studies Have Identified AWP Problem

Recent Air Force studies have identified problems similar to those discussed above and/or have identified some of the underlying causes of the problems. For example, these problems were identified in a survey that AFMC headquarters conducted in early 1998 of item managers who were responsible for problem items. Specifically, when asked if parts shortages were a significant problem, about 56 percent of the 622 item manager responses stated that they were. Similarly, when asked if a shortage of carcasses to repair was a problem, about 11 percent of the responses indicated that it was.

However, the Air Force, in general, and AFMC, in particular, have done very little to resolve the AWP problem. For example, as of December 1998, AFMC headquarters had not yet developed (1) a long-term strategy for identifying and correcting the root cause(s) of the AWP problem, (2) a systematic process for identifying and focusing management attention on the most critical AWP problem items, or (3) a standardized approach that item managers can use to analyze data on AWP problems. Further, AFMC officials acknowledged that the AWP problem was due partly to a lack of reliable data on the number and type of component parts that will be needed to repair broken items, but have not developed a specific plan for resolving the problem.

Finally, AFMC officials realize that, to effectively manage the AWP problem, the supply group's material managers must have easy access to the automated data they need to identify and analyze individual AWP problem items. However, presently, data on (1) the number of items that are in an AWP status and (2) the number and type of component parts each item needs must be obtained from several different sources, and even then may not be available in automated format.

**Manpower Constraints Have
Caused Maintenance Delays**

A shortage of personnel or skills was another major factor that limited depot maintenance activities' ability to repair items in a timely manner. Our recent work on the Air Force's logistics reform initiatives indicated that one of the key reasons for personnel and skill shortages was that AFMC officials had made little progress in developing the multi-skilled workers that their depot maintenance activities will need in order to operate effectively in a repair-on-demand environment. As discussed below, two additional reasons for personnel and skills shortages were (1) the temporary workload increase that resulted when the supply group carried a large backlog of repair requirements into fiscal year 1998 and (2) the disruptions associated with the on-going closure of two ALCs.

**Repair Backlog Caused
Temporary Manpower
Constraints**

Due largely to the budget and funding problems discussed previously, the Air Force entered fiscal year 1998 with a substantial backlog of repair work. This, in turn, increased some maintenance shops' workloads to the point where they could not accomplish all of the work during fiscal year 1998. However, because of funding constraints and the possibility that some shops' workloads may decrease once the backlog is eliminated, ALC officials decided not to hire full-time maintenance personnel to accomplish most of the additional work. Instead, they used the existing workforce and, where appropriate, overtime to reduce the backlog.

This approach allowed the supply group to alleviate, but not eliminate, some of its support problems during fiscal year 1998. For example, the shop that repairs the constant speed drive used in the B-1B aircraft cited insufficient manpower as the reason why it had problems keeping up with repairs for this item. During fiscal year 1998, the shop repaired more items than failed—139 items broke and 169 were repaired. However, the item caused B-1B aircraft to be not mission capable for 7,792 hours during fiscal year 1998 and, as of September 30, 1998, bases still had an outstanding requirement for 13 constant speed drives. On a more positive note, the constant speed drive caused aircraft to be not mission capable for only 197 hours in September 1998.

**Personnel Turbulence and
Productivity Are Problems as
ALC Closures Transfer Work to
Other Locations**

Our review of the 155 problem items indicates that the on-going closure of two ALCs and transfer of their workloads to the three remaining ALCs and other sources of repair has already had some impact. Specifically, as of September 1998, closure-related personnel and skill shortages were the primary cause of the support problem for eight of the items we reviewed. Further, the closures may become a more significant problem as the workload transfers proceed.

For example, 10 of the problem items we reviewed were part of the C-5 Malfunction Detection Analysis Subsystem that was repaired at the San Antonio ALC until the workload was transferred to the Warner Robins ALC in January 1999. The San Antonio ALC was able to reduce the number of hours these 10 items caused aircraft to be not mission capable from 24,130 hours in September 1997, to 2,308 hours in September 1998, or about 90 percent. However, the San Antonio ALC shop supervisor stated that his shop's ability to keep up with the repair workload had been adversely affected by the loss of trained maintenance technicians, especially during the first quarter of fiscal year 1999. Further, both the San Antonio and Warner Robins shop supervisors acknowledged that there was likely to be a temporary loss of productivity and efficiency during and immediately following the workload transition. Nevertheless, both supervisors said they were working together to ensure a smooth transition—by taking such action as (1) having Warner Robins personnel train at San Antonio prior to the workload transfers, (2) moving some of the test equipment to Warner Robins prior to the transition date, and (3) having San Antonio personnel visit Warner Robins after the transfer to provide assistance.

AFMC's Work Force Plan

AFMC officials are taking action to alleviate their depot maintenance manpower problems. For example, by the end of fiscal year 1999, they plan to identify (1) the work force they will need in order to accomplish their depot maintenance workload through the year 2005 and (2) requirements for not only permanent employees, but also the temporary, term, and contract field team employees that will be needed to augment the permanent workforce during unplanned peaks in demand. They also plan to develop an enhanced technical training program to cross train workers, thereby making them more versatile and providing maintenance supervisors the flexibility they need in order to operate effectively in a repair-on-demand environment.

Conclusions

Several factors contributed to the Supply Management Activity Group not being able to achieve its goals for meeting customer needs. Management actions related to forecasting requirements and estimating savings from logistics process improvements resulted in the group having fewer funds than needed to meet customer needs. As a result, even though customers had operations and maintenance funds to purchase inventory, the supply group did not have sufficient obligation authority to buy or repair items needed by customers.

A number of the problems experienced are related to implementation issues associated with the Air Force Agile Logistics program. Since we are reporting separately on the Agile Logistics program implementation and the Air Force is in the process of reviewing the requirements forecasting process, we are making no recommendations on these issues in this report. We will monitor the results of the Air Force study and report to the Subcommittee, as appropriate. Further, if the supply group is to provide more timely and responsive support to its customers, the Air Force must resolve the problem of not having the necessary component parts needed to fix broken repairable items.

Recommendation

We recommend that the Secretary of the Air Force direct the AFMC Commander to implement a comprehensive program to address depot maintenance activities' AWP problems. As a minimum, the AFMC Commander should develop (1) a strategy for identifying and correcting the underlying causes of the problem, (2) a systematic process for identifying and focusing management attention on the most critical AWP problem items, (3) a standardized approach that item managers can use to obtain and analyze data on AWP problems, and (4) more reliable data on the number and type of component parts that will be needed to repair broken repairable items.

Agency Comments

In its comments, DOD concurred with our recommendation and stated that the Air Force is taking action to improve its supply parts availability. Specifically, additional funding was provided for the purchase of spare parts in fiscal year 1999, and DOD also provided the Air Force with \$382 million in additional contract authority to purchase parts to improve parts availability beginning in fiscal year 2000. The Air Force is also conducting two studies to (1) improve the forecasting of inventory items that customers need and (2) help correct the awaiting parts problems. DOD also noted that the aging of aircraft, increased operations tempo, and technical surprises have all contributed to increased demands on the supply system and the Air Force is working to fix the problems noted in the audit.

DOD's comments also stipulated that despite shortfalls in the Agile Logistics program, it has helped the Air Force reduce its supply pipeline from 67 days in fiscal year 1994 to 52 days in 1998. We recognize that the Air Force has initiated numerous process improvements attempting to reduce

Chapter 3
Budget, Inventory Management, and Repair
Problems Were Primary Causes of Spare
Parts Shortages

its processing time, and its fiscal year 1998 budget was predicated on an average pipeline time frame of 52 days. The Air Force reduced its budget based on these predicated savings. Data available to us indicated that the Supply Group's average pipeline time for the fourth quarter of fiscal year 1998 was 87.5 days. As noted in our report, the Air Force's inability to achieve the 52 day goal was due largely to a shortage of component parts (called awaiting parts) and items on backorder. The pipeline time associated with awaiting parts and backorders accounted for 37.1 of the 87.5 days

Listing of the Reports in This Series

DOD Information Services: Improved Pricing and Financial Management Practices Needed for Business Area (GAO/AIMD-98-182, Sept. 15, 1998).

Air Force Supply Management: Analysis of Activity Group's Financial Reports, Prices, and Cash Management (GAO/AIMD/NSIAD-98-118, June 8, 1998).

Navy Ordnance: Analysis of Business Area Efforts to Streamline Operations and Reduce Costs (GAO/AIMD/NSIAD-98-24, Oct. 15, 1997).

Navy Ordnance: Analysis of Business Area Price Increases and Financial Losses (GAO/AIMD/NSIAD-97-74, Mar. 14, 1997).

Comments From the Department of Defense



COMPTROLLER

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APR 16 1999

Mr. David R. Warren
Director, Defense Management Issues
National Security and International Affairs Division
U. S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Warren:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report, "AIR FORCE SUPPLY: Management Actions Create Spare Shortages and Operational Problems" dated March 11, 1999 (GAO 511641/OSD Case 1765).

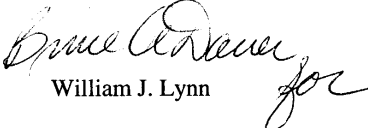
DoD concurs with the overall comments and recommendation in the report. Detailed comments are provided in the enclosure.

The Air Force is taking actions to correct the deficiencies noted. Two studies are underway which should help them identify areas for improvement. Additional funding has been provided to purchase additional parts that are critical to future operations.

The above actions plus the implementation of your recommendations should improve the reliability and accuracy of the Air Force's Supply Activity groups operations.

Thank you for the opportunity to comment on this report.

Sincerely,


William J. Lynn

Enclosure

GAO Draft Report – Dated March 11, 1999
(GAO Code 511641) OSD Case 1765

**“AIR FORCE SUPPLY MANAGEMENT: Management Actions Create Spare Shortages
and Operational Problems”**

RECOMMENDATIONS

- **RECOMMENDATION 1:** The GAO recommended that the Secretary of the Air Force direct the Air Force Material Command (AFMC) Commander to implement a comprehensive program to address depot maintenance activities awaiting parts (AWP) problems. As a minimum, the AFMC Commander should develop (1) a strategy for identifying and correcting the underlying causes of the problem, (2) a systematic process for identifying and focusing management attention on the most critical AWP problem items, (3) a standardized approach that item managers can use to obtain and analyze data on AWP problems; and (4) more reliable data on the number and type of component parts that will be needed to repair broken repairable items (pp. 12 & 63/GAO Draft Report).

DoD RESPONSE TO THE DRAFT REPORT: Concur. The Air Force is already taking action to improve its supply parts availability. With the assistance of the Congress, additional funding was provided for the purchase of spare parts in FY 1999. DoD also provided the Air Force with \$382 million in additional contract authority in FY 1999 to purchase parts to improve parts availability beginning in FY 2000. At DoD’s request, the Air Force has also initiated a comprehensive review of the procedures, methodologies, and practices employed by the Air Force supply management for forecasting customer demand. The results of this study will be available in May, 1999. The Deputy Under Secretary of Defense (Logistics) has also directed a study of the “awaiting parts” issue that is due in the next few months. These actions should help to reduce the problems noted in the draft report.

The draft report notes the impact of Agile Logistics on the level of stocks. It indicates that this program will be discussed in a separate report. Despite its shortfalls, this system has helped reduce the Air Force Supply pipeline from 67 days in FY 1994 to 52 days in FY 1998. The aging of aircraft, increased OPSTEMPO, and technical surprises have all contributed to increased demands on the supply system. The Air Force is working diligently to fix the problems noted in the audit.

Now on pp. 10, 40.

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