United States General Accounting Office

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

June 2000

MILITARY READINESS

Air Transport Capability Falls Short of Requirements

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Abbreviations

AMC	Air Mobility Command
DOD	Department of Defense
MPF/D	million pounds of fuel per day
MTM/D	million-ton miles per day
NMCS	not mission capable for supply

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National Security and
International Affairs Division

B-284769

June 22, 2000

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

Dear Mr. Chairman:

The National Military Strategy calls for U.S. forces to be able to deploy anywhere in the world to protect national interests. Having sufficient strategic airlift, sealift, prepositioned supplies and ground transportation is critical to the military's ability to deploy worldwide. In your July 1999 letter to the Comptroller General, you raised a concern that U.S. mobility capabilities may be inadequate to quickly transport the military forces and supplies necessary to execute the National Military Strategy of fighting and winning two nearly simultaneous major theater wars. This report is the first in a series to assess the ability of U. S. mobility forces to achieve that strategy. It addresses the following issues: (1) Are the Air Force's strategic airlift and aerial refueling fleets capable of meeting the requirements for winning two nearly simultaneous major theater wars? (2) What are the reasons for any shortfalls in strategic airlift and aerial refueling capability? (3) What Department of Defense (DOD) efforts are underway to resolve these capability shortfalls and what are the issues it faces in doing so? Appendix V describes the scope and methodology of our work.

Results in Brief

DOD does not have sufficient airlift and aerial refueling capability to meet the two major theater war requirements because many aircraft needed to carry out wartime activities are not mission ready. For example, during fiscal years 1997 through 1999, on average only 55 percent of the C-5 fleet, the Air Force's largest cargo aircraft, was mission capable[1]—significantly short of the 75 percent expected for wartime. In total, we estimate DOD is short (1) over 29 percent of the needed military airlift capability and (2) nearly 19 percent of the needed refueling aircraft. While the shortfalls

[1]Mission capable means an aircraft can perform at least one and potentially all of its designated mission activities.

do not mean the United States cannot win two major theater wars, the Office of the Joint Chiefs of Staff estimates that due to airlift shortfalls, military forces would arrive later than originally planned, thereby increasing the risk that war plans would not be executed in a timely manner and possibly increasing casualties.

Air Force Headquarters officials attribute the shortfalls in airlift and aerial refueling capability primarily to the age of the aircraft and spare parts shortages. Aircraft used for airlift are the C-5, C-141, and C-17; KC-135 aircraft are used for aerial refueling; and KC-10 aircraft are used for both missions. (See app. I for descriptions of each aircraft.) The C-5 fleet, which ranges in age from 10 to 30 years, averages about 21 years old and the KC-135 fleet averages 39 years old. In recent years, the mission capability of these aging aircraft has declined primarily because of the increasing number of aircraft that need depot maintenance. Air Force data also show that C-5 and KC-135 aircraft have suffered lower mission capability due to shortages of spare parts.

The Air Mobility Command is considering spending $18 billion through fiscal year 2012 on airlift and aerial refueling aircraft. Its plans include buying C-17s and upgrading the C-5 and KC-135 aircraft. However, the results of ongoing DOD studies reevaluating airlift and refueling requirements and alternatives could increase future requirements, change budget priorities, and lead to the procurement of more aircraft.

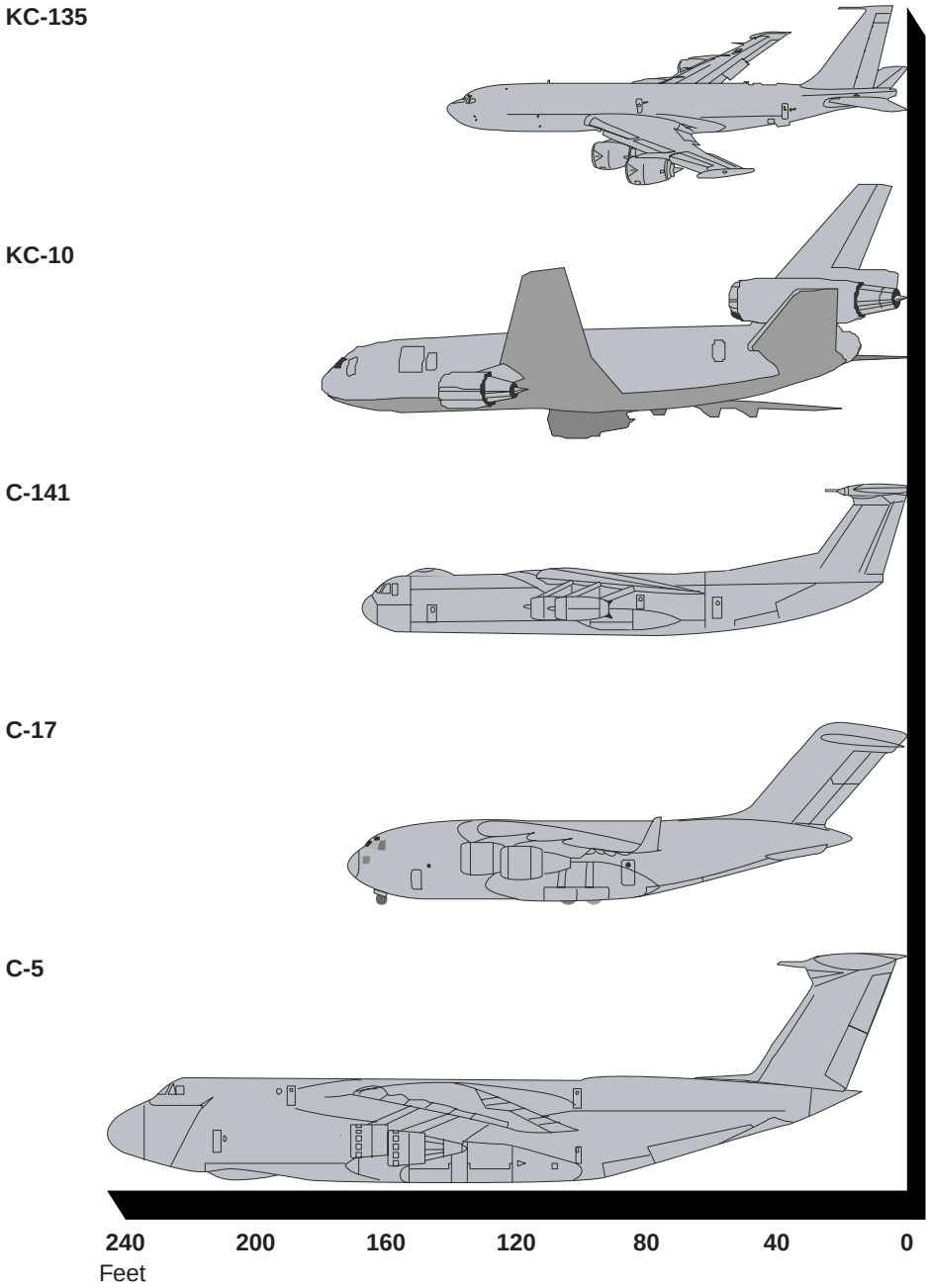
In written comments on a draft of this report, DOD acknowledged that there are airlift and aerial refueling shortfalls but disagreed with our method of computing aircraft mission capable rates. It also disagreed that these shortfalls would limit DOD's ability to meet the two major theater war requirements. Our calculations of aircraft mission capable rates, however, are consistent with Air Force war planning and DOD readiness reporting guidance. Our conclusion that DOD's ability to meet two major theater war requirements could be limited by airlift shortfalls is consistent with DOD's Quarterly Readiness Report to the Congress. We have included DOD's comments throughout the report where appropriate.

Background

The ultimate test for the military, according to the National Military Strategy, is for the United States to be able to win two major theater wars occurring nearly simultaneously. Air mobility would deliver the bulk of the initial time critical forces and supplies, and it is the cornerstone for the nation's security strategy for the foreseeable future.

Currently, DOD expects the U.S. Air Force, the Air National Guard, and the Air Force Reserves to use the C-5, C-141, C-17, and some KC-10 aircraft to carry many of the first forces overseas and support wartime operations. The military's KC-135 and the KC-10 aircraft are expected to refuel these airlift aircraft in transit. The Air Force's Air Mobility Command is responsible for managing and overseeing the readiness of the air mobility force. Figure 1 shows the relative size of the individual aircraft.

Figure 1: Relative Size of Various Airlift and Tanker Aircraft



Source: GAO.

The total annual funding for operating, maintaining, and buying new airlift and aerial refueling aircraft increased from $8.95 billion in fiscal year 1988 to $12.42 billion in fiscal year 1999 (constant 2000 dollars). As a percentage of DOD's budget, the amount for airlift and aerial refueling has doubled since fiscal year 1988, from 2.3 to 4.6 percent, a small portion when compared to other major military functions such as tactical air forces (over 11 percent) and land forces (over 18 percent). By fiscal year 2005, DOD projects airlift and aerial refueling funding will decrease to $11.85 billion (4.2 percent of DOD's budget) because of a decline in the amount budgeted for procurement. Most of the procurement funds in recent years have gone toward purchasing C-17 aircraft and will continue to do so through fiscal year 2005.

DOD Does Not Have Sufficient Airlift and Aerial Refueling Capability

DOD does not have sufficient airlift and aerial refueling capability to meet the estimated two major theater war requirements. According to DOD, shortfalls are attributable to a combination of factors, including actual mission capable rates below Air Mobility Command standards, more aircraft in depot for longer periods than planned (which is factored into mission capable rate), and a temporary loss of capability as C-17s replace C-141s. As shown in table 1, based on average mission capable rates, military airlift is over 29 percent short of the million-ton miles per day (MTM/D)[2] requirement. Furthermore, the average number of refueling aircraft mission capable is nearly 19 percent short. Measured differently, the aerial refueling shortfall equals about 14 percent of the 106.1 million pounds of fuel per day (MPF/D)[3] total capacity.

[2]MTM/D is a measure of airlift capacity that Air Mobility Command computes using a formula that is the product of the mission aircraft's (available hours per day) (the nautical miles per hour) (the expected average load) (a factor that accounts for returning empty) and is divided by a million miles. It represents the fully mobilized wartime capability of all cargo airlift, including active duty, Air National Guard, Air Force Reserve, and civilian.

[3]MPF/D is an Air Mobility Command measure of fuel offload capability cited in its Strategic Master Plan. It is computed using a formula that is the product of the aircraft (inventory) (sortie rate) (offload per sortie) and is divided by a million miles.

Table 1: Airlift and Aerial Refueling Shortfall Based on Average Mission Capable Rates

Mission	Military wartime requirement	Current peacetime capability[a]	Shortfall (overage)	Percentage total shortfall (overage)
C-5	12.98 MTM/D	9.52 MTM/D	3.46 MTM/D	11.85
KC-10	3.08 MTM/D	3.19 MTM/D	(0.11)MTM/D	(0.37)
C-17/C-141	13.14 MTM/D	7.93 MTM/D	5.23 MTM/D	17.90
Total military airlift	**29.20 MTM/D**	**20.64 MTM/D**	**8.58 MTM/D**	**29.38**
KC-135	402 aircraft	317 aircraft	85 aircraft	19.19
KC-10	41 aircraft	42 aircraft	(1) aircraft	(0.23)
Total refueling aircraft	**443 aircraft**	**359 aircraft**	**84 aircraft**	**18.96**
KC-135	74.8 MPF/D	59.0 MPF/D	15.8 MPF/D	14.9
KC-10	31.3 MPF/D	32.4 MPF/D	(1.1)MPF/D	(1.0)
Total refueling capacity	**106.1 MPF/D**	**91.4 MPF/D**	**14.7 MPF/D**	**13.9**

[a]Averages for C-5, KC-10, and KC-135 were based on rates for fiscal years 1997-99. Average for C-17 and C-141 was based on fourth quarter fiscal year 1999.

Source: Computed based on U.S. Air Force, Air Mobility Command data.

In 1995, the Air Mobility Command identified the air transportation requirements to meet the two major theater war demands of the national strategy. It concluded that the military needed to be able to lift 49.7 MTM/D. Of that amount, 29.2 MTM/D were expected to be delivered by military aircraft and the remainder was expected to be delivered by civilian contracted aircraft. For war planning, the Air Mobility Command has identified the MTM/D each type of aircraft is expected to deliver. DOD's 1997 Report of the Quadrennial Defense Review reaffirmed the nearly 50 MTM/D requirement.

According to the Air Mobility Command, the current number of refueling aircraft, while less than the classified requirement identified in 1996, is acceptable assuming the aircraft can be shifted between the two nearly simultaneous wars. DOD's 1997 Report of the Quadrennial Defense Review did not change the aerial refueling requirement.

The Air Mobility Command's determinations of the airlift and aerial refueling requirements and the ability of these forces to meet the requirements are based on the aircraft operating at standard wartime mission capable rates—the percentage of aircraft expected to be mission

capable. However, Air Mobility Command data show that many of the aircraft are not achieving these rates in recent years. During fiscal years 1997-99, the C-5 and KC-135 average mission capable rates did not achieve the standard, but the KC-10's average mission capable rate was slightly higher than the standard. The C-141 and C-17 rates were below the mission capable standard in the fourth quarter of fiscal year 1999 (see table 2). Because the C-141s are being replaced by C-17s, the Air Mobility Command expects the C-141 shortfall to be eliminated by 2004. Therefore, we considered the performance of the other aircraft of greater concern.

Table 2: Air Mobility Command Airlift and Aerial Refueling Aircraft Mission Capable Rates

	Mission capable rates (percent)	
Aircraft type	**Air Mobility Command standard wartime rates**	**Average[a] peacetime rates**
C-5	75	55
C-17	87.5	66
C-141	80	61
KC-135	85	67[b]
KC-10	85	88

[a]Average mission capable rates for the C-5, KC-135, and KC-10 were based on rates for fiscal years 1997-99. Average mission capable rates for the C-141 and C-17 were based on fourth quarter fiscal year 1999 data because these aircraft are in transition. These rates were computed by dividing the number of aircraft mission capable by the total number of primary mission aircraft.

[b]Rate does not include mission capability of 30 KC-135s assigned outside of Air Mobility Command.

Source: U.S. Air Force, Air Mobility Command.

In fiscal years 1997 through 1999, the C-5's mission capable rate averaged 55 percent (57 of 104 aircraft). This average is less than the 75-percent Air Mobility Command mission capable rate standard. At a 55-percent mission capability rate, the C-5 fleet is nearly 3.5 MTM/D short of its expected airlift contribution to two major theater wars. This deficit is of particular concern because of the C-5's ability to carry large cargo. Air Mobility Command officials said that if they needed to surge aircraft for wartime deployment, the C-5's initial shortfall may be reduced by increasing maintenance and aircrew availability, temporarily delaying some periodic maintenance activities, accelerating aircraft through maintenance, using training aircraft, and flying aircraft that would normally be considered not mission capable. Air Mobility Command officials could not quantify how quickly these steps would affect aircraft availability.

Over the past 3 fiscal years, Air Mobility Command's KC-135s have also performed below its 85 percent mission capable rate standard, by averaging 67 percent. At a 67-percent rate, the KC-135 fleet is about 85 aircraft and 15.8 MPF/D short of the expected refueling requirement. According to Air Mobility Command officials, they would employ management initiatives similar to those cited for the C-5 to increase the number of refueling aircraft available should more aircraft be needed. Again Air Mobility Command officials could not identify how quickly these steps would affect aircraft availability.

The KC-10's performance over the past 3 fiscal years has been above the 85-percent standard rate at 88 percent. Because the aircraft is used for both airlift and aerial refueling missions, its higher mission capable rate reduces shortfalls in both missions. At an 88-percent mission capable rate, the KC-10 reduced the airlift shortfall by 0.1 MTM/D. When added to the 5.2 MTM/D shortfall anticipated in the fourth quarter of fiscal year 1999 due to the C-17 replacing the C-141 and lower than expected mission capable rates, DOD is over 29 percent (8.6 of 29.2 MTM/D) short of the military airlift requirement. The higher KC-10 mission capable rate reduces the total aerial refueling aircraft shortfall by 1 aircraft, or 1.1 MPF/D to 14.7 MPF/D.

The Office of the Joint Chiefs of Staff, through its classified Joint Monthly Readiness Reviews, determined in fiscal year 1999 that air mobility shortfalls would not preclude U.S. forces from winning two major theater wars but could delay implementation of war plans. DOD has reported to the Congress that these delays could increase the potential for higher casualties in the interim and during the warfight. These reviews examined the impact of the air mobility fleet's mission capable status on the U.S. military's ability to win two nearly simultaneous major theater wars and other scenarios involving ongoing small-scaled operations. Such analyses determined the risks associated with the timely arrival of forces and the ability to move to a second war. In its latest risk assessment to the Congress, DOD acknowledged that the United States is at high risk in the second major theater war, in part, due to current airlift shortfalls. Furthermore, some analyses showed that risks increased for even one major theater war when U.S. forces were engaged in a Kosovo-size contingency because it exacerbated the shortages in engines and spare parts. (See app. II for more details on airlift and aerial refueling requirements, aircraft mission capable trends for the last 3 fiscal years, and the impact of current mission capability on executing war plans.)

Aging Aircraft and Spare Parts Shortages Cause Low Mission Capability Rates

According to Air Force Headquarters officials, aging aircraft and insufficient quantities of spare parts are the two primary reasons airlift and aerial refueling aircraft are performing below the Air Mobility Command mission capable standard rates. As aircraft age, more maintenance problems arise. As a result, the number of aircraft not mission capable increases because more aircraft are in depot maintenance than the Air Mobility Command planned (see table 3). In addition, the time it takes to perform aircraft depot maintenance generally increases with the age of the aircraft. For example, from fiscal years 1992 through 1999, the average number of days for KC-135s to complete depot maintenance more than doubled, from 170 days to 374 days due to rework of wings and other structural items, corrosion prevention measures, and rewiring. (See app. III for more information on aircraft age and the depot trends over time.)

Table 3: Average Age and Number of Aircraft in Depot Maintenance Compared to Air Mobility Command's Planned Numbers in Fiscal Year 1999

		Number of aircraft in depot (monthly average)	
Aircraft type	**Average age (years)**	**Planned**	**Actual**
C-5	21	16	36
KC-135	39	52	124[a]
KC-10	15	5	10

[a]Approximately 16 aircraft per quarter were undergoing a one-time avionics modification.

Source: U.S. Air Force, Air Mobility Command.

For years, having insufficient spare parts has also been recognized as a major contributor to aircraft performing at lower mission capable rates than expected. The Air Force measures the impact of parts shortages on aircraft availability by citing a not mission capable for supply (NMCS) rate that reflects the percentage of aircraft not meeting mission requirements because parts needed for repairs are not available. The Air Force also tracks the number of times parts are removed from one aircraft to fix another, which is called the cannibalization rate. Table 4 compares the fiscal year 1999 NMCS and cannibalization rates to the Air Mobility Command standard rates for each. It shows that due to the lack of spare parts, the C-5's and KC-135's average rates exceeded both standards, while only the KC-10's cannibalization rate exceeded the standard. (See app. IV

for more details on the extent to which these aircraft were NMCS and cannibalized for parts during fiscal years 1997 through 1999.)

Table 4: Aircraft Average Not Mission Capable for Supply and Cannibalization Rates Compared to Air Mobility Command Standard Rates for Fiscal Year 1999

	Not mission capable for supply rate[a]		Cannibalization rate[b]	
Aircraft type	**Average**	**Standard**	**Average**	**Standard**
C-5	17.75	8.5	54.93	19.6
KC-135	12.65	8.5	11.05	4
KC-10	4.47	5	4.51	3

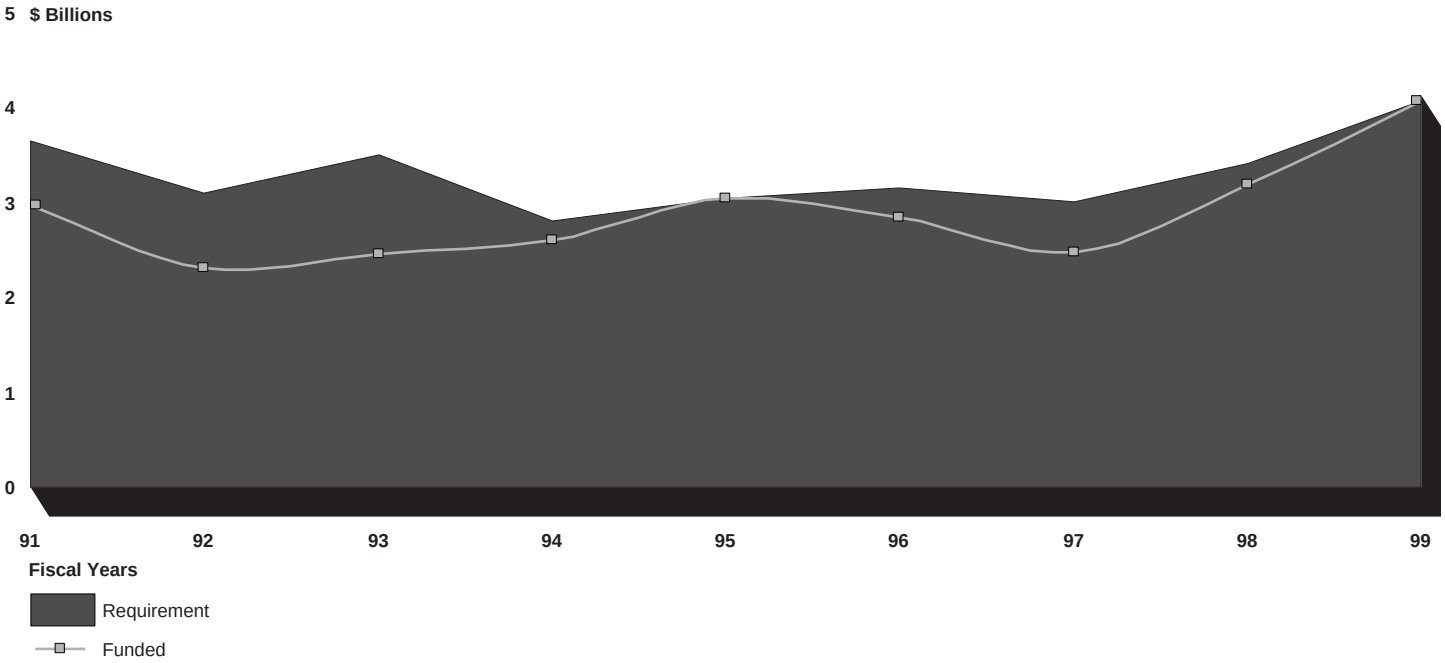
[a]Percentage of aircraft that cannot meet mission requirements because they lack parts.

[b]Number of cannibalizations per 100 flights.

Source: U.S. Air Force, Air Mobility Command.

Despite long-standing insufficient spare part problems, the Air Force has not consistently provided all of the funds its forces said are required to buy spare parts. As shown in figure 2, since fiscal year 1991, the Air Force has fully funded what it identified as the total requirement for spare parts only twice—in fiscal years 1995 and 1999.

Figure 2: Amount Funded Versus Required for Spare Parts for Fiscal Years 1991-99



Source: U.S. Air Force, Deputy Assistant Secretary (Budget).

We reported in 1995[4] and again in 1999[5] that the C-5 had not been achieving the 75-percent mission capable rate, in part, because it lacked spare parts. DOD responded to the 1995 report by saying that Air Force initiatives to fully fund C-5 operations, provide increased spare parts funding, and fund modifications would improve the aircraft's readiness, but not visibly until 1997. The Air Force increased C-5 spare parts funding from 76 percent of requirements in fiscal year 1994 to 100 percent in fiscal year 1996. However, funding then decreased to 80 percent of requirements in fiscal year 1997.

Our 1999 report stated that the parts shortage was due, in part, to DOD's weaknesses in forecasting inventory requirements and the failure of its logistics system to achieve expected inventory management

[4] *Strategic Airlift: Improvements in C-5 Mission Capability Can Help Meet Airlift Requirements* (GAO/NSIAD-96-43, Nov. 20, 1995).

[5] *Air Force Supply: Management Actions Create Spare Parts Shortages and Operational Problems* (GAO/NSIAD/AIMD-99-77, Apr. 29, 1999).

improvements. We also noted that to support the mission capability rates at that time, the Air Force was routinely cannibalizing parts and using parts from the units' war reserve kits that support deployed operations. DOD again responded that Air Force initiatives would fix the problem.

In 1999, the Air Force received an additional $904 million in obligation authority to buy more spare parts. This amount consisted of $387 million to buy spares attributable to the Kosovo Operation, $135 million to the Oklahoma City Air Logistics Center, and $382 million to overcome the accumulated shortfall in spare part inventories. According to the Air Force Material Command, some of this money is to go to the C-5 and the KC-135. Despite this increase, Air Force officials state that spare part shortages will continue to be a problem in the near term because it will take 18 to 24 months for increased consistent funding to improve the availability of spares.

Modernization Plans Are Being Reevaluated, Causing DOD to Face Difficult Choices

Currently, the Air Mobility Command plans to invest $18 billion through 2012 upgrading the C-5 and KC-135 and buying C-17 aircraft (see table 5). According to DOD, the C-5 and KC-135 upgrades and purchase of 120 C-17s will slightly improve capability and reduce operating and support costs. After the delivery of the 120 C-17s is completed, DOD stated it will be able to increase planned airlift capability from 46 MTM/D in 1999 to 50 MTM/D by 2005 and buying 14 additional C-17s, beginning in fiscal year 2003, would further increase its capability. However, several studies underway could increase air mobility requirements, increase the number of aircraft DOD wants to buy, and change the extent and timing of aircraft upgrades. Such changes would cause DOD to face difficult choices in deciding how to resolve the shortfalls.

Table 5: Air Mobility Command Initiatives and Related Funding Dollars in Billions

Action	Fiscal year	Amount	Comments
C-17 aircraft purchase	2001-2003	$8.2	The last 35 of 120 C-17s are being purchased to replace the C-141s on an equal capacity basis.
C-17 additional aircraft purchase	2003-2005	4.2	14 additional C-17s purchased to increase operational flexibility and yield a net increase in overall capability.
C-5 aircraft upgrades	2001-2012	5.3	Reliability and maintainability improvements that reduce overall ownership costs.
KC-135 aircraft upgrades	2001-2006	0.3	Reduces crew size and lowers ownership costs.
Total		**$18.0**	

Source: U.S. Air Force, Air Mobility Command and DOD comments.

The Air Mobility Command had expected to eliminate the airlift shortfall in 2004 by buying 134 C-17s to replace the 266 C-141s. According to DOD estimates, it will have bought 85 C-17s at a cost of $25.4 billion by the end of fiscal year 2000. Buying the remaining 49 aircraft is expected to cost about $12.4 billion through fiscal year 2005.

Because of the C-5's low mission capable rates, the Air Mobility Command is considering upgrading the aircraft at a cost of $5.3 billion. The upgrade program involves replacing the engine; strengthening the structure; and upgrading many of the aircraft's auxiliary power, electric, hydraulics, and other systems. The funding for the program would be budgeted through fiscal year 2012.

According to DOD officials, the planned upgrades to the KC-135 are to improve its capabilities, not its mission capable rate. However, the Air Mobility Command is spending approximately $300 million through fiscal year 2006 to replace some engines and perform some other minor actions that, according to Air Force officials, will improve the fleet's maintainability and reliability. Although the Air Mobility Command has forecasted that a replacement for the KC-135 should be entering the inventory in fiscal year 2013, the funding for this replacement has not been identified, even though it is reasonable to assume funds would be required well before then.

All of these plans could be significantly affected by a number of studies underway. The most significant of these may be the Mobility Requirements Study 2005. The results of this study, according to Air Mobility Command officials, may not be reported until September 2000. The focus of this study

is to determine the capability that is needed to win two nearly simultaneous major theater wars. It will examine issues such as the impact of deploying forces already dispersed in small-scaled contingencies around the world, effects of chemical and biological weapons on mobility, and the effect of support provided by host nations. These issues, according to Air Mobility Command officials, will almost certainly increase the amount of airlift and aerial refueling that is required.

Other ongoing studies that are examining aircraft economic service life and aerial refueling requirements include an evaluation of how to overcome the C-5 airlift shortfall and a tanker requirements study. The results of these studies, when coupled with the Mobility Requirement Study 2005 results, could have significant force size and budget implications. For example, the C-5 study examines nine alternatives for providing the same heavy lift capability currently expected of that aircraft. The alternatives include the replacement of C-5s, various combinations of upgraded C-5s, and the purchase of additional C-17s. The tanker requirements study could suggest increasing the number of refueling aircraft required. According to Air Mobility Command officials, the cost to replace the 546 aircraft in the KC-135 fleet could be significant and at a pace of 15 to 20 aircraft a year, it could take a substantial period of time.

Based on these study results, DOD will face difficult choices about how to resolve the current airlift and refueling capability shortfalls. These choices will likely involve one or a combination of the following options, each of which carries some risk.

- Do not change current plans and accept associated risks. DOD would follow through on its scheduled purchase of C-17s to replace the C-141s and upgrade the C-5 and KC-135 aircraft. It would continue employing workarounds to overcome any temporary capability shortfalls should the aircraft mission capable rates not achieve standards.
- Decrease requirements by adjusting war plans to allow more time for deploying forces into theater or planning for less than two nearly simultaneous major theater wars. For example, allowing more time for the arrival of forces into a theater would reduce the peak demand for airlift and aerial refueling. Reducing the size of the ground and combat air forces to transport overseas would also decrease the cargo requirements. Planning for less than two nearly simultaneous major theater wars would reduce the overall tonnage and refueling requirement.

- Reduce peacetime operational commitments, thereby limiting the number of airlift and aerial refueling flights to the level commensurate with sustaining the mission capable standards. Limiting the number of aircraft available to support peacetime deployments could reduce the fleets' demand for spare parts, thereby reducing the number not mission capable and increasing mission capable rates.
- Prioritize funding for airlift and aerial refueling operations and modernization to the levels commensurate with achieving and sustaining the desired capability levels.

Agency Comments and Our Evaluation

In its comments on a draft of this report, DOD disagreed with our report and overall conclusion that DOD does not have sufficient airlift and air refueling capability to meet the two major theater war requirement because many aircraft are not mission ready. DOD acknowledged that shortfalls in airlift and aerial refueling capabilities are made worse by chronic spare part shortages and excessive aircraft in depot maintenance. However, it asserted that our report overstates the current mission capability shortfall and does not recognize that some of the reasons for the shortfall are normal characteristics during peacetime. Furthermore, DOD said we erroneously characterized its $18 billion planned airlift and aerial refueling investments to modernize the fleet as an effort to overcome the large mission capability shortfall.

We disagree with DOD's statement that we overstated the airlift and aerial refueling shortfall. As our report points out, our shortfall computations were based on methodology that is consistent with Air Force airlift warplanning guidance and DOD's October 1999 guidelines for reporting equipment readiness to the Congress. We also believe that comparing the fleet's readiness status to the wartime requirement is the appropriate way to assess the readiness of the airlift and aerial refueling aircraft for the onset of two major theater wars. As to not recognizing that lower mission capable rates are a normal characteristic of peacetime operations, we believe the large number of aircraft consistently in depots, the duration of their maintenance, and the current parts shortage would delay their availability for deployment in the event of crisis. Furthermore, we state in the report that management actions could be taken to reduce the shortfall if a deployment surge occurs. However, we note that Air Mobility Command officials could not identify how quickly these actions could be completed and provide the aircraft needed for a wartime surge.

Appendix VI contains the full text of DOD's comments and our evaluation of them. DOD also provided technical comments, which we incorporated as appropriate.

We are providing copies of this report to the appropriate congressional committees and the Honorable William S. Cohen, Secretary of Defense and the Honorable F. Whitten Peters, Secretary of the Air Force. Copies will also be made available to others upon request.

If you or your staff have questions concerning this report, please call me at (757) 552-8111. The major contributors to this report are listed in appendix VII.

Sincerely yours,

Neal P. Curtin
Associate Director
National Security Preparedness Issues

Airlift and Refueling Aircraft

The Air Mobility Command is responsible for providing global airlift services and air refueling operations. To carry out its mission, it has the C-5, C-141, and C-17 to transport equipment and supplies and the KC-135 and KC-10 to refuel aircraft. The KC-10 aircraft is also used for transporting equipment and supplies. Figures 3 to 7 show the individual aircraft.

Figure 3: C-5 Aircraft

Source: U.S. Air Force.

The C-5 is one of the largest aircraft in the world. It can carry 291,000 pounds of large cargo for 1,530 nautical miles without refueling and can take off fully loaded in 8,300 feet or land in 4,900 feet. The aircraft length is 247 feet and height is 65 feet with a wing span of 223 feet. The C-5 has a distinctive high T-tail, a 25-degree wing sweep, and four turbofan engines mounted on pylons beneath the wings. Ground crews can load and unload the C-5 simultaneously at the front and rear cargo openings since the nose and aft doors open the full width and height of the cargo compartment. It can also “kneel down” to facilitate loading directly from truck bed levels and can carry nearly all of the Army’s combat equipment, including large heavy items as the 74-ton mobile scissors bridge.

Figure 4: C-141 Aircraft

Source: U.S. Air Force.

The C-141 fills many airlift requirements through its ability to airlift combat forces over long distances, deliver those forces and their equipment either by landing or airdrop, resupply forces, and transport the sick and wounded from the hostile area to medical facilities. The newer C-141s can carry 68,000 pounds of large cargo for 2,270 nautical miles without refueling. The aircraft length is 168 feet and height is 39 feet with a wing span of 160 feet. The C-141 fleet, nearing 9 million flying hours, is being replaced by the C-17.

Figure 5: C-17 Aircraft

Source: U.S. Air Force.

The C-17 is the newest, most flexible cargo aircraft to enter the airlift force. The C-17 is capable of rapid strategic delivery of troops and all types of cargo to main operating bases or directly to forward bases near the front lines. The aircraft is also able to perform airdrop missions when required. The C-17 can carry 160,000 pounds of large cargo for 2,400 nautical miles without refueling, can take off fully loaded and land in 3,000 feet, and can carry almost all of the Army's air-transportable equipment. The aircraft length is 174 feet and height is 55 feet with a wing span of 170 feet. The C-17 will be considered the primary military airlift aircraft once it replaces the C-141s.

Figure 6: KC-135 Aircraft

Source: U.S. Air Force.

The KC-135's principal mission is air refueling, which enhances the U. S. Air Force's capability to accomplish its global missions. The aircraft also provides aerial refueling support to U.S. Navy, U.S. Marine Corps, and allied aircraft. The KC-135 can carry 150,000 pounds of fuel for 1,500 nautical miles. The aircraft length is 136 feet and height is 42 feet with a wing span of 131 feet. A cargo deck above the refueling system can hold a mixed load of passengers and cargo.

Figure 7: KC-10 Aircraft

Source: U.S. Air Force.

The KC-10 is an Air Mobility Command advanced tanker and cargo aircraft designed to increase global mobility for U.S. armed forces. The aircraft length is 182 feet and height is 58 feet with a wing span of 165 feet. The KC-10 has 6 large fuel tanks with a combined capacity of more than 356,000 pounds of fuel–over twice as much as the KC-135. Using either an advanced aerial refueling boom or a hose and drogue refueling system, the KC-10 can refuel a wide variety of U.S. and allied military aircraft on the same flight.

Although the KC-l0's primary mission is aerial refueling, it can combine the tasks of a tanker and cargo aircraft by refueling fighters and simultaneously carrying the fighter support personnel and equipment on overseas deployments. The KC-10 can transport up to 75 people and nearly 170,000 pounds of cargo a distance of about 4,400 miles without refueling.

Current Airlift and Aerial Refueling Capability

The Department of Defense (DOD) does not have sufficient airlift and aerial refueling capability to initially meet the two major theater war requirements. Its military airlift capability is over 29 percent short of the wartime requirement—almost 12 percent of the shortfall is due to the C-5 aircraft performing below Air Mobility Command's mission capability[1] expectations. Nearly 18 percent is due to insufficient airlift capability while the C-17 replaces the C-141. DOD's aerial refueling capability is nearly 19 percent short of the required number of aircraft because the KC-135 is performing below Air Mobility Command's standard. According to DOD, air mobility shortfalls add risk to its ability to execute war plans.

Airlift Falls Short of Requirements

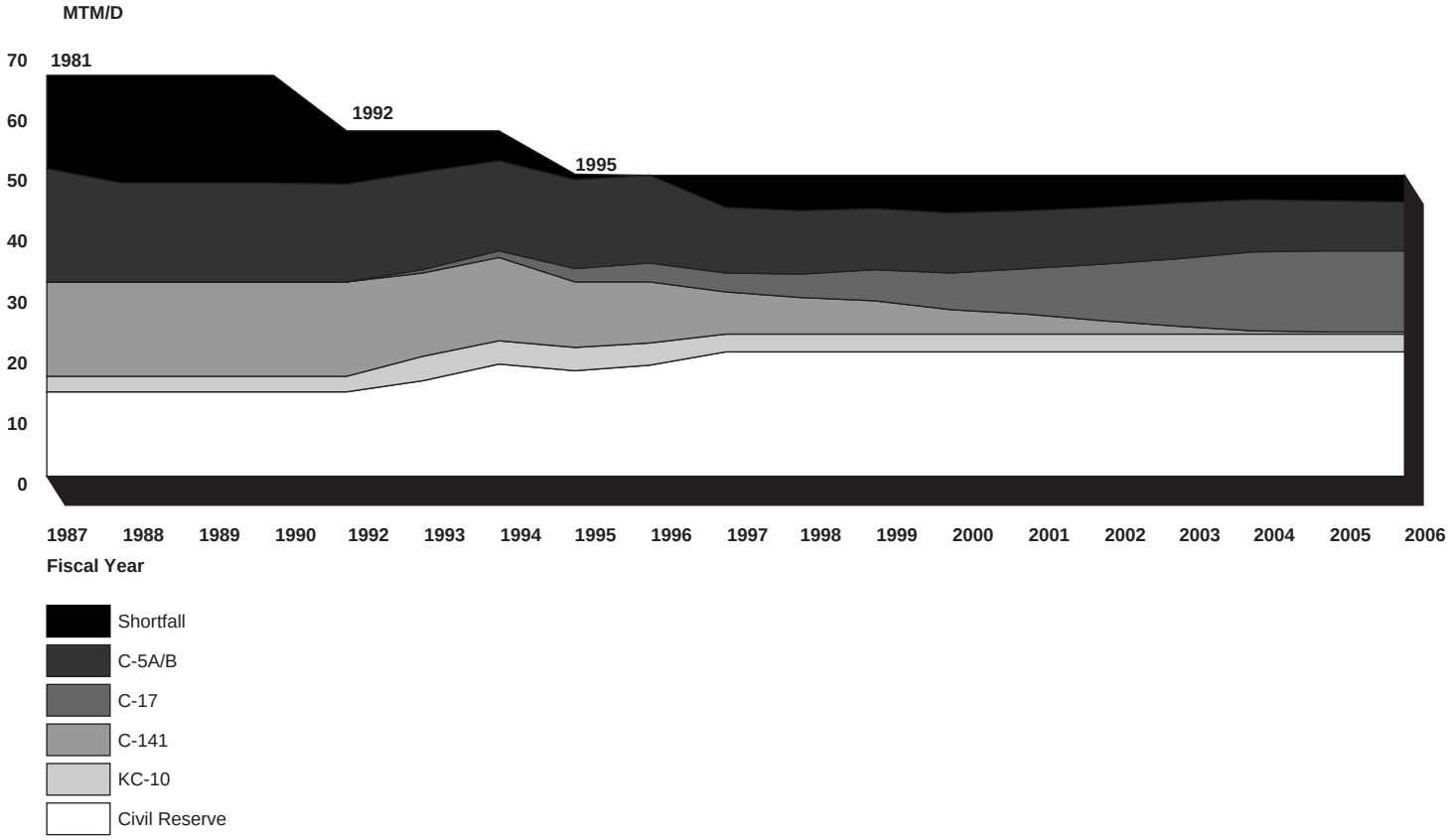
In 1981, 1992, and 1995, DOD identified its airlift requirements. In 1981, DOD issued its Congressionally Mandated Mobility Study[2] that set a 66-million ton miles per day (MTM/D) objective for strategic airlift. In 1992, after the fall of the former Soviet Union, DOD performed a Mobility Requirement Study that showed a need to airlift 57 MTM/D to provide the forces needed for two major theater wars. The 1995 Mobility Requirements Study Bottom Up Review Update further reduced the airlift requirement to 49.7 MTM/D. Military cargo aircraft were expected to deliver about 29 MTM/D of the 1995 requirement and contracted aircraft called the civil reserve air fleet would transport the remainder.

The Air Mobility Command has acknowledged that it does not have sufficient military airlift and refueling capabilities. These conclusions are based on a comparison of the assumed number of mission capable airlift and aerial refueling aircraft versus the two major theater war requirements. An Air Mobility Command estimate provided in September 1999 showed the expected contributions that various levels of the contracted civilian aircraft and each type of military airlift aircraft will make (see fig. 8). Despite plans to replace the 141s with C-17s, the Command still expects to be short airlift at least through fiscal year 2006, as the figure shows.

[1]Mission capable refers to the condition of an aircraft indicating it can perform at least one and potentially all of its designated missions.

[2]Department of Defense Authorization Act, 1981, Pub. L. 96-342, § 203(b), 94 Stat. 1077, 1080 (1980).

Figure 8: Airlift Requirement Through Fiscal Year 2006 and Projected Shortfall



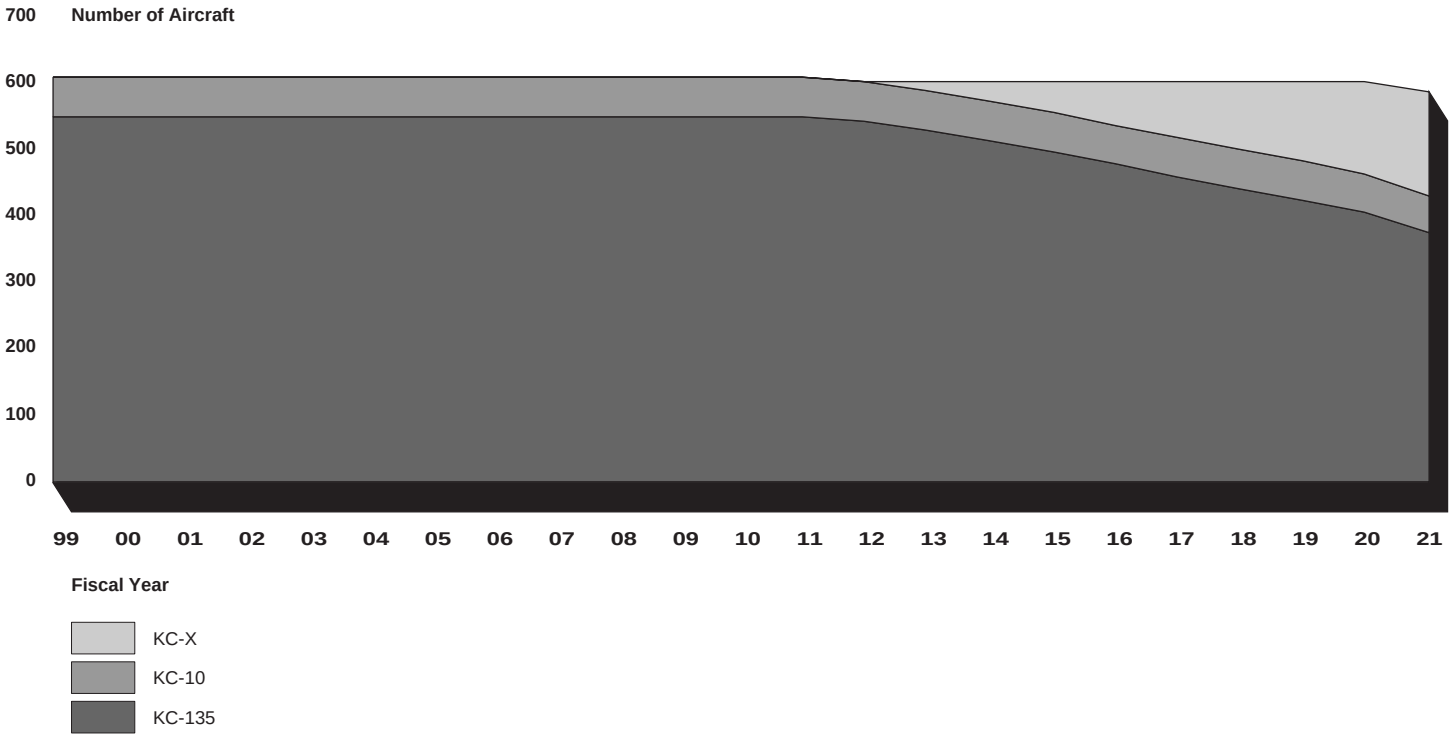
Source: U.S. Air Force, Air Mobility Command.

Aerial Refueling Falls Short of Requirements

The Air Mobility Command's last comprehensive aerial refueling requirement study was in 1996. The classified results for two major theater wars were stated in terms of the number of aircraft and million pounds of fuel per day (MPF/D) necessary to support the war time military airlift and combat aircraft operations. According to the Command, the military does not have sufficient aircraft in the refueling fleet to meet the requirement without shifting refueling aircraft between wars. DOD's current guidance to the Command is to maintain at least the current refueling forces through fiscal year 2005. As a result, according to the Command, about 600 KC-135 and KC-10 aircraft are needed (see fig. 9). They can provide approximately 106 MPF/D. The Command anticipates sustaining the fleet size by replacing

the KC-135 with a new refueling aircraft (labeled KC-X) beginning in about fiscal year 2013.

Figure 9: Aerial Refueling Requirement Through Fiscal Year 2021



Source: U.S. Air Force, Air Mobility Command.

Aircraft Mission Capability Rates Fall Short of Standards

The Air Mobility Command's airlift and aerial refueling aircraft mission capability data[3] show that for fiscal years 1997-99 the C-5 and KC-135 aircraft have not operated at the expected levels necessary to meet requirements for the two major theater wars. Their reduced performance contributes to a shortfall of over 29 percent in military airlift and nearly 19 percent of aerial refueling aircraft, or about 14 percent of its capacity.

[3]Some of DOD's aircraft status reports show different numbers because they focus on the number of aircraft that units possess, whereas our analysis is based on the number of aircraft that are anticipated to meet wartime airlift and aerial refueling requirements.

The Air Mobility Command's determinations of the airlift and aerial refueling requirements, contributions by aircraft, and shortfalls (see figs. 8 and 9) are based on airlift and aerial refueling aircraft achieving expected mission capable rates. Table 6 shows the total number of each type of aircraft, the number authorized to Air Mobility Command units, and the standard mission capable rates needed to meet wartime requirements. It also shows the number of mission capable aircraft needed based on the standard rates and the number of aircraft reported as mission capable. Rates for the C-5, KC-135, and KC-10 aircraft are based on fiscal years 1997-99 data. Because the C-17 and C-141 are in transition, their rates are based on fourth quarter fiscal year 1999 information.

Table 6: Air Mobility Command Airlift and Aerial Refueling Aircraft Data

Type of aircraft	Total number of aircraft	Total mission authorized aircraft[a]	Standard mission capable rates[b]	Equivalent number of aircraft needed[c]	Equivalent number of aircraft mission capable[d]	Average aircraft mission capable rates[e]	Number of aircraft short (over)
C-5	126	104	75	78	57	55	21
C-17	52	44	87.5	39	29	66	10
C-141	172	135	80	108	83	61	25
KC-135	546	472	85	402	317 [f]	67 [f]	85 f
KC-10	59	48	85	41	42	88	(1)

[a]Excludes aircraft in inventory reserved for backup and training.

[b]Percentage of mission authorized aircraft needed to meet wartime requirements.

[c]The mission capable rate times the number of mission authorized aircraft.

[d]The equivalent number of aircraft is based on the number of mission capable hours that units reported.

[e]Actual percentage of authorized aircraft that are mission capable is based on the number of mission capable hours that units report.

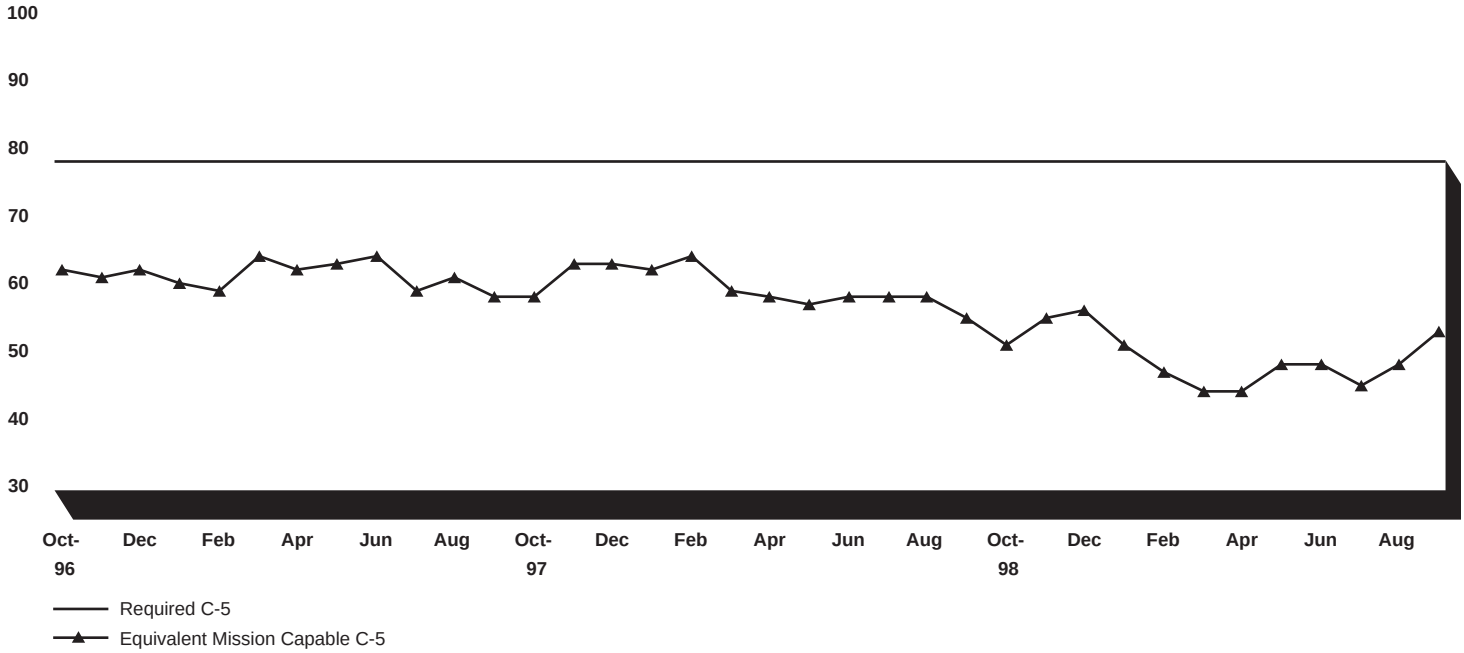
[f]Air Mobility Command only tracks 442 KC-135 authorized aircraft and 30 KC-135s are assigned to other commands. The 67-percent average mission capable rate for 442 aircraft was used to compute the mission capable numbers for all 472 aircraft.

Source: U.S. Air Force, Air Mobility Command.

While four of five aircraft types are performing below standards, the C-141s are to be replaced by new C-17s, which are just entering the inventory. Therefore, the C-5, KC-135, and KC-10 aircraft are of greater concern. Although the mission capable rate of the KC-10 (88 percent) is above standard (85 percent), its performance is important because it helps meet both airlift and aerial refueling requirements.

As shown in figure 10, since the beginning of fiscal year 1997, the largest number of mission capable C-5s has been about 64 aircraft (61.5 percent of the 104 authorized aircraft in the fleet). This number is well below the 78 aircraft identified in table 6 as required to meet war plans. During the period corresponding with the Kosovo Operation (March through July 1999), as few as 44 C-5s were mission capable (42.3 percent of 104 aircraft).

Figure 10: C-5 Aircraft Required and Mission Capable, Fiscal Years 1997-99



Source: U.S. Air Force, Air Mobility Command.

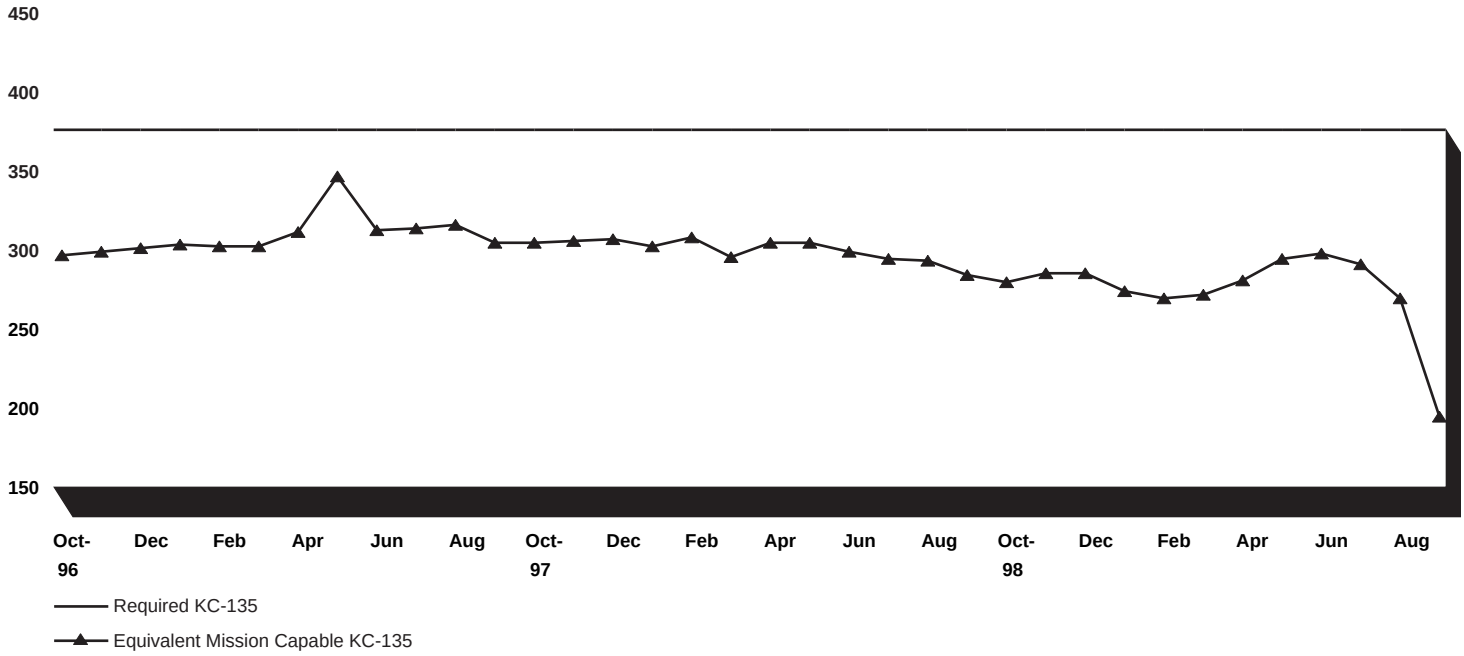
Should only 55 percent of the C-5 mission authorized aircraft (about 57 aircraft) and 88 percent of the KC-10s (about 42 aircraft) be mission capable at the start of a war, DOD could be 3.4 MTM/D short in military airlift—almost 12 percent. When added to the more than 5.2 MTM/D shortfall in the fourth quarter of fiscal year 1999 attributable to the C-17 and C-141, the total shortfall is nearly 8.6 MTM/D, or over 29 percent of the military portion of the requirement.

The C-5 fleet's low mission capable rate is of particular concern because (1) this aircraft will lift less cargo to a theater than is expected and (2) the C-5 carries the greatest amount of large cargo, such as Army tanks. An

analysis of one major theater war scenario showed that about 70 percent of the cargo required in the critical first 30 days would be this type of cargo. Air Mobility Command officials said the C-5's initial shortfall may be resolved by management initiatives such as withdrawing aircraft from depots, flying aircraft that would normally be considered not mission capable, and using aircraft assigned for training pilots.

The Air Mobility Command aerial refueling fleet has also been operating below its desired mission capability level. During fiscal years 1997-99, the number of equivalent mission capable KC-135s assigned to Air Mobility Command active and reserve forces peaked at about 347 aircraft (79 percent of the 442 authorized aircraft) versus 376 aircraft (the 85-percent standard). However, the number had declined to 194 aircraft (44 percent of 442 authorized aircraft) by September 1999 (see fig. 11). According to the Air Mobility Command, during the Kosovo Operation, the number of tanker aircraft involved approximated a major theater war commitment—thereby straining the fleet.

Figure 11: KC-135 Air Mobility Command Aircraft Required and Mission Capable, Fiscal Years 1997-99

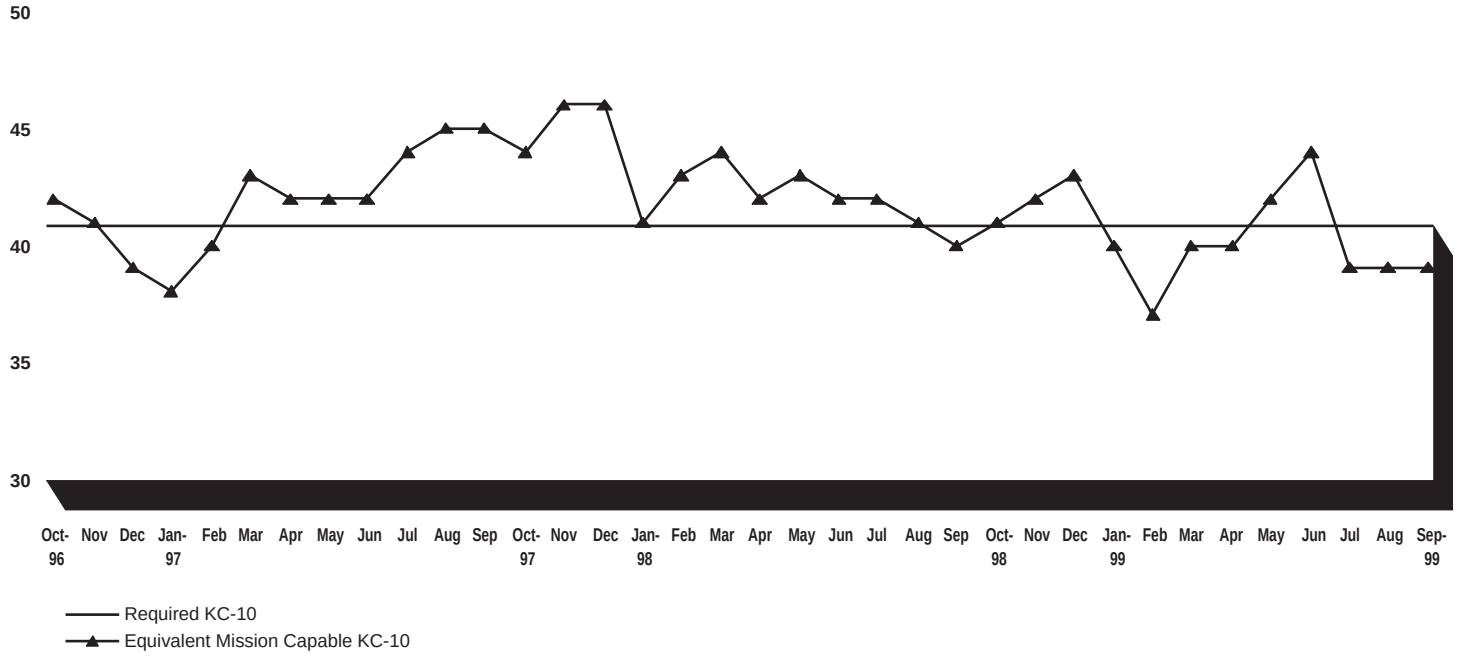


Source: U.S. Air Force, Air Mobility Command.

A major contributor to the KC-135's mission capable decline since July 1999 has been the failure of fuel tanks, a flight control system in the tail section, and some gears. Air Mobility Command officials said they expect to fix these problems by September 2000. Data show the KC-135's mission capable rate has improved from a low of 44 percent (194 aircraft) in September 1999 to 52 percent (229 aircraft) in February 2000.

As noted previously, the KC-10s are expected to not only provide airlift but also aerial refueling capability. For 2 months during fiscal years 1997 through 1999, as many as 46 KC-10s (96 percent of the 48 mission authorized aircraft) were mission capable, exceeding the 41 expected based on an 85-percent mission capable standard. However, the number of mission capable KC-10s had declined to 39 (81 percent of 48) in September 1999. Moreover, KC-10 mission capability was more frequently below the level expected in fiscal year 1999 than in the previous 2 years (see fig. 12). The KC-10's average mission capability in fiscal years 1997-99 slightly reduces the airlift and aerial refueling shortfalls.

Figure 12: KC-10 Aircraft Required and Mission Capable, Fiscal Years 1997-99



Source: U.S. Air Force, Air Mobility Command.

Should the KC-135 and KC-10 fleets' mission capability rates be 67 percent and 88 percent, respectively, at the beginning of a war, DOD would be 84 aircraft (nearly 19 percent) or 14.7 MPF/D (nearly 14 percent) short of expected refueling capability. According to Air Mobility Command officials, several 1999 Joint Chiefs of Staff analyses showed that because of the KC-135's low mission capability rates, DOD would have to employ numerous workarounds to ensure sufficient aerial refueling. The workarounds might include deferring depot maintenance, accelerating aircraft through their final days of depot maintenance, and flying some aircraft with missing or broken parts, which would not affect flight safety but would normally make them not mission capable.

Current Mission Capability Shortfalls Add Risk to Executing War Plans

The Joint Chiefs of Staff, through its Joint Monthly Readiness Review process, has examined the impact of readiness deficiencies on the ability of U.S. forces to win two major theater wars and other scenarios involving participation in small-scaled contingencies at the onset of war. It has also elevated airlift deficiencies as concerns and provided a means to track progress in resolving them. Although the details are classified, the Joint Monthly Readiness Reviews showed that degraded airlift and refueling capabilities would increase risks associated with DOD's ability to implement the two major theater war plans in a timely manner. Furthermore, risks would increase for even one major theater war when U.S. forces are already engaged in a Kosovo size small-scale contingency. The analyses did not conclude that the adverse impact would jeopardize the ultimate ability of the United States to win. However, the air mobility shortfalls increased (1) the time lines to halt the enemy and start the counteroffensive and (2) delays in these timelines add the potential for higher casualties in the interim and during the war.

Steps taken by the Air Mobility Command after the Kosovo Operation illustrated the potential adverse impact of low mission capable rates on air mobility. Even though, according to the Air Mobility Command, the Kosovo effort was less than for a major theater war, the cannibalization and spare parts problems for airlift and aerial refueling aircraft were serious. To alleviate these problems, the Command allowed the airlift and aerial refueling forces to reduce their availability for at least 120 days after the operation. For example, Dover Air Force Base, which is host to a large number of C-5s, did not make the usual 65 percent of its aircraft available for flying. It operated at 55 percent availability for 90 days and 60 percent for an additional 30 days. Dover Air Force Base officials told us this allowed Dover time to rebuild the spare parts supply and improve mission

capable rates. The Command's action of lowering aircraft availability levels following Kosovo for all tanker and airlift forces so they could recover from such an operation raises speculation about how quickly and effectively the aircraft could immediately shift from such an operation to meet one major theater war requirement. Air Mobility Command officials have also expressed concern about the loss of flexibility to respond to multiple missions after the 134 C-17s replace the 266 C-141s because they will have fewer aircraft and less flexibility to respond to multiple theater requirements.

Aging of the Mobility Aircraft Contributes to Lower Mission Capable Rates

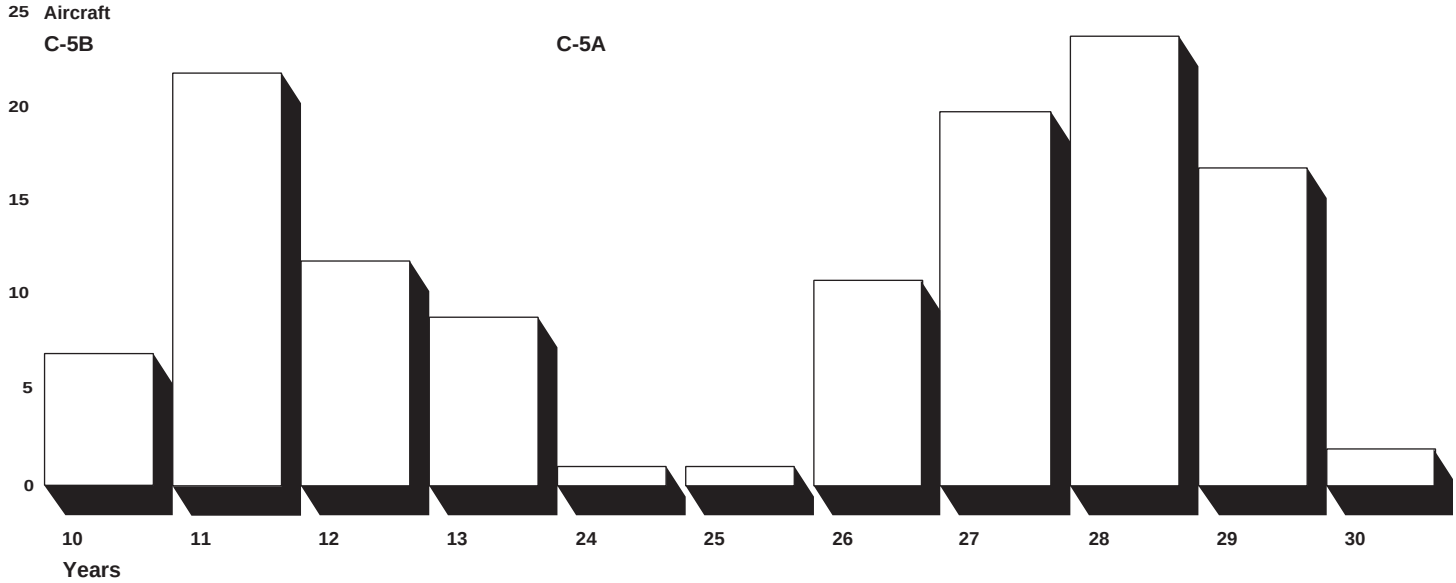
Aging is a general factor that affects all weapon systems. Older aircraft and engines not only require more inspections and maintenance but also increase downtime for maintenance. The aging issue is important to mobility air forces since they have some of the oldest aircraft in the Air Force fleet. The KC-10 aircraft is relatively young, whereas the KC-135 is the oldest aircraft in the fleet and some of the C-5As are not far behind.

According to Air Force officials, one of the reasons for the lower than expected mission capable rates in recent years for the C-5 and KC-135 aircraft is their age. Both the service life (flying hours) and the chronological age contribute to structural fatigue, corrosion cracking, worn out systems, and obsolescence. Each of these issues causes a large workload that directly affects aircraft availability due to increased (1) depot maintenance days, (2) field maintenance (inspections and repair), and (3) operational restrictions.

Age of Mobility Aircraft Is High

The C-5 fleet has two primary models, the C-5A and the C-5B. The 76 C-5As range from 24 to 30 years old, with an average of 27.6 years, and the 50 C-5Bs range from 10 to 13 years old and average 11.5 years (see fig.13). Together, they average about 21 years old.

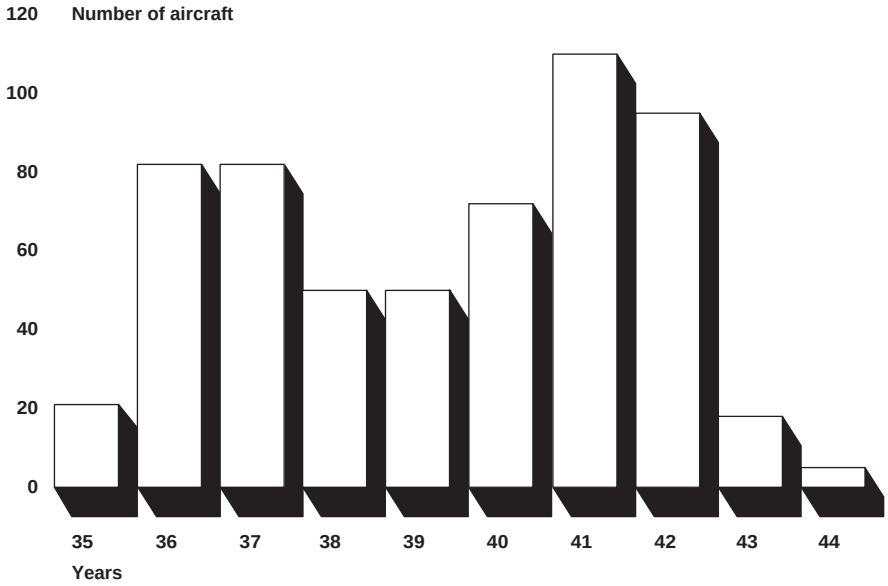
Figure 13: Age of the C-5 Fleet as of December 1999



Source: Warner Robins Air Logistics Center, Robins Air Force Base, Ga.

The 546 KC-135s are the oldest of the Air Force's air mobility aircraft. These aircraft range in age from 35 to 44 years old and average 39 years (see fig. 14).

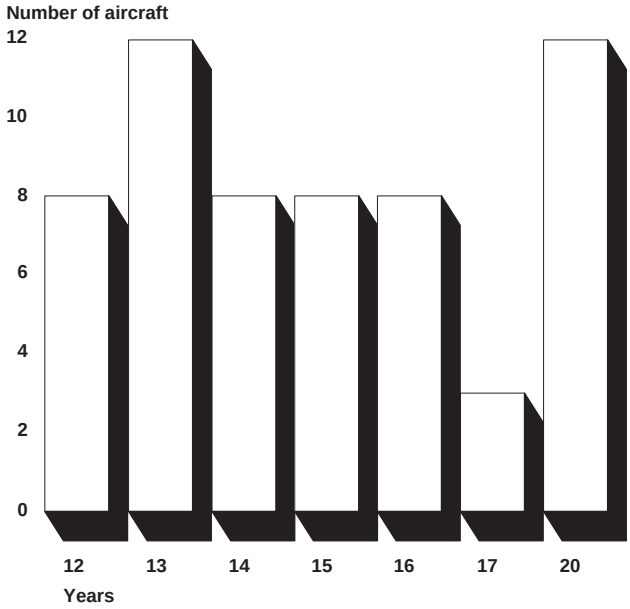
Figure 14: Age of the KC-135 Fleet as of September 1999



Source: Oklahoma City Air Logistics Center, Tinker Air Force Base, Okla.

The 59 KC-10 aircraft range in age from 12 to 20 years and average over 15 years old (see fig. 15).

Figure 15: Age of the KC-10 Fleet as of January 2000

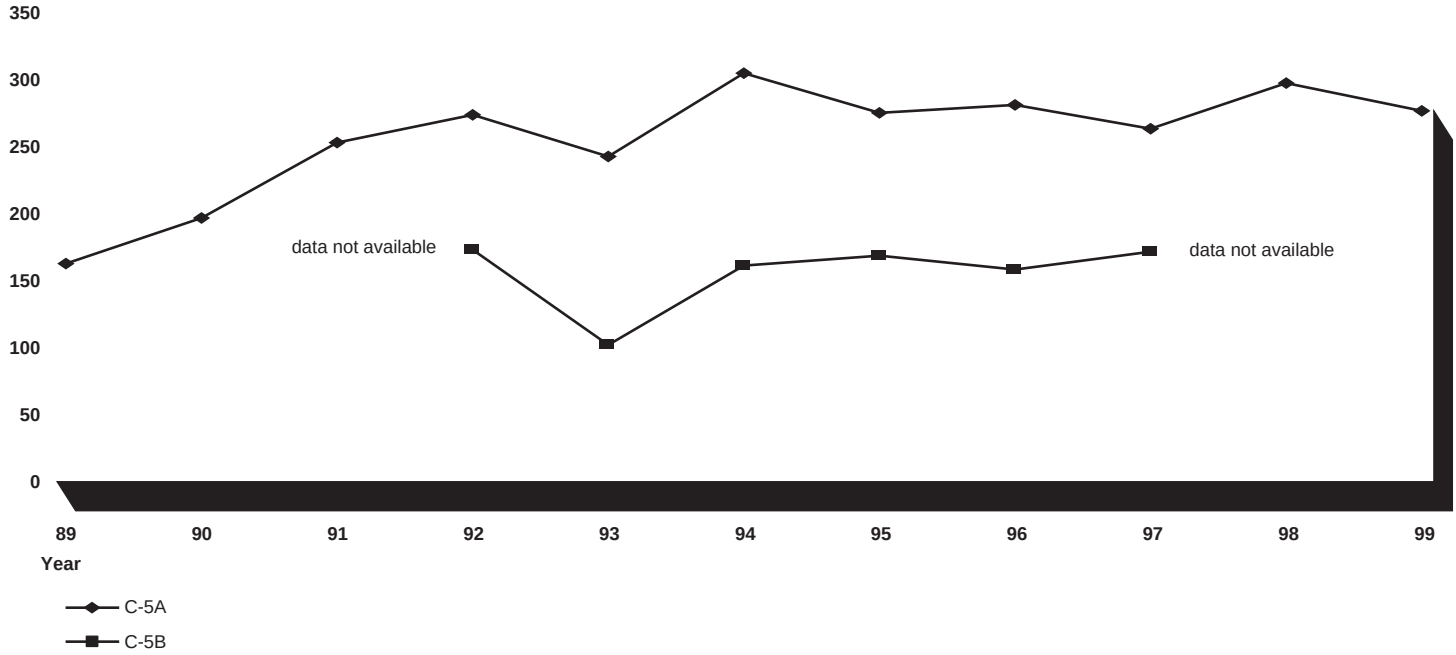


Source: Oklahoma City Air Logistics Center, Tinker Air Force Base, Okla.

Depot Maintenance Days Are Increasing

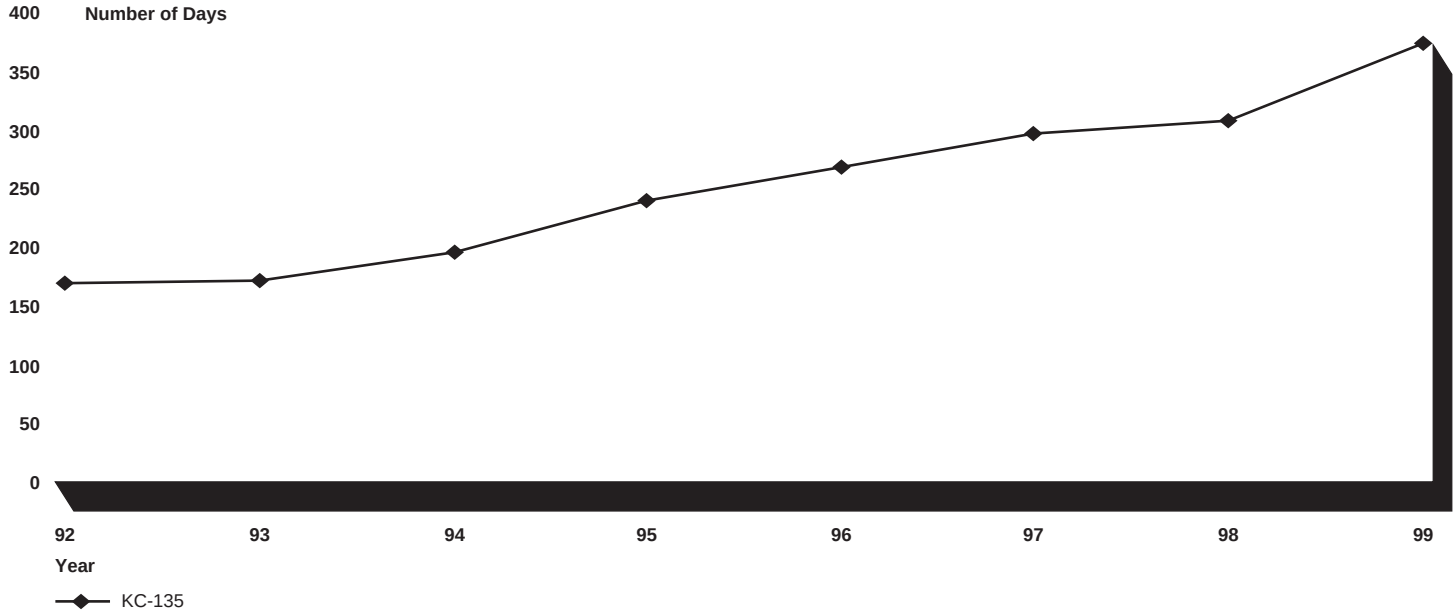
While not all of the increases in depot maintenance time may be attributable to aircraft age, as the C-5 and KC-135 aircraft have aged, the number of days they spend in depot maintenance has increased. The Air Mobility Command considers the C-5 depot maintenance time unacceptably high. As shown in figure 16, the average depot maintenance time for the 76 C-5As has increased from 163 days to 278 days. The 50 C-5Bs, time in depot has been relatively stable, ranging from 173 days in 1993 to 172 days in 1997. The KC-135's average time spent in depot maintenance was 374 days in 1999, up from an average of 170 days in 1992 (see fig. 17).

Figure 16: C-5 Average Depot Maintenance Days Fiscal Years 1989-99



Source: Warner Robins Air Logistics Center, Robins Air Force Base, Ga.

Figure 17: KC-135 Average Depot Maintenance Days Fiscal Years 1992–99



Source: Oklahoma City Air Logistics Center, Tinker Air Force Base, Okla.

The reasons for the high depot maintenance for the KC-135 have changed. According to project management data, the key maintenance action in fiscal year 1998 was to repair the aircraft's surface. In fiscal year 1999, the primary problem appeared to be fixing wing defects.

Not Mission Capable for Supply and Cannibalization Rates Generally Exceed Air Mobility Command Standards

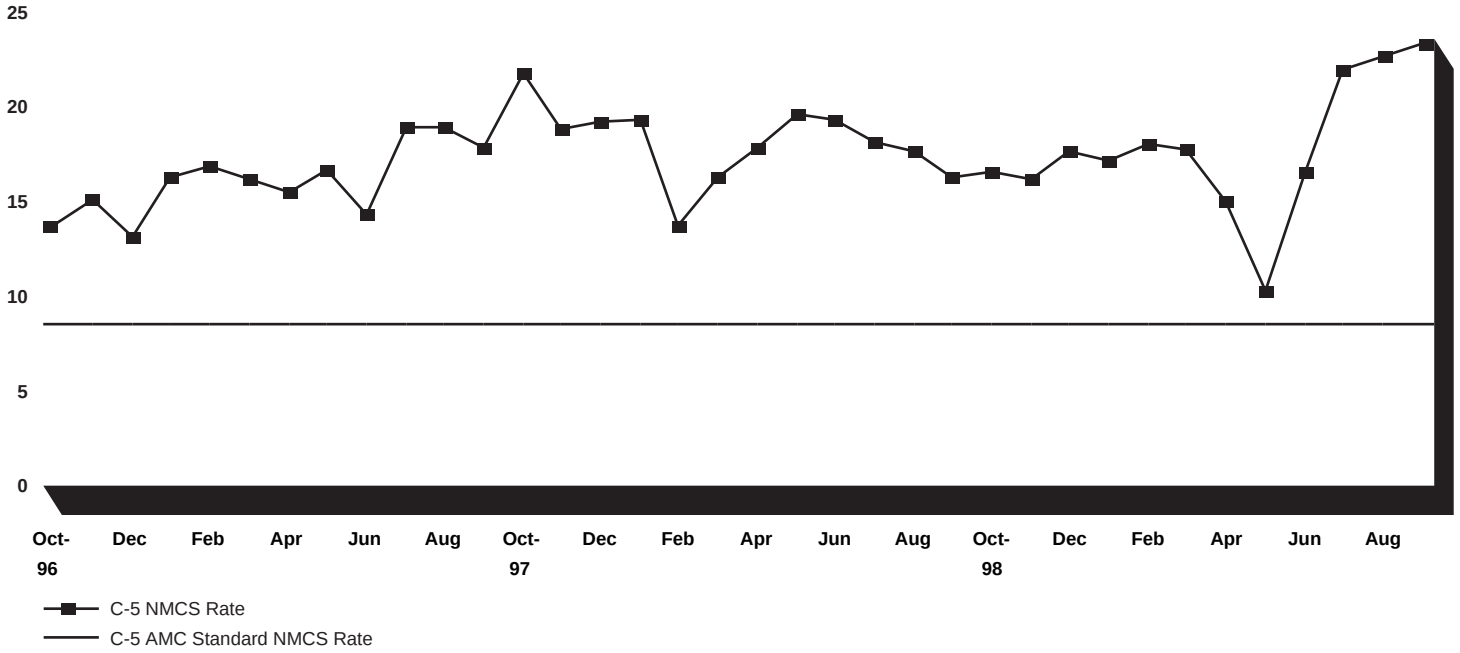
The C-5, KC-135, and KC-10 aircraft have experienced higher than expected not mission capable for supply (NMCS) rates and/or cannibalization (removing parts from one aircraft to fix another) rates during fiscal years 1997 through 1999 due to a lack of spare parts.

High NMCS and Cannibalization Rates Evidence the Lack of Spare Parts

Aircraft are classified as NMCS when they cannot perform any missions due to the unavailability of parts. According to Air Force officials, the lack of aircraft spare parts is a major contributor to the lower than expected mission capable rates for the C-5, KC-135, and to a lesser degree KC-10 aircraft. Particularly with the C-5 and KC-135 aircraft, the NMCS rates have exceeded the current Air Mobility Command standard in fiscal years 1997 through 1999. The cannibalization rates for all three aircraft have generally exceeded the current Air Mobility Command standard, which is based on frequency per 100 flights or sorties. Cannibalizations usually occur because parts are unavailable in the supply system and therefore may have minimized the potential NMCS and spare parts shortage.

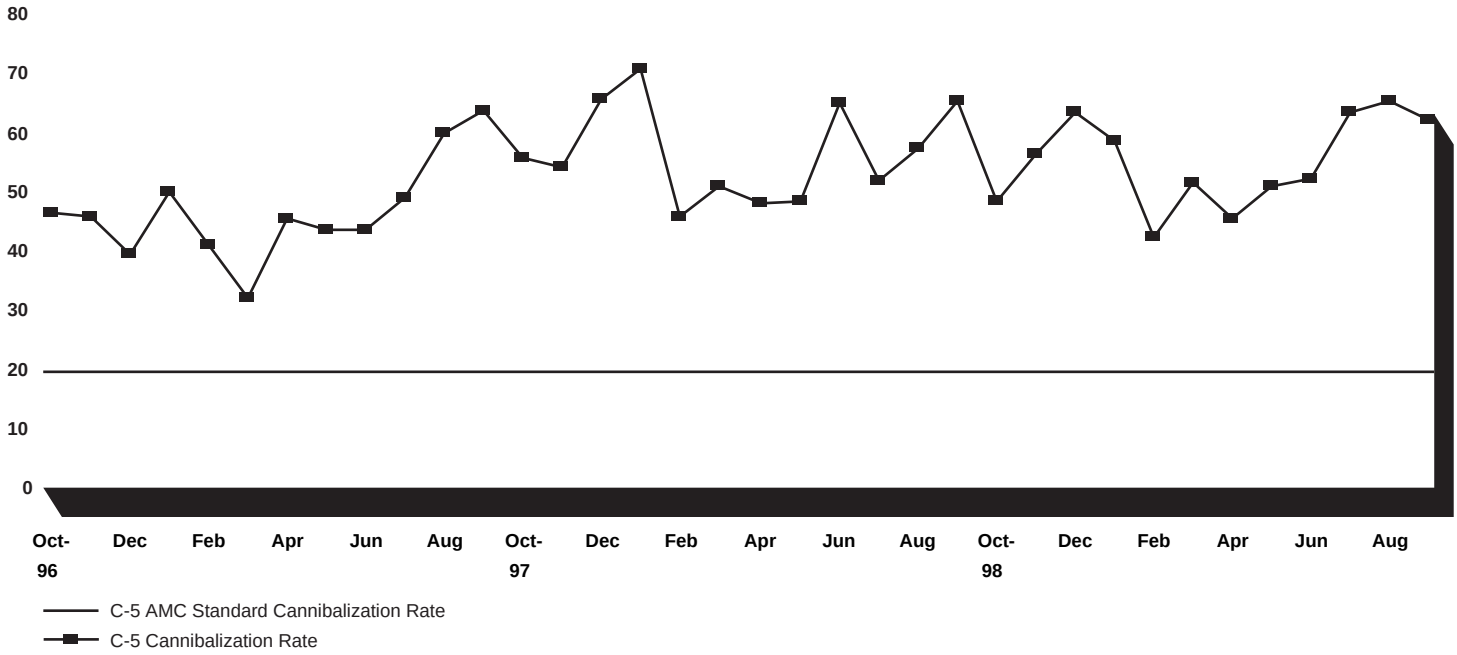
The C-5 has experienced problems with a lack of spare parts and high levels of cannibalizations for the last 3 fiscal years. The lack of spares has caused the C-5 fleet to consistently exceed Air Mobility Command's NMCS and cannibalization standards during that period, at times by more than 250 percent (see figs. 18 and 19).

Figure 18: C-5 NMCS Rates Compared to the Air Mobility Command Standard for Fiscal Years 1997-99



Source: U.S. Air Force, Air Mobility Command.

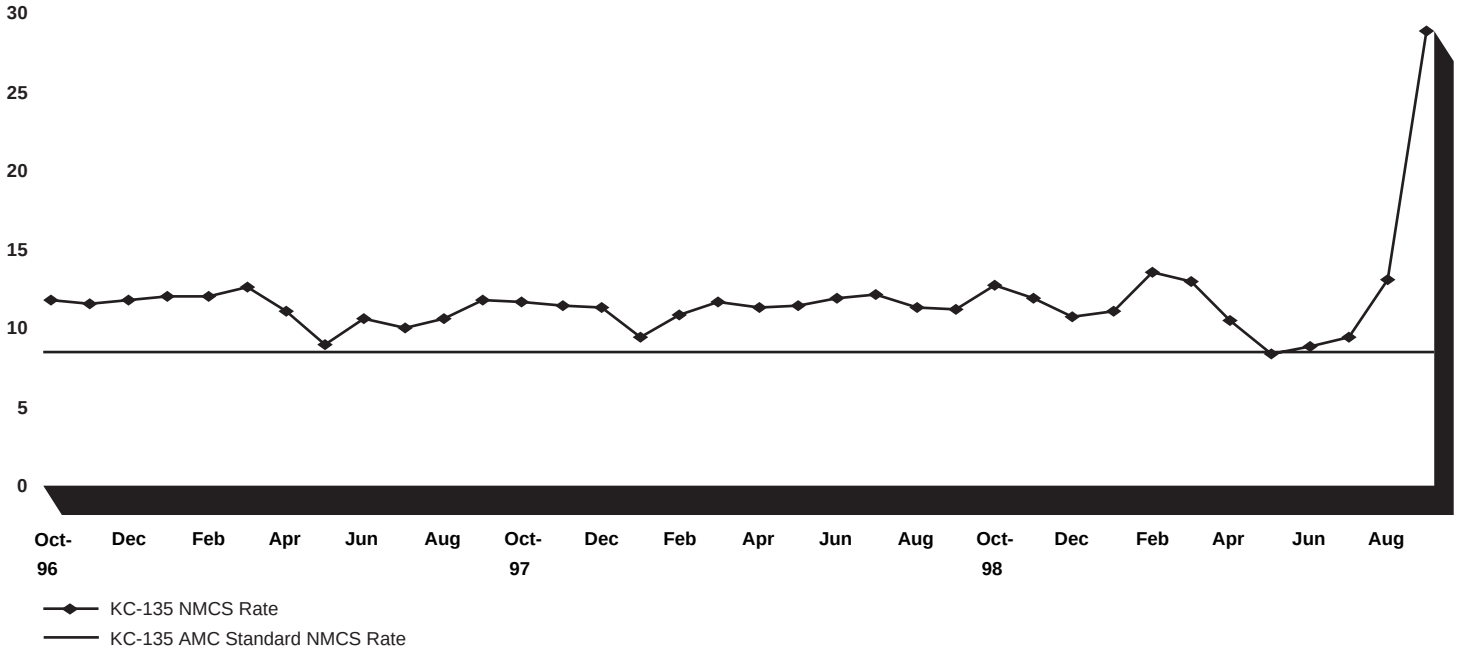
Figure 19: C-5 Cannibalizations per 100 Sorties Compared to the Air Mobility Command Standard for Fiscal Years 1997-99



Source: U.S. Air Force, Air Mobility Command.

Figure 20 shows that the KC-135 NMCS rates have exceeded the Air Mobility Command standard during the last 3 fiscal years and that the rates increased significantly at the end of 1999. Air Force officials attribute this year-end increase to the failure of the flight control systems in the tail section and the lack of available parts for the needed repairs.

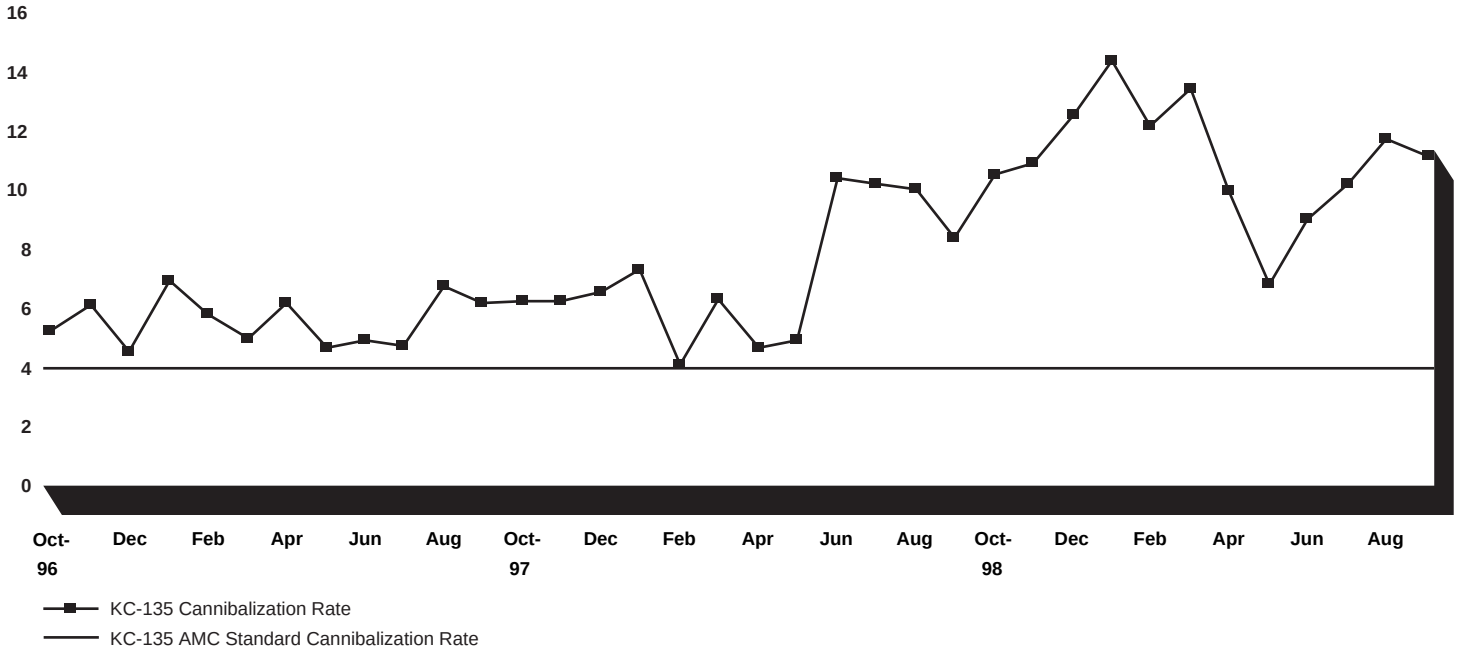
Figure 20: KC-135 NMCS Rates Compared to the Air Mobility Command Standard for Fiscal Years 1997-99



Source: U.S. Air Force, Air Mobility Command.

As figure 21 shows, KC-135 cannibalizations during the last 3 fiscal years also exceeded the Air Mobility Command standard, at times by as much as three times. The high rate of cannibalizations to support mission capability levels may have served to minimize the NMCS rate, which already exceeded Air Mobility Command standards.

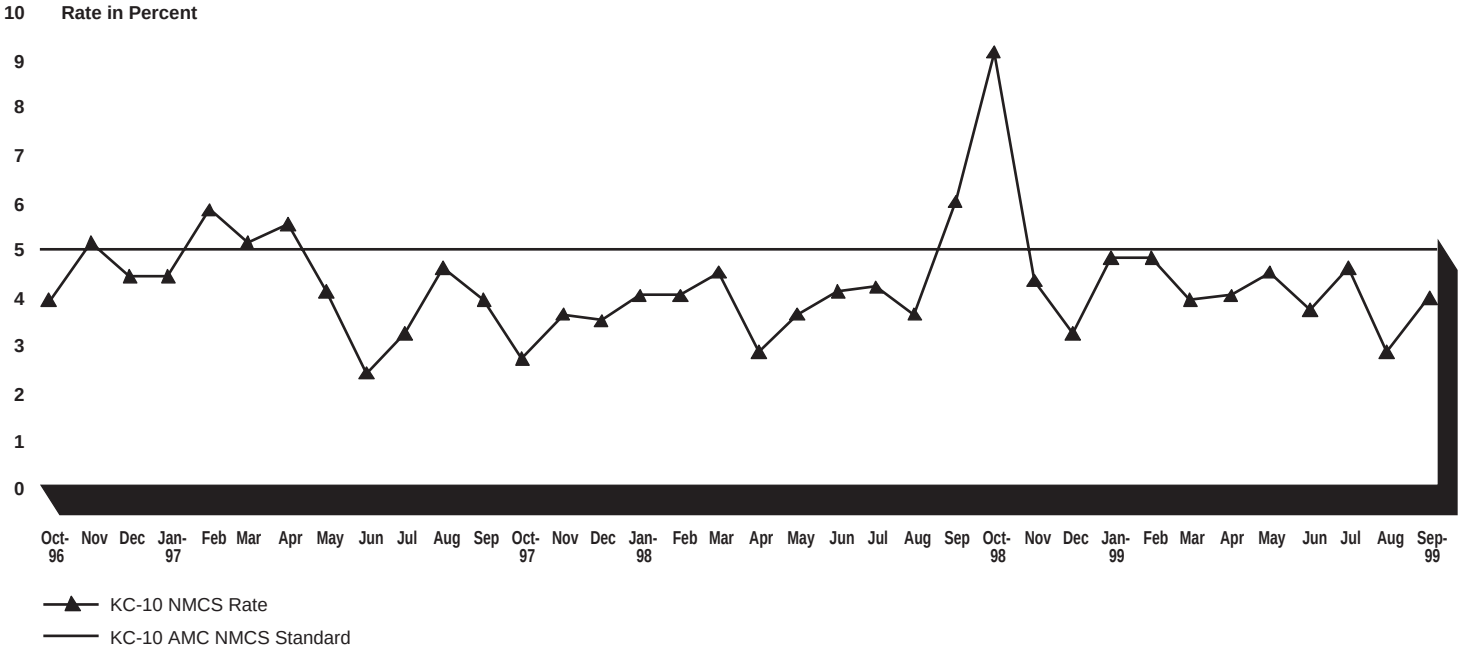
Figure 21: KC-135 Cannibalizations Per 100 Sorties Compared to the Air Mobility Command Standard for Fiscal Years 1997-99



Source: U.S. Air Force, Air Mobility Command.

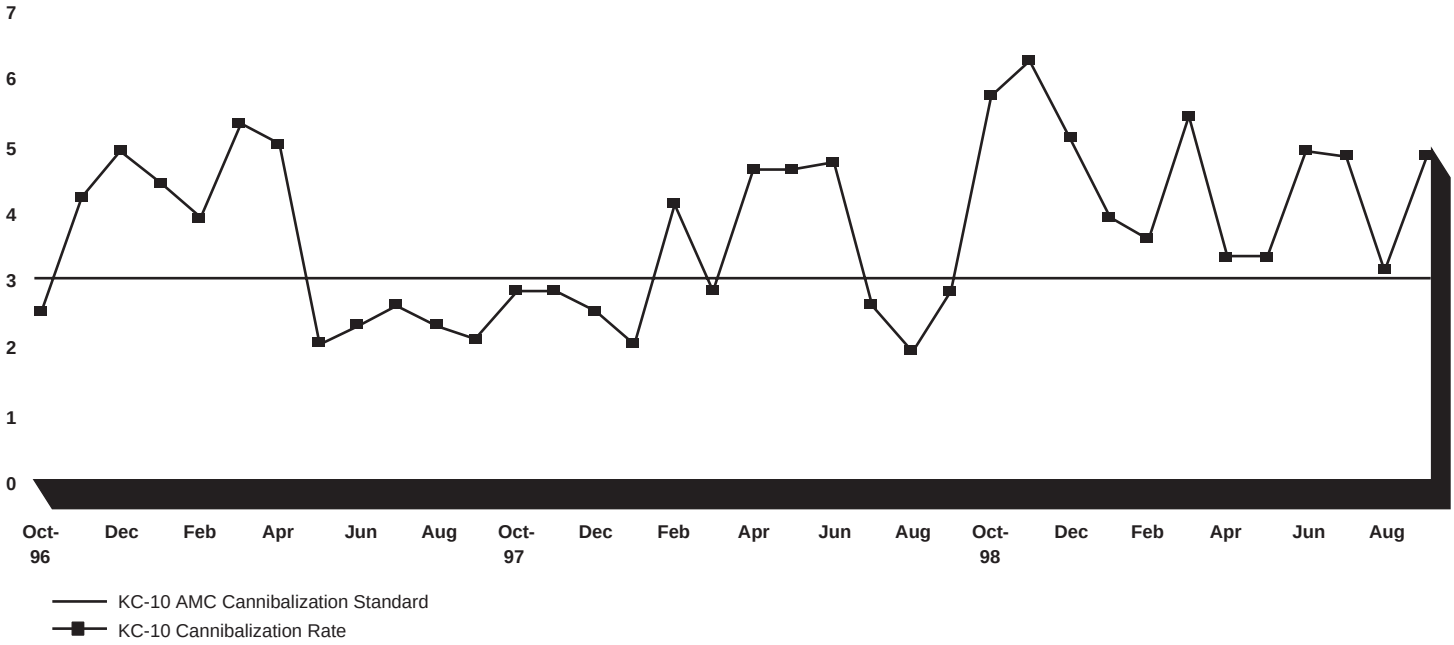
The KC-10 NMCS rates, as shown in figure 22, were usually below the Air Mobility Command standard. However, the cannibalization rates, as shown in figure 23, were frequently higher than the standard during the last 3 fiscal years. Again, the rate of cannibalizations may have served to minimize the KC-10's NMCS rate.

Figure 22: KC-10 NMCS Rates Compared to the Air Mobility Command Standard for Fiscal Years 1997-99



Source: U.S. Air Force, Air Mobility Command.

Figure 23: KC-10 Cannibalizations Per 100 Sorties Compared to the Air Mobility Command Standard for Fiscal Years 1997-99



Source: U.S. Air Force, Air Mobility Command.

Scope and Methodology

To examine the capability of U.S. strategic air mobility forces to execute the requirements for winning two nearly simultaneous major theater wars, we received briefings, reviewed documents, and interviewed officials at the Office of the Secretary of Defense, the Office of the Joint Chiefs of Staff, the U.S. Transportation Command, Headquarters, U.S. Air Force, the U.S. Air Force Mobility Command, and various other Air Force commands in the United States. We also reviewed our prior reports. Much of our analysis focused on comparing the wartime strategic airlift and aerial refueling requirements identified as a result of the Mobility Requirement Study Bottom Up Review Update, and 1996 aerial refueling study to aircraft mission capability status in fiscal years 1997, 1998, and 1999.

To identify the C-5, C-141, C-17, KC-135, and KC-10 aircraft mission capability status over the 3-year period, we obtained and reviewed information from the U.S. Air Force Air Mobility Command's Health of Force database. The Health of Force database reported the monthly aircraft mission capability, not mission capable due to supply, and the parts cannibalization rates compared to performance standards. To ensure we used the appropriate data, we resolved any conflicting information with Air Mobility Command officials. We also reviewed data reported by units through the Status of Resources and Training System and the Air Force's System Executive Management Reports. We reviewed selected classified DOD Joint Monthly Readiness Review Reports and talked with Joint Staff officials to obtain information on the impact of airlift and aerial refueling shortfalls.

To identify reasons for the airlift and aerial refueling capability shortfalls, we talked with and obtained information from officials at Headquarters Air Mobility Command, the Headquarters Air National Guard, Headquarters Air Force Reserves, and the U.S. Air Force Air Logistics Center project offices for the C-5, KC-135, and KC-10. We also received briefings and talked with officials from C-5 units at Dover Air Force Base, Delaware.

We obtained and reviewed information on DOD's efforts to resolve the shortfalls and related costs from a variety of sources. We reviewed the Joint Staff's deficiency database to identify concerns raised during the Joint Monthly Readiness Reviews that are being tracked until they are resolved. We also obtained the cost of DOD's plans to buy the remaining C-17s from its future year defense plan. The C-5 and KC-135 project offices and officials at Headquarters Air Mobility Command provided their aircraft modernization plans and related costs. Headquarters U.S. Air Force identified several initiatives to reduce the spare parts shortfall and the

associated costs. We obtained general funding data from DOD's future year defense plan. We also monitored the status of several studies, including the Mobility Requirements Study 2005 that could affect future air mobility forces and the budget.

Our review was conducted from July 1999 through April 2000 in accordance with generally accepted government auditing standards.

Comments From the Department of Defense

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

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STRATEGY AND
THREAT REDUCTION

MAY 15 2000

Mr. Neal P. Curtin
Associate Director, National Security Preparedness Issues
National Security and International Affairs Division
U.S. General Accounting Office
Washington, DC 20548

Dear Mr. Curtin,

This is the Department of Defense (DoD) response to the GAO draft report, "MILITARY READINESS: Capability to Transport Forces and Supplies Falls Short of Requirements" dated May 1, 2000 (GAO Code 702017/OSD Case 1991). DoD non-concurs with the report and GAO's overall conclusion that there is insufficient airlift and aerial refueling capability to meet the two Major Theater War (MTW) requirements because many aircraft needed to carry out these activities are not mission ready. Enclosure (1) contains a detailed list of critical and substantive comments with supporting rationale.

See comment 1.

The DoD acknowledges a shortfall in airlift and aerial refueling capabilities exacerbated by chronic spare parts shortages and excessive aircraft in depot status. Spare parts levels and resupply procedures are being examined to ensure desired readiness levels are maintained. However, the report misrepresents the current state of DoD's air mobility fleet, and contains a number of inaccuracies that overstate the shortfall in both airlift and aerial refueling capability. The report fails to note that some of the principal drivers for the GAO "shortfall" are normal attributes of the peacetime fleet since our mobility forces are not structured or funded to perform at wartime rates during peacetime. Additionally, the GAO erroneously attributes DoD's total investment in airlift and aerial refueling as an effort to compensate for a large capability shortfall. To the contrary, the majority of DoD's airlift investment is intended primarily to modernize the airlift fleet and reduce ownership costs. The department is considering alternatives, including C-5 modernization and procurement of additional C-17s, to increase airlift capability above today's level.

Two major DoD studies related to this report that project lift requirements into the future are due out in the coming months: Mobility Requirements Study 2005 and a Tanker Requirements Study 2005. These in-depth studies may indeed project a shortfall in the 2005 timeframe. However, until these studies are completed, it would be inappropriate to forecast their conclusions.

The Department acknowledges the hard work and effort by your staff and appreciates the opportunity to review and comment on the draft GAO report.

Sincerely,

Edward L. Warner, III

w/enclosure

DoD Comments on GAO Draft Report #702017

See comment 1.

1. (Critical) Page 4, line 3: DoD disagrees with GAO's statement that "DOD does not have sufficient airlift and air refueling capability to meet the two major theater war requirement because many aircraft are not mission ready."

   Rationale: DoD acknowledges a current shortfall in capability relative to our requirement for two major theater wars (MTW). However, it is important to note that this shortfall does not mean that DoD cannot execute two MTWs, but that the associated risks are greater than desired. For example, our latest risk assessment in the Quarterly Readiness Report to Congress acknowledges that we are at high risk in the second MTW in some part due to current airlift shortfall. This assessment does not refer to DoD's capability to win the second MTW, but rather, its ability to meet the CINC's timelines for the warfight.

   GAO states that many aircraft are not mission ready. However, its computed values for peacetime mission readiness do not comport with those supplied to the Department by the Air Mobility Command. For example, the GAO states on page 9 that C-5 mission capable (MC) rates have averaged 55% from FY 1997-1999 and was 51.9% in Sept 1999. While GAO's method of computing peacetime MC rates is mathematically valid, it is at variance with AMC's method which computes a C-5 MC rate of 61.9% in the same time frame. The key difference is that GAO divides MC aircraft by PMAI, while AMC divides by possessed aircraft. GAOs MC rate is lower because PMAI consistently exceeds possessed aircraft. GAO's use of this lower MC rate to compute a million-ton mile per day statistic is not the best indicator of airlift fleet readiness and overstates the actual shortfall.

   Furthermore, there are important differences between the Department's peacetime posture and its wartime capability goal, many of which the GAO fails to take into account. Chief among these is the fact that a large percentage of organic airlift and air refueling capability resides in the Air National Guard and the Air Force Reserve. Some Reserve Component units possess their own aircraft, while others are associated with active-duty units.[1] Unless the President has authorized a reserve call-up, these units' planned and actual mission-capable rates are lower than wartime levels, both because fewer planes are needed (due to reserve aircrews' flying fewer hours in peacetime), and because fewer maintenance assets are available to generate mission-capable aircraft. This difference is most evident in the Reserve Component units which possess their own aircraft. For example, the Air Mobility Command has stated that the combined peacetime mission-capable-rate goal for C-5As possessed by the Air National Guard and Air Force Reserve is 57.8%, as compared with a 75% goal for active-duty C-5s.

   A second distinguishing factor during peacetime is that active-duty aircraft operate at a lesser

[1] In a reserve associate unit, the active duty unit owns the aircraft, while the Reserves provide aircrews and maintainers who share the responsibility of flying and maintaining the planes. Reserve associate crews account for nearly 50 percent of the Air Force's C-141 and C-5 aircrew capability, and 43 percent of KC-10 air crew capability. Reservists account for 36 percent of C-17 aircrews. Associate maintenance people comprise 44 percent of the C-5 and 45 percent of the C-141 airlift maintenance forces, and 37 percent of the KC-10 maintenance force.

Enclosure (1)

operations tempo (and a lower mission-capable rate) than they would during a wartime surge. During wartime, several actions are taken to produce surge mission-capable rates for airlift aircraft within both the active and reserve components. These actions include increasing maintenance manpower and aircrew availability and temporarily delaying certain periodic maintenance activities.[2] Furthermore, were peacetime mission capable rates to equal the planned wartime surge rates, the Department actually would have excess organic capability after the C-17 purchase is completed. Most active-duty C-5s are newer B-model aircraft, with a historically higher mission-capable rate than the older C-5As flown by the Reserve Components. AMC has stated that it has a peacetime mission-capable-rate goal of 75% for the C-5s it possesses. When combined proportionately with the 57.8% goal for the reserve component, the combined active/reserve component mission-capable-rate goal is 68.4% of possessed aircraft. This is 6.6% below the 75% surge mission-capable rate assumed for the C-5 in arriving at the Department's wartime goal. GAO's computations overlook this distinction, allowing for no difference between wartime planning factors and peacetime mission-capable rate requirements for either active or reserve units. By repeating this erroneous assumption for all aircraft, GAO significantly understates the Department's wartime surge capability. Although the GAO does allude to a surge capability on page 9, GAO neither accurately describes this important means of augmenting the nation's wartime airlift capacity, nor includes this added capacity in its calculations of supposed shortfalls.

A third difference relates to the GAO's method of computing airlift capacity vs. the methodology assumed in mobility studies. Mobility studies have historically been used to determine whether additional force structure is required to fulfill wartime requirements. For this reason, these studies assume that the number of available aircraft is equal to the total inventory less aircraft dedicated to the training mission and the average number of aircraft planned to be undergoing depot maintenance throughout two MTWs. GAO assumes that if the actual number of aircraft in depot during peacetime exceeds this average, there is a shortfall in capability. In fact, however, some of the aircraft in depot at the start of hostilities can be generated in the initial days of a conflict. The number of aircraft in depot, during both a first and a second MTW, would be lower than the number observed during peacetime. Thus, by departing from well-accepted mobility study assumptions—Presidential reserve call-up, surge mission-capable rates, and fewer aircraft in depot—the GAO incorrectly computes a wartime shortfall based on data drawn largely from peacetime metrics.

The 1997 *Report of the Quadrennial Defense Review* established a goal of 50 MTM/D of total (military and CRAF) airlift capacity and makes no changes to aerial refueling force structure. The QDR does not delineate a parallel metric for peacetime use. Instead, in keeping with the Department's commitment to decentralized management, the Air Force is responsible for ensuring that the desired wartime capability is attainable. Thus the Air Force's peacetime mission-capable rate and depot inventory goals should be designed to support a wartime surge to appropriate levels, but are not directly, mathematically related to wartime capacity. While the Department concurs with GAO that there is cause for concern when depot inventory consistently exceeds the planned levels, there is no analytical basis to conclude that the Department currently has insufficient airlift and air refueling assets to fight two nearly simultaneous major theater wars.

2 Manpower increases are partially achieved by activating reserve personnel, and partially by canceling leave and extending the working hours of maintenance personnel.

See comment 2.

2. (Substantive) Page 4, lines 7-9. Change to read, "DoD acknowledges that airlift shortfalls could cause military forces to arrive later than originally planned, thereby increasing the risk that war plans could not be executed as originally planned."

Rationale: As written the statement implies a direct causal link between the current airlift shortfall and greater casualties in the event of a war. The potential for such an effect is present, but it is not necessarily the case that the current shortfall would result in greater casualties. It is more accurate to say that airlift shortfalls effect DoD's ability to meet the CINC's timelines for the warfight. Thus, potentially longer timelines required to complete the halt and buildup phases and initiate the counter-offensive, increase the potential for higher casualties in the interim and during the warfight.

See comment 3.

3. (Substantive) Page 5, line 1: Change first two sentences to read, "DoD plans to increase its target for planned airlift capability from 46 MTM/D in 1999 to 50 MTM/D by 2005, when the delivery of 120 C-17s acquired under a multi-year contract is completed. The Department plans to purchase additional C–17s in coming years to ensure that U.S. mobility forces possess the operational flexibility to respond to the full spectrum of crises."

Rationale: The GAO reports that DOD is spending $18B by 2012 to eliminate airlift and air refueling shortfalls. This figure obscures the true purposes of DoD procurement spending on airlift and air refueling aircraft. For example, the Department's purchase of 120 C-17s equates to 13.4 MTM/D of airlift capacity. Of that total, only 3.6 MTM/D, or 27%, represents a net increase over the current organic capability; the remainder replaces C-141 capability as that aircraft retires. The following table illustrates why much of the $18 billion cited by GAO is not being spent to raise current capacity levels.

Acquisition Program	Capability Increase?	Comments
C-17 multi-year	Slightly	The first 120 C-17s are being purchased largely to replace the C-141 on an equal-capacity basis.
Additional C-17s	Yes	Purpose is to increase operational flexibility. Yields a net increase in overall capability.
C-5 AMP and HPT	Very Slightly	Reliability and maintainability improvement; reduces total ownership cost. This spending is not aimed at a significant increase in mission-capable rate or decrease in depot loads.
KC-135 Pacer Crag	No	Reduces crew size; lowers total ownership cost. This spending is not aimed at a significant increase in mission-capable rate or decrease in depot loads.

Incidentally, three of these programs actually represent degradations to current aircraft availability—C-5 AMP and HPT, and KC-135 Pacer Crag—because aircraft undergoing modification are not immediately available to fly worldwide missions. GAO fails to note these are transitory effects in its report, leading the reader to believe that current depot inventories will persist.

3 Enclosure (1)

See comment 4.

4. (Substantive) Page 7, Table 1. "Military requirement" column for airlift is misleading in that the QDR does not express a requirement by aircraft, but rather combines all sources of airlift. It correctly applies AMC planning factors to the programmed number of aircraft underlying the 50 MTM/D goal. For aerial refueling, "Military requirement" column is misleading in that the QDR does not set a goal for peacetime mission-capable rates. In contrast to the QDR goal for airlift, the DoD does not have a recognized military requirement for aerial refueling capability; 106.1 MPF/D is an internal metric employed by AMC force planners. "Current capability" column is incorrectly computed (see comment 1 above), rendering the remaining columns incorrect as well.

See comment 5.

5. (Substantive) Page 7, Table 1, footnote 2. Change to read, "…using a formula that is the product of the aircraft's (available flying hours per day)(nautical miles per hour)(expected average load in short tons)(a factor that accounts for returning empty) and is divided by one million."

   Rationale: Accuracy. The actual formula for MTM/D calculations appears in AF Pamphlet 10-1403, "Air Mobility Planning Factors", p.8.

See comment 6.

6. (Substantive) Page 7, Table 1, footnote 3. Change to read, "…using a formula that is the product of the aircraft's average fuel load in pounds)(average number of sorties per day) and is divided by one million.

   Rationale: Accuracy. MFP/D is an unofficial and rarely used metric for aerial refueling; however, if it is to appear in the GAO report, it should be defined as indicated above.

See comment 7.

7. (Substantive) Page 7, paragraph1. Change to read, "These shortfalls are attributable to a combination of factors including: actual MC rates below AMC standards; more aircraft in depot for longer periods than planned (factored into MC rate); and the pace of C-141 retirements outstripping C-17 acquisitions.

   Rationale: Accuracy.

See comment 8.

8. (Substantive) Page 8, Line 1. Change to read, "The DoD's 1997 *Report of the Quadrennial Defense Review* established a goal of 50 MTM/D of airlift capacity and makes no changes to aerial refueling force structure."

   Rationale: Accuracy (see comment 1 above).

See comment 9.

9. (Substantive) Page 8, Line 6-10. Change to read, "The DoD's 1997 *Report of the Quadrennial Defense Review* made no change to current aerial refueling force structure. The Department's ongoing Tanker Requirements Study is expected to provide insights in order to update this goal."

   Rationale: Requirements do not arise by default, contrary to the GAO's statement. The Department's QDR direction to retain the current force structure is the standard by which the Air Force should be judged. The ongoing tanker study, combined with policy and fiscal guidance, will be used to update the DoD requirement.

4 Enclosure (1)

See comment 10.

10. (Substantive) Page 9, Table 2. Wartime mission capable rates are incorrectly computed.

Rationale: See comment 1 above.

See comment 11.

11. (Substantive) Page 9, lines 7-11. Discussion of surge capability overlooks several significant factors contributing to this important means of augmenting the nation's wartime airlift capacity.

Rationale: See comment 1 above.

See comment 12.

12. (Substantive) Page 14, Discussion of cause and expected impact of airlift investments is misleading.

Rationale: See comment 3 above.

See comment 13.

13. (Substantive) Page 17, line 1. Change to read "…the cost to replace the 546 aircraft in the KC-135 fleet."

Rationale: Accuracy. There are only 546 KC-135s. There are additional special C-135s but they are not used in a refueling role.

See comment 14.

14. (Substantive) Page 17, line 6. GAO states that current plans will require the DoD to "continue to accept the risk of a shortfall". This is incorrect.

Rationale: DoD's current plans will produce a net increase in capability. First, upon completion of the current C-17 multiyear purchase contract (120 C-17s, the equivalent of 13.4 MTM/D), DoD will achieve a net increase in organic capability of approximately 3.6 MTM/D, or 27% of the C-17's total capacity. Second, as GAO noted earlier in its report, the Department has announced plans to purchase approximately 14 additional C-17s, which will result in increases to both capability and operational flexibility. Additionally, the impact of depot modification programs will diminish under current plans; these include the KC-135 PACER CRAG program, HPT and AMP modifications to the C-5, and the C-17 Global Reach Enhancement Program, none of which are discussed in the GAO report. Upon completion of these modification programs, the number of possessed aircraft is expected to increase. The Air Force is also pursuing several initiatives to drive down the number of aircraft in depot status.

See comment 15.

15. (Substantive) Page 17, 1st subparagraph, 2nd sentence. Change to read, "DoD would follow through on its scheduled purchase of C-17s to replace the C-141s…"

Rationale: Accuracy. Current AF multiyear contract for 134 C-17s currently exceeds the MTM/D capability of the C-141s they replace.

See comment 16.

16. (Substantial) Page 22, paragraph 2. Change to read, "…failure of the flight control system in the tail section (Stabilizer Trim Actuator failure)."

Rationale: Accuracy.

5 Enclosure (1)

See comment 17.

17. (Substantive) Page 37, line 1. Change to read, "The 546 KC-135s are the oldest…"

Rationale: Accuracy.

6 Enclosure (1)

The following are GAO's responses to DOD's comments dated May 15, 2000.

GAO Comments

1. With respect to whether DOD has sufficient airlift and air refueling capability to meet the two major theater war requirements, we believe our data show that due to the substandard mission capable status of the fleet, the airlift and aerial refueling capabilities available for the onset of war are significantly below the Air Mobility Command's wartime planning requirements. To calculate our aircraft mission capable rates, we compared the number of mission capable aircraft to the total number of aircraft that should be mission available according to the Command's wartime planning process (total aircraft minus those allotted for training and depot maintenance). This method for calculating mission capable rates is consistent with Air Force Pamphlet 10-1403, "Air Mobility Planning Factors" and recommended in DOD's October 1999 guidance for future Quarterly Readiness Reports to the Congress. In contrast, the Air Mobility Command rates referred to by DOD compared the number of mission capable aircraft to the total number of aircraft physically at units. This methodology results in higher mission capable rates because unit totals do not account for their aircraft that are in depot in excess of those allotted for maintenance.

2. According to the DOD Quarterly Readiness Reports to the Congress, the low mission capable status of air mobility forces, while not jeopardizing our ability to win the war, add risk and would delay the implementation of war plans. Furthermore, it states that potentially longer timelines required to halt the enemy and start a counter offensive increase the potential for higher casualties in the interim and during the warfight.

3. We agree that these plans could allow DOD to increase airlift capability from 46 MTM/D in 1999 to 50 MTM/D in 2005 when delivery of 120 C-17s is completed, assuming they achieve the 87.5-percent wartime mission capable rates. We included DOD's comments on the purposes of the $18-billion investment in table 5.

4. We do not believe table 1 is misleading. The Air Mobility Command's wartime planning process shows that of the 50 MTM/D, a portion of the 29.2-MTM/D military airlift requirement is to be delivered by each type of aircraft as shown in table 1. The Air Mobility Command also specifies expected mission capable rates by type of refueling aircraft. MPF/D is

cited as another aerial refueling metric in the Air Mobility Strategic Plan 2000.

5. The footnote is changed to reflect DOD's comment.

6. We did not change the footnote. The Air Mobility Command provided the definition cited.

7. The paragraph is changed to reflect DOD's comment.

8. The paragraph is changed to reflect DOD's comment.

9. The paragraph is changed to reflect DOD's comment.

10. See our response to comment 1.

11. The paragraph is changed to reflect DOD's comment.

12. The paragraph is changed to reflect DOD's comment.

13. The number is changed to reflect DOD's comment.

14. We did not agree with DOD's comment. The risk of a shortfall remains until aircraft achieve standard mission capable rates and efforts to drive down the number of aircraft in depot are successful.

15. The paragraph is changed to reflect DOD's comment.

16. We do not believe it is necessary to specify the name of the part.

17. The number is changed to reflect DOD's comment.

GAO Contacts and Staff Acknowledgments

GAO Contacts

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Staff Acknowledgments

In addition to those named above, Raul S. Cajulis, Lawrence E. Dixon, James E. Lewis, Sharon L. Reid, and Gregory J. Symons made key contributions to this report.

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