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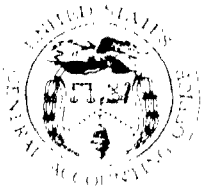
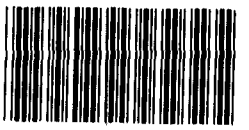
Report to the Chairman, Subcommittee on Projection Forces and Regional Defense, Committee on Armed Services, U.S. Senate

December 1992

MILITARY AIRLIFT

Structural Problems Did Not Hamper C-141 Success in Desert Shield/Storm





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National Security and
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December 29, 1992

The Honorable Edward M. Kennedy
Chairman, Subcommittee on Projection
Forces and Regional Defense
Committee on Armed Services
United States Senate

Dear Mr. Chairman:

As you requested, this report provides information on the performance of the C-141 during Operation Desert Shield/Storm, its structural problems, and planned Air Force C-141 service life extension programs.

We are sending copies of this report to the Chairmen, House and Senate Committees on Appropriations and House Committee on Armed Services; the Secretaries of Defense and the Air Force; the Director, Office of Management and Budget; and other interested parties.

Please contact me on (202) 275-4268 if you or your staff have any questions concerning this report. Major contributors to this report are listed in appendix II.

Sincerely yours,

Nancy R. Kingsbury

Nancy R. Kingsbury
Director
Air Force Issues

Executive Summary

Purpose

The C-141 aircraft, long considered the backbone of the Air Force's strategic airlift fleet, is at the end of its originally designed service life. Although the Air Force had planned to conserve the aircraft's remaining useful life by flying fewer hours and limiting the weight of cargo carried, Operation Desert Shield/Storm caused the Air Force to abandon its plan. During the Operation, the C-141's flying hours almost doubled its planned peacetime program, raising concern over accelerated wear to the aging aircraft. At the request of the Chairman of the Subcommittee on Projection Forces and Regional Defense, Senate Committee on Armed Services, GAO assessed the performance of the C-141 during Operation Desert Shield/Storm, its structural problems, and planned Air Force C-141 service life extension programs.

Background

The Air Force's Air Mobility Command is responsible for providing global airlift services. To carry out that mission, the Command has a fleet of C-141, C-5, KC-10, and C-130 aircraft. The Air Force is also developing and producing the C-17 aircraft. The C-141 is the oldest airlifter in the Command's aircraft fleet in terms of average age. It was first introduced into the Air Force inventory in the mid-1960s. As of June 1992, there were 265 C-141s in the Command's inventory, and almost all had reached their originally designed service life of 30,000 flying hours. In 1984, the Air Force initiated a program to extend the C-141's service life to 45,000 hours.

Results in Brief

The C-141 performed well in Operation Desert Shield/Storm. However, the aircraft has experienced serious technical and structural problems, and the ongoing service life extension program—to 45,000 hours—has been and continues to be delayed because of technical problems and higher funding priorities. As a result, the C-141 fleet will be approaching an average of 45,000 damage hours—calculated by multiplying service hours by a factor reflecting the severity of stress on the aircraft of different types of flying—at the same time as its life is being extended to 45,000 service hours. The Air Force plans to retain much of the C-141 fleet in its active inventory until at least the year 2010. Keeping the aircraft active for that length of time will require major work to prevent continued deterioration and may require severe constraints on its use.

The physical deterioration of the C-141 fleet and the slow pace at which the service life is being extended to 45,000 hours will result in reduced airlift capability. This problem is exacerbated by delays in the C-17

program, which will not make any significant contribution to airlift capability until at least the late 1990s.

Principal Findings

C-141 Fleet Performed Well in Operation Desert Shield/Storm

The airlift effort during Operation Desert Shield/Storm was the largest in history over a short period of time, with the Air Mobility Command and Civil Reserve Air Fleet carriers flying more than 15,500 missions. Over one-half of those missions and more than one-quarter of the total cargo tonnage moved was flown by C-141s. To make as many C-141s as possible available for the Operation, the Command delayed all scheduled maintenance activities, accelerated work on aircraft already in programmed depot maintenance, and deferred plans for additional aircraft to begin depot maintenance. The flying hours for the C-141 fleet almost doubled its planned peacetime flying rates. Although operational restrictions were (and continue to be) in effect for most of the C-141 fleet because of structural problems such as wing cracking, these restrictions had little impact on the C-141's performance during Operation Desert Shield/Storm. For example, cargo weight restrictions had little impact because most aircraft were filled with cargo before reaching the weight limitation. Finally, the missions flown in support of Operation Desert Shield/Storm generally required taking off, climbing to a cruising altitude, and landing. This type of use is less severe and stressful on the aircraft's structure than low-level flying or in-flight refueling, which are typical peacetime training missions.

Since the Operation ended, however, the Air Force has discovered cracks around the windshield posts and has placed additional operating restrictions, including altitude restrictions, on most of the C-141 fleet. If these restrictions had been implemented during the Operation, they would have significantly reduced the C-141's effectiveness.

C-141 Service Life Extension Has Been Delayed

The decision in 1977 to increase the length of the C-141 fuselage and add an aerial refueling capability was based, at least in part, on the feasibility of extending the aircraft's service life to 45,000 hours. Although the Air Force also identified actions needed to accomplish the increase, the work was not started until 1984 and has not yet been completed. The completion

date for the program is uncertain but will not be earlier than fiscal year 1997.

The key factor delaying the completion of the C-141 service life extension program has been the lack of funding priority. However, another critical factor was the discovery in 1989 of generalized random cracking in the wings that has been attributed to the added stress on the aircraft's structure encountered during certain types of missions. In April 1991, an Air Force study group completed a wing crack assessment and concluded that the C-141 was operating beyond an acceptable level of risk for military aircraft. Although the group also noted that ongoing inspections and repairs had temporarily reduced the risk of catastrophic failure, the level of risk still exceeded acceptable standards for military aircraft. As a result, most of the C-141s have been operating under weight and mission restrictions.

Delays in C-141 Repairs Will Reduce Current Airlift Capabilities

The entire C-141 fleet is nearing or has surpassed the aircraft's originally designed service life of 30,000 hours. In addition, as the C-141 service life extension program has been delayed, many aircraft are approaching their "extended" service life in terms of damage hours. The Air Force plans to retire some C-141s over the next several years. To conserve and extend the useful life of the remaining C-141s, the Air Force plans to limit the number of hours and the types of missions flown. As a result of these retirements and reduced use of the remaining C-141s, a reduction in airlift capability will occur in the late 1990s or the early 2000s. In addition, if the service life extension program is further delayed or the C-141 fleet experiences unforeseen structural problems, the Air Force could face a far more serious airlift shortage. Such a shortage would be particularly evident if the Command is required to support another major conflict such as Operation Desert Shield/Storm.

Further Extension of the C-141's Service Life

In a recent report, the Department of Defense Inspector General recommended that, as a complement to the ongoing procurement of C-17s, the Air Force study the feasibility of further extending the C-141's service life to 60,000 hours. The Air Force has stated that such an extension program would not be necessary or cost-effective. However, in the Conference Report on the National Defense Authorization Bill for Fiscal Year 1993, the conferees agreed to several provisions concerning the C-17 program. One provision directs that no fiscal year 1994 production funds

will be available for the C-17 until the Air Force Scientific Advisory Board investigates the possibility of a C-141 service life extension program.

The congressionally-required investigation by the Scientific Advisory Board into the possibility of a further extension of the C-141's service life beyond 45,000 hours is very timely. That investigation, intended to be a comprehensive analysis of how the C-141 should be used in the future, should provide an opportunity to review (1) the current technical and funding status of ongoing C-141 repairs, (2) the current technical and funding status of the C-141 service life extension program to 45,000 hours and how that work relates to any further service life extension, and (3) the Air Force's current plans for retiring a portion of the C-141 fleet and how the remaining C-141s will be used and maintained.

Recommendations

Because of the mandated study by the Scientific Advisory Board, GAO is not making any recommendations.

Agency Comments

In commenting on a draft of this report, the Department of Defense concurred with the report's findings and conclusions.

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Abbreviations

AMC	Air Mobility Command
CRAF	Civil Reserve Air Fleet
DOD	Department of Defense
GAO	General Accounting Office

Introduction

Operation Desert Shield/Storm, the largest sustained airlift ever undertaken over a short period of time, depended heavily on the C-141 aircraft fleet. Over an 8-month period, the Department of Defense (DOD) airlifted approximately 473,000 passengers and 543,000 tons of cargo to the theater of operations, over 7,000 miles from the United States. Over one-half of the missions and more than one-quarter of the total cargo tonnage moved were flown by the C-141 Starlifter fleet.

Airlift is the primary mission of the Air Mobility Command (AMC), which was created on June 1, 1992, from assets of the Military Airlift Command and the Strategic Air Command. AMC is responsible for providing airlift, aerial refueling, aeromedical evacuations, combat rescue, and operational support airlift to all DOD agencies. As the air component of the U.S. Transportation Command, AMC serves as the single manager for air mobility and supports the missions of the war-fighting commanders.

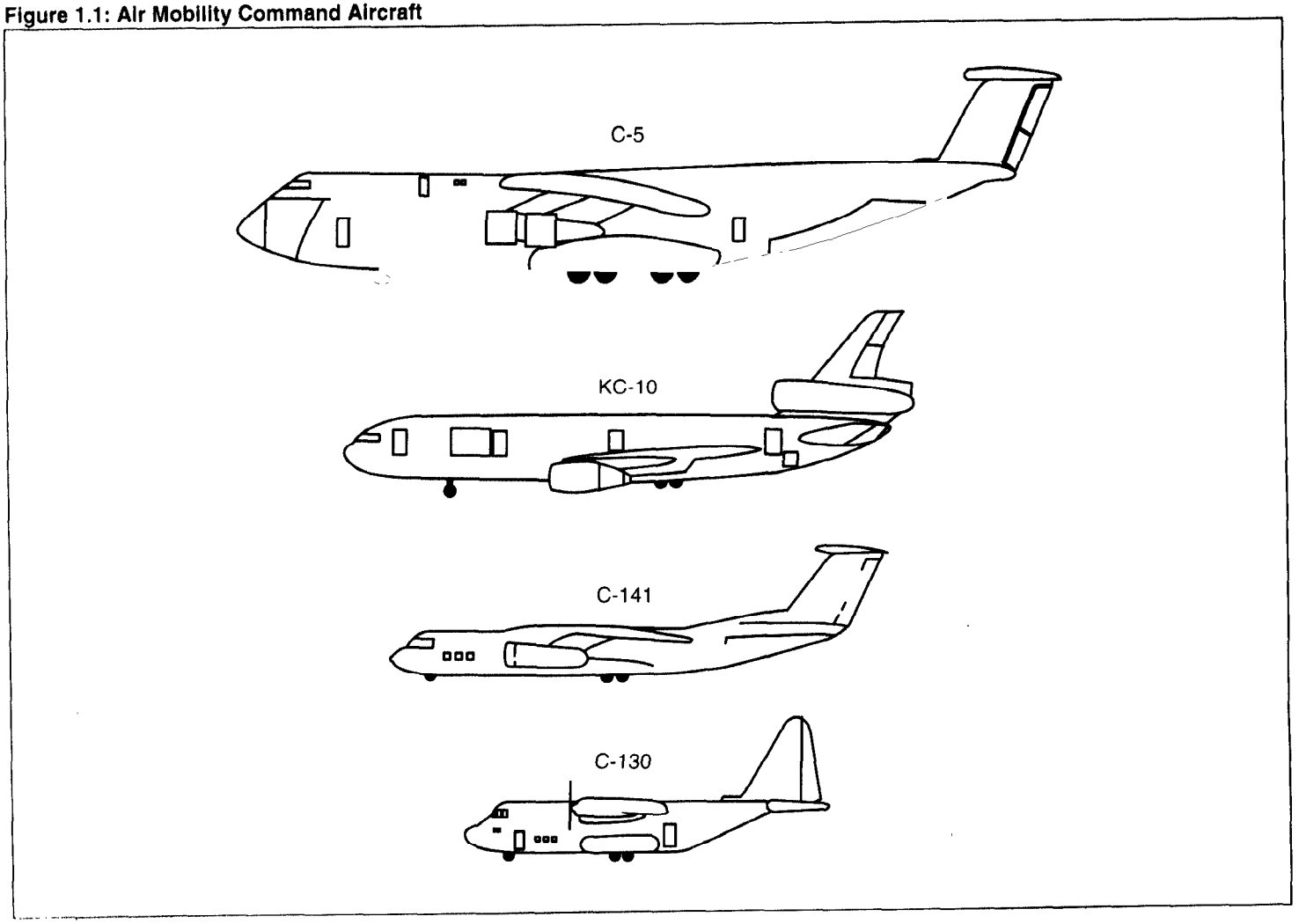
AMC, headquartered at Scott Air Force Base, Illinois, has several types of airlift aircraft at its disposal, including the C-141. However, the continued effectiveness of the C-141 fleet has been questioned because of its age and known structural problems.

Air Mobility Command Aircraft

AMC maintains four airlift systems capable of intertheater and intratheater operations. These are the C-5 Galaxy, the C-141 Starlifter, the KC-10 Extender, and the C-130 Hercules. The C-5 and C-141 are intertheater airlift aircraft, whereas the C-130 is an intratheater aircraft. The C-5 and C-141 do not generally deploy to a theater of operations; they deliver cargo and personnel to the theater and then return to a U.S. base. C-130 aircraft are deployed to a theater and transport cargo and personnel within the theater. In addition, AMC has assumed command responsibility for some of the KC-10 tanker aircraft that also provide cargo carrying capability. Figure 1.1 shows the different types of military airlift aircraft.

The C-5 aircraft, developed and produced by the Lockheed Corporation, is an air refuelable, four-engine, high-wing, T-tail, long-range, heavy lift jet transport. The aircraft is designed to airlift a wide variety of combat units, personnel, and military logistics supplies. The C-5 can carry 340 troops or 36 standard military pallets. It can transport a maximum payload of 121 tons up to 1,650 nautical miles. The C-5 is currently the only airlift aircraft capable of carrying outsized equipment.

Figure 1.1: Air Mobility Command Aircraft



The C-141 aircraft, also developed and produced by Lockheed, is an air refuelable, four-engine, high-wing, T-tail, long-range jet transport. It can carry 200 ground troops, 103 litter patients, or 13 standard military pallets and can transport 35 tons[1] up to 1,970 nautical miles. The C-141 can also be used to airdrop up to 35 tons or 155 paratroops. It is currently the only airlift aircraft that has effectively used aerial refueling to travel intertheater distances, airdrop, and then recover back to the United States with no en route stops.

[1]A few C-141s have been reinforced to carry up to 45 tons for special missions.

The C-130 aircraft is a four-engine, high-wing, turbo-prop assault transport that can deliver troops or cargo in either airdrop or airland operations. This aircraft was also developed and produced by Lockheed and can carry 92 ground troops, 64 paratroops, 74 litter patients, or 6 standard military pallets. Its maximum intratheater payload is 25 tons. The C-130 is the only existing airlifter that can routinely operate from forward locations or make low altitude parachute extraction system deliveries into areas where aircraft are unable to land.

The KC-10 tanker aircraft, developed and produced by the McDonnell Douglas Corporation, is a military air refuelable version of the DC-10 aircraft. It can carry 27 standard military pallets and up to a maximum of 85 tons of payload approximately 3,400 nautical miles.

In July 1982, the Air Force contracted with the McDonnell Douglas Corporation to develop the C-17, which will be an air refuelable, four-engine, high-wing, T-tail, long-range, heavy-lift jet transport designed to operate in both the intertheater and intratheater roles. The C-17 is being designed to carry about 80 tons up to 2,400 miles and to perform the full range of airlift missions, including airdrop and parachute extraction of all sizes of equipment. The C-17 is to operate routinely into small, austere airfields and will provide the first capability to deliver, airdrop, or extract outsize cargo in the tactical environment. However, the C-17 development program is experiencing delays, which will affect scheduled delivery dates.

In addition, AMC contracts for long-term commercial airlift for DOD and is responsible for planning, coordinating, and managing the Civil Reserve Air Fleet (CRAF) program. The CRAF program uses commercial aircraft, both passenger and cargo, to augment military airlift aircraft during a crisis or in wartime.

Objectives, Scope, and Methodology

Because the C-141 fleet is aging, the Chairman of the Subcommittee on Projection Forces and Regional Defense, Senate Committee on Armed Services, requested that we evaluate the performance of the C-141 in Operation Desert Shield/Storm and the Air Force's future plans for the aircraft. The objectives of our review were to determine whether

- age or structural problems limited the effectiveness of the C-141 in Operation Desert Shield/Storm,
- the overall performance of the C-141 was satisfactory in terms of maintenance and availability, and

- the Air Force plans to extend the service life of the C-141.

We focused our efforts on the operational readiness and performance of the C-141 aircraft fleet during Operation Desert Shield/Storm. We also determined what actions the Air Force is taking to correct and/or solve the structural problems associated with the C-141. In addition, we performed an aging analysis of the C-141 fleet to project approximately when each aircraft would reach 40,000 and 45,000 service life and damage hours. (Damage hours are described in chapter 4).

We performed our work primarily at AMC Headquarters, Scott Air Force Base, Illinois. We discussed C-141 issues with logistics, engineering, maintenance, supply, and operations officials at AMC and with representatives at the Warner Robins Air Logistics Center, Robins Air Force Base, Georgia; the Air Force Safety Agency, Norton Air Force Base, California; and the Lockheed Aeronautical Systems Company, Marietta, Georgia.

We sought the views of responsible officials within the Air Force, the Office of the Secretary of Defense, and Lockheed during the course of our work and incorporated their comments where appropriate. We conducted our review from November 1990 to September 1992 in accordance with generally accepted government auditing standards.

C-141 Airlift Fleet Performed Well in Operation Desert Shield/Storm

The airlift during Operation Desert Shield/Storm was the largest in history over a short period of time, with AMC and its CRAF carriers flying more than 15,500 missions. Over one-half of those missions and more than one-quarter of the total cargo tonnage moved were flown by C-141s. To make as many C-141s as possible available for the Operation, AMC delayed all scheduled maintenance activities, accelerated work on aircraft already in programmed depot maintenance, and deferred plans for additional aircraft to begin depot maintenance. Although operations of the C-141 were restricted because of identified structural problems, these restrictions had little effect on the C-141's performance during Operation Desert Shield/Storm.

Major Role Played by C-141s in Operation Desert Shield/Storm

The United States airlifted more cargo to the Persian Gulf during the first 50 days of Operation Desert Shield/Storm than was airlifted during the entire Berlin airlift. Between August 7, 1990, and April 4, 1991, AMC's intertheater aircraft (including CRAF) flew more than 15,500 missions in support of the Operation. Although C-5s transported more than 40 percent of the cargo because of their significantly larger size, C-141s flew more than half the total missions. Figures 2.1 and 2.2 show the percentage of missions flown and the amount of cargo moved by type of aircraft from August 1990 to April 1991.

Figure 2.1: Operation Desert Shield/Storm Missions Flown by Aircraft Type

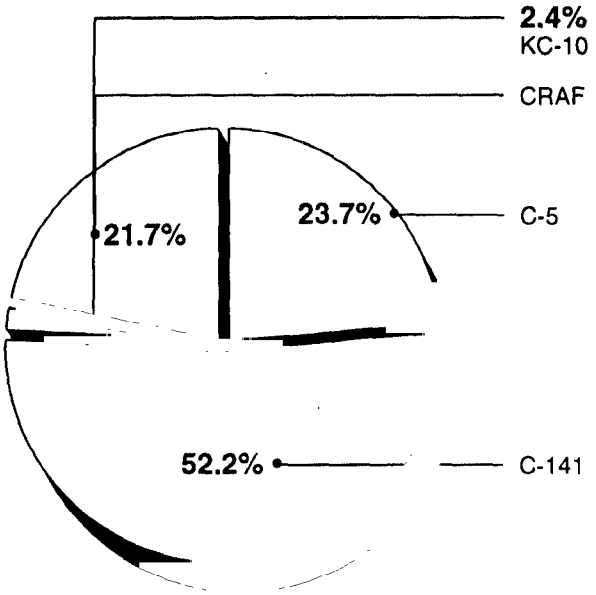
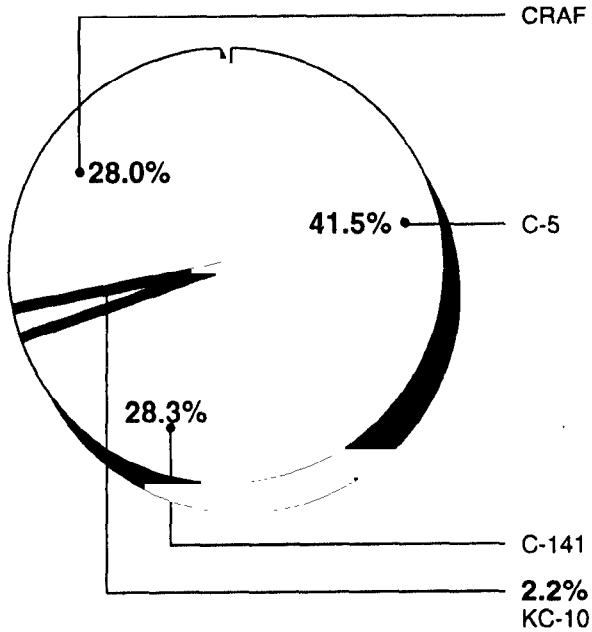


Figure 2.2: Operation Desert Shield/Storm Cargo Moved by Aircraft Type



Flying hours for the C-141 aircraft fleet increased more than 50 percent over the planned program during Operation Desert Shield/Storm. In fiscal year 1990, prior to the Operation, the C-141 fleet averaged about 22,000 monthly flying hours. In August and September 1990, the fleet flew over 43,000 and 41,000 hours, respectively. The total programmed flying hours for fiscal year 1990 were about 257,000. However, the fleet actually flew almost 305,000 hours. The fleet flying hours for fiscal year 1991 were over 397,000 and exceeded the total annual programmed hours of 257,000 by approximately 55 percent.

Actions Taken to Improve Availability of C-141 Aircraft

At the onset of Operation Desert Shield, AMC[1] took several actions to increase the number of available intertheater aircraft and to decrease maintenance hours per flying hour. During the two airlift surge periods (August-September 1990 and December 1990-January 1991), AMC stopped scheduled maintenance activities, such as home station checks,[2] isochronal

[1]AMC was not created until June 1992, well after the end of the Operation. However, to avoid confusion, we will refer only to AMC and not to its predecessor organization.

[2]Performed every 50 days, home station checks include actions such as lubrication, inspections for dents, cracks, etc.

inspections,[3] modifications, other inspections, and aircraft refurbishments. Work on aircraft already in the depot for maintenance was accelerated, and planned depot maintenance work was deferred for both the active and Air Reserve Component fleets. In addition, AMC increased isochronal inspection intervals from 200 to 300 days in mid-December 1990.

The programmed depot maintenance and inspection cycle is scheduled to be performed every 60 months and involves extensive inspection and maintenance actions not normally capable of being performed at home station facilities. These actions may also include modifications, repainting the aircraft, and refurbishment of the aircraft interior.

At the start of Operation Desert Shield, about 50 C-141 aircraft were at Warner Robins Air Logistics Center or at the Lockheed facility in Marietta, Georgia, for scheduled and unscheduled maintenance. To provide maximum aircraft availability, the work on a total of 41 C-141 aircraft was accelerated at Warner Robins during the two airlift surge periods. Acceleration included (1) suspending acceptance of additional aircraft for maintenance at the depot facilities, (2) extending the workday and workweeks at the depot facilities, and (3) cannibalizing aircraft as necessary to complete the essential maintenance tasks on the maximum amount of aircraft. Also, 15 aircraft scheduled for programmed depot maintenance were deferred from fiscal year 1991 to fiscal year 1992. For the C-141 fleet, 54 aircraft, including some Air Force Reserve and Air National Guard aircraft, were scheduled for programmed depot maintenance in fiscal year 1991. This number was reduced to 39 aircraft in April 1991 because of maintenance deferrals during Operation Desert Shield/Storm.

In addition, prior to Operation Desert Shield/Storm, AMC was considering increasing intervals between scheduled isochronal inspection cycles based, in part, on the results of a Rand Corporation study showing that aircraft incur wear-and-tear from the inspections themselves. The study also showed that, although the number of flying hours varied by aircraft between inspection intervals, there was no observed negative impact from the longer intervals between inspections. During the initial period of the Desert Shield airlift, the isochronal inspections scheduled for 33 C-141s were deferred. When those C-141s were inspected in October and November 1990, the intervals between isochronal inspections ranged from 240 to 250 days and no problems were found during the inspections. AMC

[3]Performed at the aircraft's home station, isochronal inspections are in-depth inspections of the aircraft's systems and structures. In addition, any maintenance that was deferred is now completed.

requested an increase between isochronal inspection intervals from 200 to 300 days, which the C-141 Systems Program Management Office at Warner Robins approved in mid-December 1990. An AMC C-141 logistics representative stated that if the 300-day interval is too long, the interval may be adjusted down to 250 days or back to the original 200 days.

The above actions optimized the number of C-141s available for use. Of the 234 aircraft (218 AMC aircraft plus the 16 Reserve and Guard aircraft) potentially available, an AMC logistics representative told us that logistics and operations officials agreed to make 188 C-141 aircraft available, on a daily basis, for Operation Desert Shield/Storm missions. In March 1991, the daily available number was reduced to 170 aircraft to allow maintenance facilities to catch up on maintenance actions postponed during the second surge period in December 1990 and January 1991. According to AMC logistics representatives, C-141 aircraft availability during the Operation usually included aircraft ready for new missions, aircraft en route to the Middle East, and aircraft returning from the Middle East. The balance of the C-141 fleet was used to support non-Operation Desert Shield/Storm activities, including missions flown for presidential and vice presidential support and other missions and exercises directed by the Joint Chiefs of Staff.

Operational Restrictions Had Little Impact on C-141 Performance

The C-141 aircraft is normally capable of carrying a maximum cargo payload of about 35 tons. However, because of structural problems such as wing cracks, C-141 aircraft had operational restrictions in effect prior to and during Operation Desert Shield/Storm (see ch. 3). These restrictions included (1) a maximum cargo payload limit of 51,000 pounds, or about 25.5 tons; (2) a maximum cruise velocity and restricted airspeed during takeoff and approach and in severe turbulence; (3) the maximum G forces to be incurred during certain maneuvers; (4) avoiding known or forecasted severe turbulence; (5) cargo weight limitations for aerial refueling training missions; and (6) airspeed and cargo weight limitations for low level or airdrop missions.

During Operation Desert Shield/Storm, the Air Force implemented a further reduction in cargo weight carried for most C-141 aircraft to 45,000 pounds. This reduction was made to allow aircraft to carry an additional 6,000 pounds of fuel because of the distances between bases in the United States and Spain or Germany and between Europe and Saudi Arabia.

In September 1990, AMC authorized waivers to operate C-141 aircraft at emergency wartime planning weight limitations. The emergency wartime planning limitations are the maximum allowable cargo and fuel combinations for varying operational weights. The operating weight includes the crew, trapped fuel, trapped oil, usable oil, and standard equipment, but does not include cargo or usable fuel. According to AMC logistics representatives, the increased weight authorizations only applied to additional fuel above the added 6,000 pounds previously gained from the reduction in allowable cargo weight.

While the additional fuel added to the overall aircraft weight and could cause additional stress to the aircraft structure, AMC logistics representatives told us that the stress of the added fuel weight would differ from the stress caused by adding more constant cargo weight. For example, an additional 7,200 pounds of cargo in the C-141 fuselage would place added stress on the area where the fuselage is joined to the wings. In contrast, an additional 1,200 gallons of fuel at about 6 pounds per gallon would weigh a total of 7,200 pounds, but the weight would be dispersed across the wings where the fuel is contained. C-141 fuel consumption is almost 2,000 gallons per hour. The added 1,200 gallons of fuel would be consumed in a little over 30 minutes, whereas the added cargo weight would stress the aircraft structure throughout the flight.

We were not able to determine the number of aircraft that were authorized to operate up to the emergency wartime planning weight limitations. According to AMC officials, the Command issued blanket waivers to cover a varying number of aircraft missions and, in some cases, a number of aircraft, but it did not maintain records on whether the aircraft were actually loaded with the extra weight.

Despite the need for some waivers, Air Force officials at Warner Robins Air Logistics Center said that the cargo load and operating restrictions on the C-141 fleet had minimal impact on the amount of cargo carried because most aircraft were filled with cargo before reaching the weight limitation. They did note that some aircraft may have reached the weight limitation when carrying ammunition loads, which are denser and heavier than many other types of cargo. However, the Command did not keep any records on the number of times this occurred.

Air Force officials at Warner Robins said that missions flown for Operation Desert Shield/Storm were actually more benign than those flown in peacetime in terms of severity. Peacetime training missions for

certain combat scenarios require low-level flying or aerial refueling, which is more stressful to the aircraft. Most C-141 missions in Operation Desert Shield/Storm ascended and remained at cruising altitudes until the aircraft descended for landings at en route fields or final destinations in the Middle East. This type of flying resulted in lower stress severity factors for C-141s than those incurred during typical peacetime flying. However, Lockheed representatives stated that the increased flying hours during Operation Desert Shield/Storm over the anticipated peacetime flying hours did result in some increased overall stress on the C-141 fleet.

As discussed in chapter 3, the Air Force has discovered cracks in the windshield post area of many C-141s and restricted the maximum altitude that the aircraft can fly. Since this problem was noticed in early 1992, it had no impact on the C-141's effectiveness during Operation Desert Shield/Storm. However, if the same restrictions had been in place during the Operation, the C-141's effectiveness may have been significantly affected.

Middle East Environment Had Minimal Impact on C-141 Aircraft

AMC logistics representatives told us that the Middle East environment had minimal impact on the C-141 aircraft. Some C-141s encountered problems with sand on the rubber hydraulic seals on the aircraft landing struts. A rubber cover for the struts was devised as a temporary fix, but it was never installed on aircraft. Tire failures were reported to be a problem in the Saudi Arabian area, but AMC logistics representatives said the failure rates were less than during normal peacetime training and operational missions when more landings are accomplished. The logistics representatives also thought that the low impact was due to the aircraft only spending several hours on the ground at Saudi Arabian bases and then returning to bases in Europe or the United States.

Nevertheless, AMC officials contend that the conditions experienced in the Middle East significantly accelerated the deterioration of the aircraft's paint and, in some cases, created exposed and untreated areas on the aircraft skin surface.

Conclusions

The C-141 airlift fleet generally performed well during Operation Desert Shield/Storm, despite structural problems and operational restrictions. Because of the less stressful nature of the missions and the fact that most aircraft were filled with cargo before reaching weight limitations, there was minimal impact due to the structural restrictions. The overall

performance of the aircraft was not adversely affected by environmental conditions. In addition, the positive experience with delayed maintenance inspections led the Air Force to increase the intervals between scheduled maintenance.

Extension of C-141 Fleet Service Life

Since its introduction in the 1960s, the C-141 has been the backbone of the Air Force's airlift fleet. However, many of the aircraft have already exceeded the originally designed service life of 30,000 hours. The Air Force has identified the actions needed to increase the service life of C-141 aircraft to 45,000 hours but has not yet completed the work needed on the aircraft.

A complicating factor affecting the completion of work to increase the service life to 45,000 hours and Air Force future plans for the C-141 is the development of generalized random cracking in the wings. These cracks have been attributed to the stress on the aircraft's structure encountered during certain types of missions. The Air Force has delayed some of the work to extend the service life to 45,000 hours until it can fix the areas with cracks. Further, as a result of the wing cracks, most of the C-141s have been restricted on the weight they can carry and the types of missions they can perform. An Air Force study group concluded that this cracking has created a situation in which aircraft are operating beyond the Air Force's acceptable level of risk for military aircraft. The group noted that the ongoing inspections and repairs had temporarily reduced the risk of catastrophic failure; however, the level of risk still exceeded acceptable standards for military aircraft.

Extension of C-141 Service Life to 45,000 Hours

The C-141 became operational within the Air Force in 1965. In 1975, the Lockheed Corporation proposed (1) increasing the length of the C-141 fuselage by over 23 feet to increase its cargo volume by 3 pallet positions and (2) adding an aerial refueling capability. A key factor in the Air Force's decision to accept Lockheed's proposal was the feasibility of extending the C-141's service life from its originally designed 30,000 hours to 45,000 hours. The aircraft fleet had already accumulated an average of 20,000 service life hours. In 1977, an engineering study conducted for the Air Force Scientific Advisory Board determined that the service life of the C-141 could be extended from 30,000 to 45,000 equivalent hours, provided an aggressive inspection and modification program was implemented. In 1977, the Air Force approved the stretch proposal. The first stretched aircraft was delivered to the Air Force in December 1979 and the final modified aircraft was received in 1982. As of June 1992, there were 265 stretched C-141 aircraft in the AMC fleet.

Underlying the conclusion in the 1977 study that C-141s could achieve a 45,000-hour service life was the assumption that aircraft usage would remain relatively the same. However, since 1977, the C-141's roles have

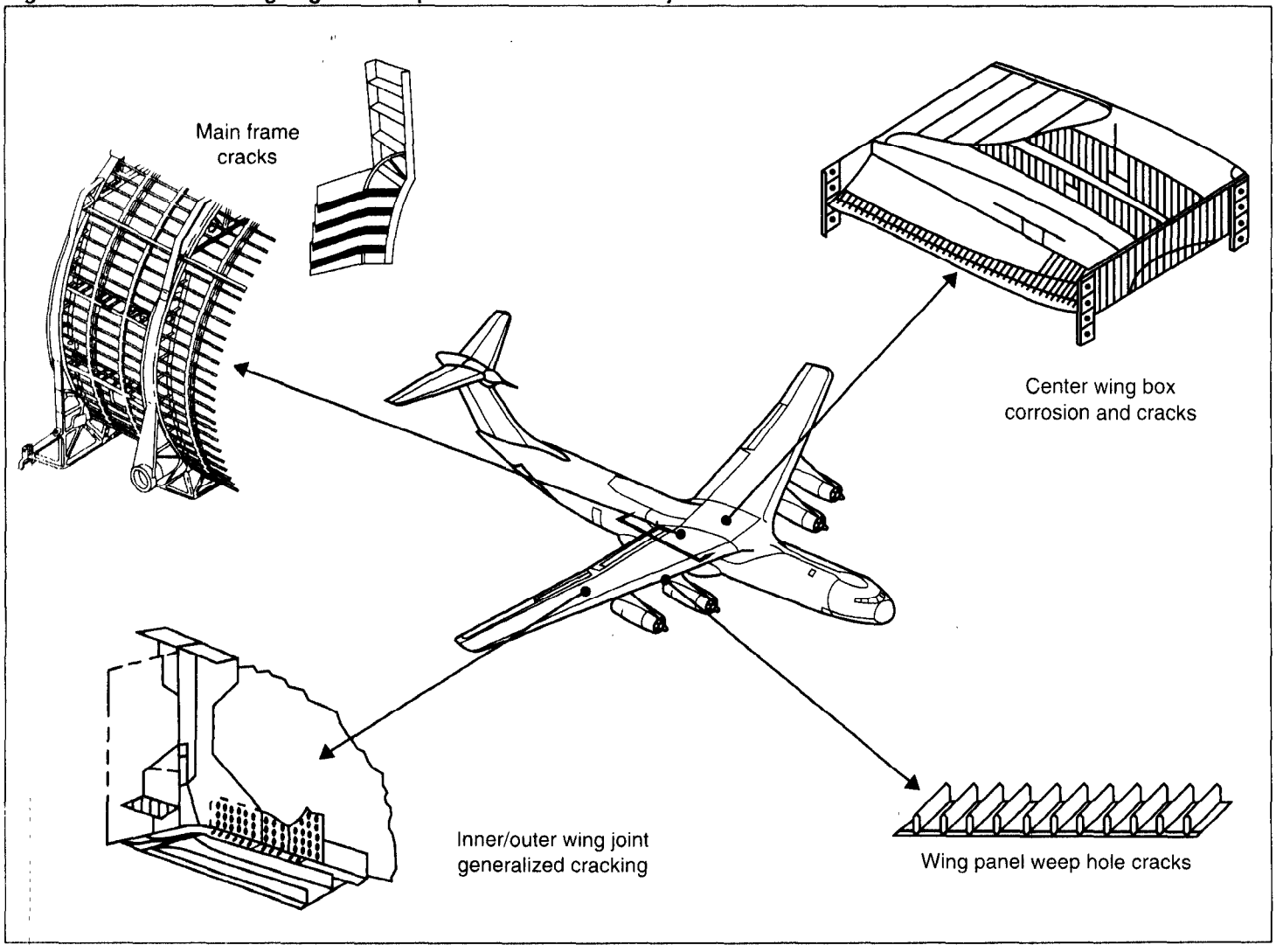
changed, and the amount of high-stress missions being flown has increased significantly. Normal peacetime flying now regularly includes high-stress, low-level flying and aerial refueling training missions. An hour of this type of flying may place the equivalent of about 1.6 hours of stress on specific aircraft structural areas. The Air Force believes that these high-stress missions have contributed to the degradation of the C-141's structure, including (1) increased fatigue cracks in the aircraft structure (discussed later in this chapter), (2) wing cracks and corrosion in the center wing box, and (3) cracks in the inner/outer wing joint area. In addition, the Air Force did not begin implementing the 1977 study recommendations for an aggressive inspection and modification program until 1984, when structural problems began to appear. AMC and Warner Robins C-141 officials said that study recommendations were not instituted sooner due to a lack of funding and higher priority projects.

Because of the structural problems, the Air Force had instituted plans to conserve the C-141s by flying fewer hours and limiting the weight of cargo carried. However, Operation Desert Shield/Storm caused the Air Force to temporarily abandon its plan to fly fewer hours. A C-141 normally averages 4 to 5 hours flight time each day during peacetime, but that time more than doubled during the Operation.

While the majority of the needed structural inspections and modifications identified in the 1977 study have been accomplished, structural inspections, repairs/replacements, and modifications have not yet been completed on (1) the center wing box, (2) the inner/outer wing joint, (3) the inner wing lower surface weep holes, and (4) the main frames. Again, according to the Air Force, the projects have not been completed because of higher priority projects and a lack of sufficient funding. Figure 3.1 shows the location of the sections on the aircraft for these repair and modification projects. In 1985, the pressure bulkhead was also identified as requiring enhancement for the C-141s to attain a 45,000-hour service life. The Air Force estimates the ongoing service life extension will not be completed until at least fiscal year 1997 and will cost about $439 million.

Although not associated with the extension of the C-141's service life, another structural problem with the C-141 has recently been identified. Some C-141 aircraft have developed cracks in the windshield post area, requiring further operational restrictions.

Figure 3.1: Location of Ongoing C-141 Repair and Modification Projects



Note: Pressure bulkhead not included.

Status of C-141 Service Life Enhancement and Modification Programs

The 45,000 hour service life enhancement program has not yet been completed on any of the C-141 aircraft. Since the Air Force is planning to retire some C-141s in the near future, not all aircraft will receive the enhancements. Repair or replacement will depend on the number of C-141s remaining in the Air Force inventory when the enhancement programs are initiated.

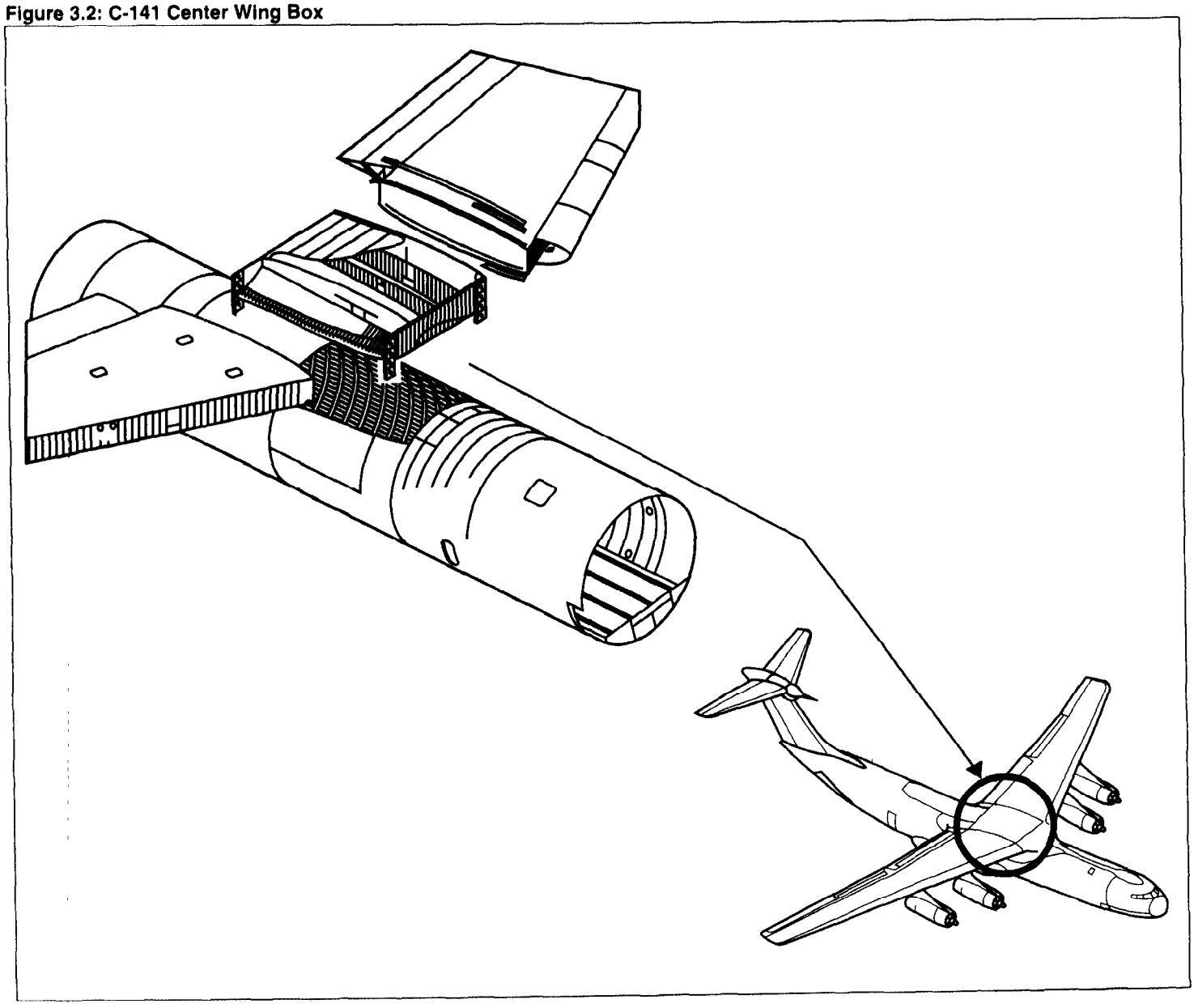
C-141 Center Wing Box

In 1985, the center wing box repair program was initiated to replace upper wing panels and to recondition the center wing dry bay area (see fig. 3.2). In April 1988, extensive corrosion and lower wing panel cracks were discovered during the repair program, resulting in the need to replace rather than repair the center wing box on the remaining C-141s and possibly on some that had already been repaired. The Air Force awarded a contract to Lockheed Aeronautical Systems Company in September 1988 to redesign a replacement center wing box by using a more corrosion-resistant material, thickening the lower panels in the milled area, and adding a new finish. A contract to produce the replacement center wing boxes is not expected to be awarded until late 1992.

In 1989, during center wing box repairs, extensive cracks and corrosion were discovered in the inner/outer wing joint area, which required immediate repair. The 20 aircraft scheduled for center wing box repairs in fiscal year 1989 were reduced to 14, and all 20 scheduled for fiscal year 1990 repairs were canceled due to the severity of the inner/outer wing joint cracks. All of the aircraft on which center wing repairs had been canceled received temporary repairs. If those aircraft remain in the active inventory, they will be scheduled for center wing box replacement during their next scheduled programmed depot maintenance. As of July 27, 1992, center wing repairs had been completed on 82 C-141s.

The Air Force estimates that the funding needed to complete the center wing box replacement program is about $243 million. A total of 121 center wing boxes will be procured, including 3 spares. Production installation was to begin during the first quarter of fiscal year 1992. However, the start of the major portion of the center wing box replacement program has been slipped to fiscal year 1993, with estimated completion in fiscal year 1996. Air Force officials at Warner Robins told us that schedule slippage was necessary due to the urgency of repairing the wing joint cracks.

Figure 3.2: C-141 Center Wing Box

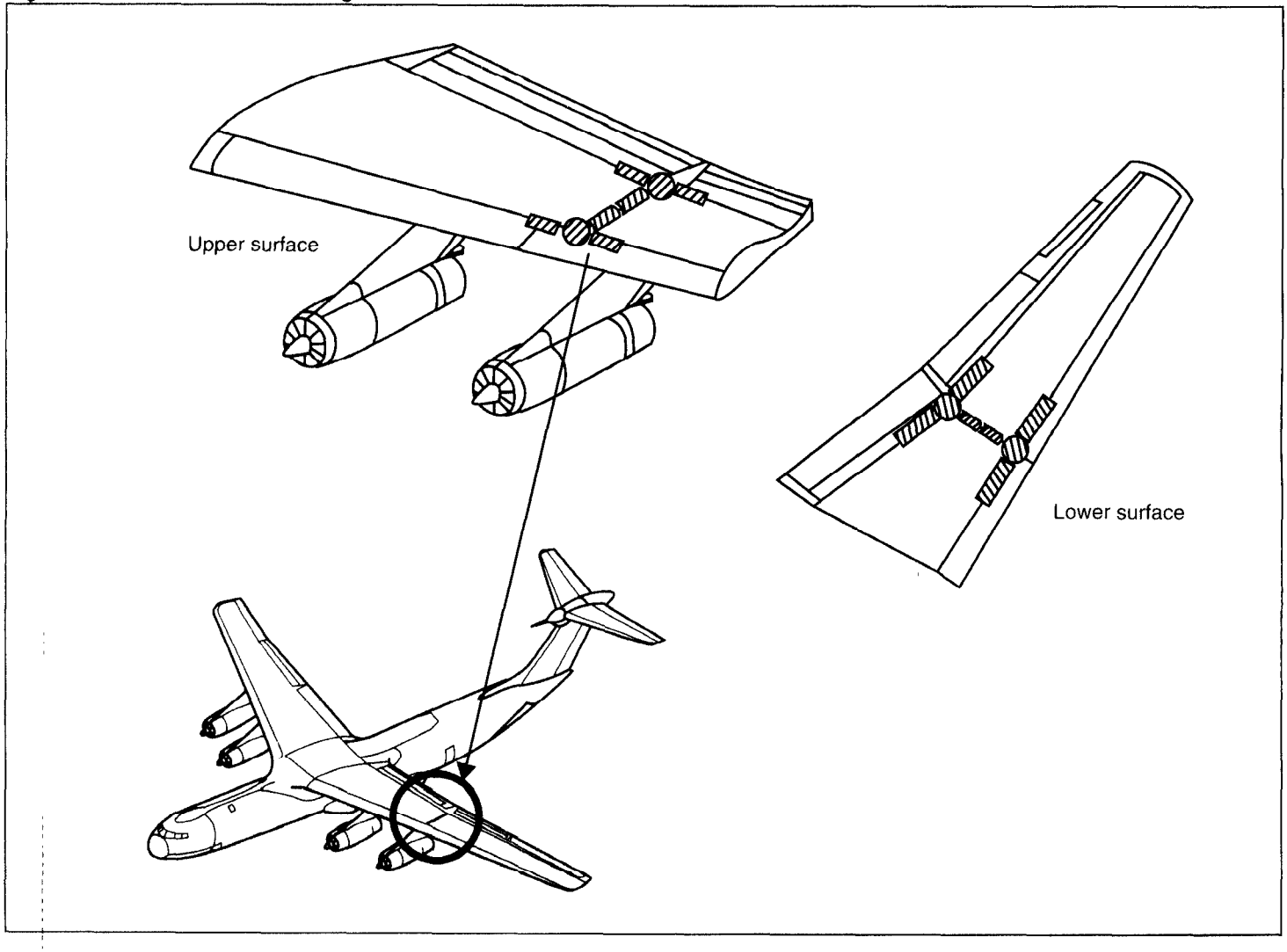


C-141 Inner/Outer Wing Joint

The 1977 study identified the inner/outer wing joint areas as one of the areas needing repair. Since that time, fatigue cracks have been found in bolt holes throughout this joint (see fig. 3.3). This condition existed to some extent prior to Operation Desert Shield/Storm because increased aerial refueling and low-level flight training accelerated wing cracking and

resulted in the inner/outer wing joint experiencing generalized, multisite cracking. Generalized cracking is defined as random, unpredictable, and widespread occurrence of fractures. To correct this condition, the Air Force instituted a depot-level repair program consisting of (1) removal of all fasteners, (2) nondestructive inspection of all bolt holes, and (3) installation of a fatigue-rated fastener.

Figure 3.3: C-141 Inner/Outer Wing Joint



In July 1989, during preliminary work on the wing repairs, Warner Robins maintenance personnel discovered a longitudinal structure that runs the length of each wing, called a rear beam cap, that had been severed. The severed cap caused fuel leaks and stress overload on other load-bearing structures of the aircraft. In August 1989, a safety technical order was issued requiring inspection of the rear beam caps on all C-141 aircraft. The safety technical order also imposed fleetwide operational flight restrictions that included a 51,000-pound cargo load limitation until all C-141 aircraft were inspected and released for normal flight operations. In September 1989, an additional 71 aircraft were discovered with generalized cracking in the inner/outer wing joint area as a result of the inspections of the rear beam cap.

As a result of these and other inspections that identified wing joint cracks, all C-141s were required to operate at or below the 51,000-pound load limitation until the aircraft had been repaired or released for normal operations. As of June 16, 1992, 67 C-141s had wing crack repairs and were operating without restrictions due to wing cracks. In addition, about 50 C-141s were in for wing crack repairs at that time.

There are four wing joint areas being repaired, two of which are considered safety critical and must be completed on all C-141 aircraft by the end of fiscal year 1993. The other two modifications are to be made during the normal programmed depot maintenance cycle starting in fiscal year 1994. The total estimated program cost, as of June 1992, to modify and repair 269 C-141 aircraft[1] is $122.2 million.

In April 1991, Warner Robins Air Logistics Center and Lockheed completed a C-141 wing risk analysis and concluded that the aircraft were operating beyond an acceptable level of risk for military aircraft. In June 1991, a technical working group met at Warner Robins to discuss the results of the wing risk analysis. The working group was comprised of aircraft structural engineering specialists from the Aeronautical Systems Division of the Air Force Systems Command (now Air Materiel Command), AMC, Warner Robins, Lockheed, and the Air Force Inspection and Safety Center. After reviewing the data and methods used to accomplish the wing risk analysis, the group concluded that multiple site damage on the C-141 wings continues to be a primary concern to aircraft safety. The group also noted that the effects of the ongoing inspections and repairs had temporarily reduced the risk of catastrophic failure but

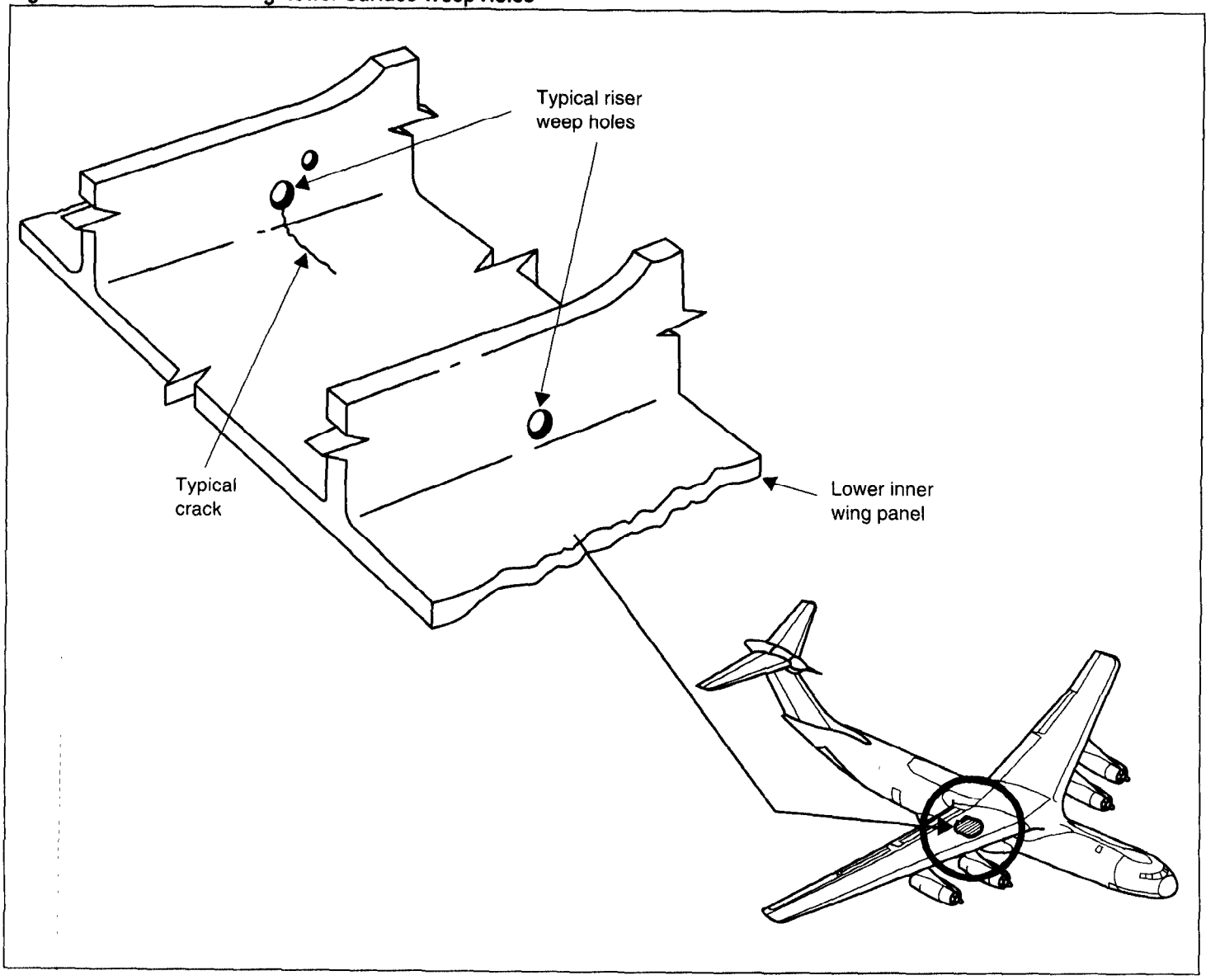
[1]The total of 269 aircraft included 4 unmodified C-141A aircraft that belong to another command plus the 265 modified C-141B aircraft in the AMC fleet as of mid-1992.

the level of risk still exceeded acceptable standards for military aircraft. According to group members, the recurring inspections and temporary repairs reduce the risk because of the known crack growth rate. Monitoring the crack growth rate through the inspections provides opportunities to catch any severe problems and repair them before a catastrophic failure would occur. Inspections are currently being performed every 100 days on unrepaired aircraft and every 300 days on those aircraft that have received temporary repairs.

C-141 Inner Wing Lower Surface Weep Holes

Inspection and rework of the lower panel weep holes (see fig. 3.4) is being done to prevent fatigue cracking in panel risers and the wing skin. The weep holes allow fuel to flow between the fuel cells in each wing. The goal of the weep hole modification is to delay onset of generalized fatigue cracking, such as has occurred in the wing joint, in areas identified in the 1977 study. The weep hole rework was being performed concurrently with the repairs for the inner/outer wing joint cracks. However, Air Force officials told us that weep hole rework has been postponed, due to the extent of problems encountered with the wing crack repairs, and will probably be performed during programmed depot maintenance from fiscal years 1994 through 1996 at an estimated cost of $10.7 million. As of July 27, 1992, weep hole rework had been completed on 41 of the planned 175 C-141s.

Figure 3.4: C-141 Inner Wing Lower Surface Weep Holes

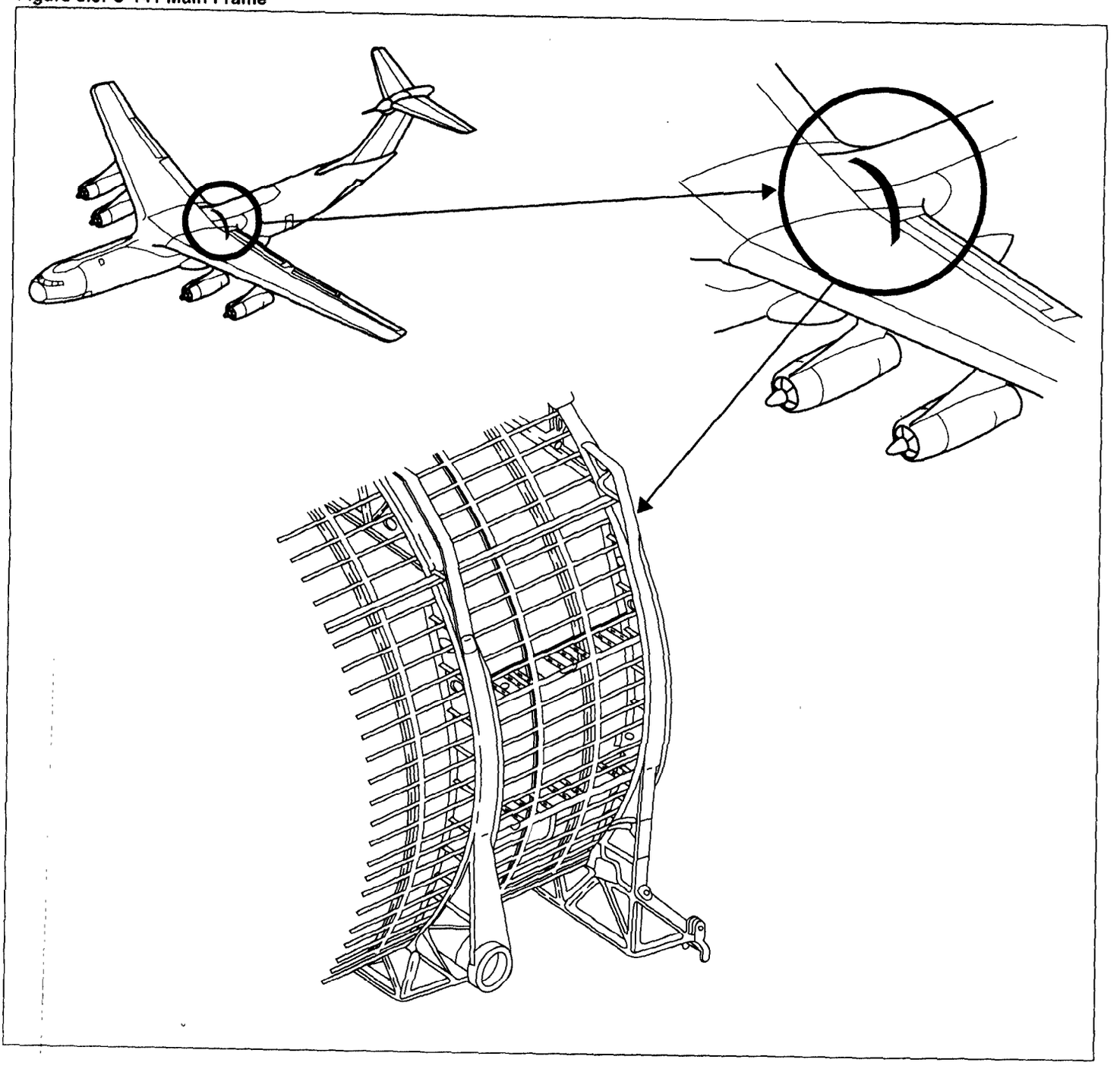


C-141 Main Frame

The C-141 main frame (see fig. 3.5) is made of aluminum forgings that are highly susceptible to stress corrosion cracking. The main frame was also identified in the 1977 study as needing improvement or modification in order for the C-141 fleet to reach the 45,000-hour service life. Since fiscal year 1989, approximately 15 aircraft required main frame replacements due to stress corrosion cracking. A depot level program to replace the

main frames with improved material during programmed depot maintenance is expected to start in fiscal year 1995 and cost an estimated $61 million. The number of aircraft receiving main frame repairs or replacement will depend on the number of C-141s remaining in the Air Force inventory when the repair/replacement program is initiated. Currently, plans are to repair main frames on an as-needed basis until 1995.

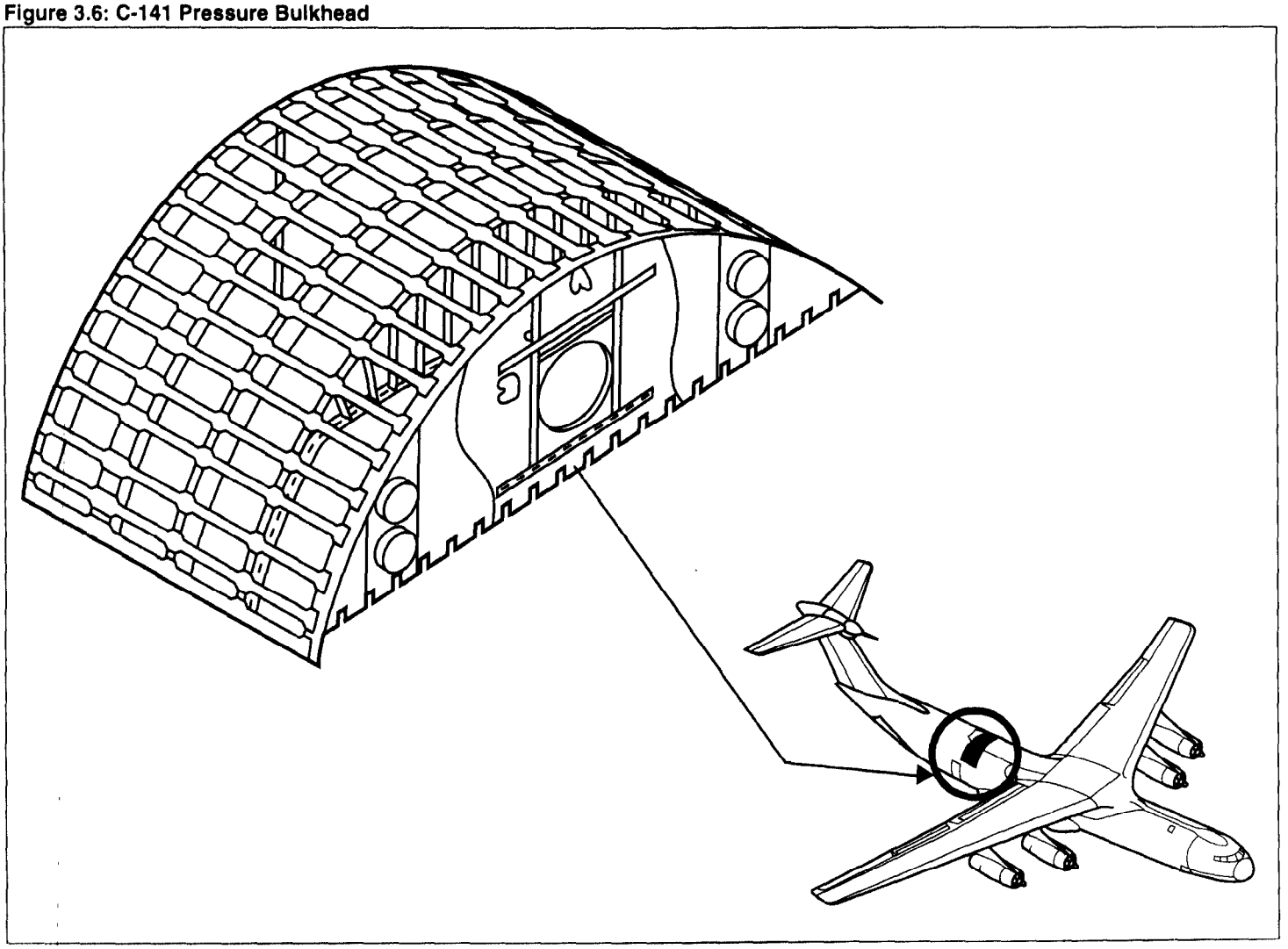
Figure 3.5: C-141 Main Frame



C-141 Pressure Bulkhead

In 1985, the C-141 fleet was found to have a significant amount of structural cracking and corrosion in the pressure bulkhead (see fig. 3.6). In August 1985, a safety technical order was issued to perform field-level inspections and apply temporary repairs. In November 1986, an initial engineering redesign/repair effort proved inadequate to correct the problem. In August 1988, a new repair designed to redistribute pressure loads evenly across the bulkhead was successful and the prototype was completed in December 1988. Initial repair of aircraft during periodic depot maintenance began in October 1990 and should be completed in late fiscal year 1995. As of August 18, 1992, 54 aircraft have had pressure bulkhead repairs during programmed depot maintenance. This repair treats the corrosion and reinforces the pressure bulkhead. C-141 program management officials stated that aircraft scheduled to be retired will be repaired only on an as-needed basis. The estimated program cost is $3 million.

Figure 3.6: C-141 Pressure Bulkhead



C-141 Window Frame Cracks

C-141 aircraft have developed cracks in the windshield post area and have been restricted to flying at a maximum altitude of 28,000 feet. This recent cracking problem was first noticed in March 1992 and a safety technical order was issued, effective May 15, 1992, to inspect all C-141 aircraft. As a result of the size and number of cracks found during the inspection, the following restrictions on pressurization have been placed on the aircraft.

- Aircraft with cracks of 3/4 inch or less may be flown with no restriction on pressurization, but must be inspected at each 100-day home station check for any progression or evidence of additional cracking.

- Aircraft with cracks longer than 3/4 inch or that run behind something where length cannot be determined are not permitted to fully pressurize and will be inspected at each through or post flight location for additional cracking or additional damage. These aircraft are restricted to a maximum altitude of 28,000 feet.
- Aircraft with more than one crack exceeding 3/4 inch in length in the same area are not permitted to pressurize and are also limited to flying at an altitude not to exceed 10,000 feet.

We were told by an AMC official that those aircraft restricted to a maximum altitude of 10,000 feet will probably be limited to local training flights only. In addition, those aircraft restricted to a maximum altitude of 28,000 feet could result in additional fuel consumption and/or reduced cargo load weight carried. These actions could be required because the C-141 is not as fuel efficient at 28,000 feet as at the normal cruising altitude of about 39,000 feet.

As of June 14, 1992, 254 of the 265 C-141s had been inspected for window frame cracks. Including the projected status of the 11 C-141s not inspected, the C-141 fleet's status was as follows:

- 98 aircraft (or 37 percent) were unrestricted,
- 149 aircraft (or 56 percent) were restricted to a maximum altitude of 28,000 feet, and
- 18 aircraft (or 7 percent) were restricted to 10,000-feet maximum altitude.

In addition, of the 64 aircraft with completed inner/outer wing joint repairs and no longer subject to operational restrictions, 39 had window frame cracks and were subject to the pressurization restrictions mentioned above. Of the 39 aircraft that had been inspected and had window frame cracks, 33 aircraft were restricted to the maximum altitude of 28,000 feet, and 6 aircraft were restricted to the maximum altitude of 10,000 feet.

The windshield cracking situation is not directly associated with the extension of the C-141s service life to 45,000 hours. According to an AMC logistics official, cracking in the windshield area has been a problem for some time, but Warner Robins did not fund for designing, engineering, and developing a replacement. The official stated that funding had not been made available due to funding of higher priority projects.

Conclusion

The full program to extend the C-141's service life to 45,000 hours has not been completed on any aircraft to date. While many of the potential structural problems were identified as early as 1977, the Air Force did not begin implementing the recommendations until 1984. Primarily as a result of the increased stress on the aircraft due to changing missions, many of the aircraft have developed generalized random cracking in the wings, which the Air Force considers a safety problem.

According to the Air Force, the service life extension program on most of the C-141 aircraft that will remain in the inventory will not be completed before fiscal year 1997. Some of the repairs will be done on an as-needed basis and may not be completed on the remaining inventory for several years after 1997.

Delays in C-141 Repairs and C-17 Deliveries Will Reduce Current Airlift Capabilities

The entire C-141 fleet is nearing or has surpassed its 30,000-hour service life, in terms of actual flying hours. In addition, as the Air Force has encountered a series of delays in its ongoing service life extension program, many aircraft are approaching their "extended" service life in terms of projected damage hours. The Air Force plans to retire some C-141s over the next several years. To conserve and extend the useful life of those C-141s remaining in the inventory, the Air Force plans to limit the number of hours and the type of missions flown. However, as a consequence, a reduction in current airlift capability will occur in the late 1990s or the early 2000s. In addition, if the program to extend the service life of C-141 aircraft to 45,000 hours is further delayed or the C-141 fleet experiences structural problems beyond those already identified, the Air Force could face a serious airlift shortage if required to support another major conflict such as Operation Desert Shield/Storm. Further, delays in aircraft deliveries have precluded any significant contribution to the Air Force's airlift capability by the C-17 until at least the late 1990s.

Current C-141 Fleet Age and Projected Retirement Schedule

In January 1992, the Air Force issued Volume I of its Mobility Requirements Study, which was required by the National Defense Authorization Act for Fiscal Year 1991. The study presents moderate risk solutions to a variety of projected worldwide scenarios that are based in part on estimated 1999 airlift assets and optimum airlift capabilities. One of the airlift assets expected to be available in 1999, and remain in the Air Force inventory until at least 2010, is the C-141. However, the average age of the C-141 aircraft in the Air Force inventory is over 25 years. The Air Force currently plans to retire 117 C-141s beginning in fiscal year 1993 and ending in fiscal year 2001. The Air Force's plan was to retire one C-141 for each C-17 aircraft that was to be delivered during this time frame. However, according to an AMC official, although C-17 deliveries have slipped, C-141 retirements have not been delayed. The projected retirements are no longer tied to the delivery of C-17s but are tied to base closures and force structure reductions. AMC and Warner Robins Air Logistics Center personnel will control which aircraft are to be retired and when. Table 4.1 shows, as of June 1992, the projected C-141 retirements by fiscal year.

Table 4.1: Projected C-141 Retirements and Aircraft Remaining in the AMC Inventory by Fiscal Year

Fiscal year	Aircraft to be retired	Aircraft remaining in inventory
1992	0	265
1993	20	245
1994	0	245
1995	2	243
1996	14	229
1997	23	206
1998	13	193
1999	19	174
2000	17	157
2001	9	148
Total	**117**	

AMC has identified which planes will be retired through fiscal year 1997. Criteria for selecting C-141s for retirement include factors such as the accumulated service life and damage hours, the severity of wing cracks, next scheduled programmed depot maintenance, and problems that a specific aircraft could be experiencing besides those identified in this report and the costs to repair or fix those problems. In addition, the projected C-141 retirement schedule could be further affected by additional base closures and force structure reductions.

The retirement of 20 C-141s in fiscal year 1993 due to a base closure, the operational limitations on the fleet, and AMC's plan to use the remaining C-141s less will result in a near-term reduction in strategic airlift capability because an adequate number of C-17s will not be available as an offset. In addition, the current C-17 delivery status and the Air Force's plans to retire C-141s as scheduled could also result in a sizable reduction in airlift capability for fiscal years 1996 through 2001.

Projected C-141 Service Life and Damage Hours

The service life of the C-141 is measured by zones in terms of service (flying) and damage hours. Service hours simply represent actual flying hours. Damage hours are more complicated. There are 21 individual aircraft tracking zones that represent typical aircraft structures. A damage tolerance analysis of the most critical sections of each zone is used by engineers at Warner Robins to determine inspection intervals and safety limits. Severity factors are also calculated from the same data to determine the relationship between actual flying hours and damage hours. Damage

hours are determined by multiplying the actual flight hours by the severity factors for each zone. Severity factors are determined by the stress placed on specific aircraft structural areas during certain flight maneuvers such as G forces incurred, low-level flights, and aerial refueling. A normal mission would have a severity factor of 1.0, whereas a low-level or airdrop mission might have a factor of 1.6. Because each aircraft flies different missions and each mission produces unique load stress on each zone, Warner Robins and Lockheed officials told us that it is not possible to give an overall aircraft severity factor.

Currently, one of the most critical structural areas is the wing lower surface spanwise splices. The area was identified in the Air Force Scientific Advisory Board's 1977 study as needing repair. The wing splices are also considered critical because generalized random cracking in this area would cause an excessive maintenance burden. We, therefore, used actual service life and calculated damage hours for the wing splices to project when and how many of the 206 C-141s not currently identified for retirement would reach 30,000, 40,000, and 45,000 service life hours and damage hours. The Air Force plans to retire an additional 58 C-141s through fiscal year 2001 but has not yet identified the specific aircraft or when they are to be retired. As stated earlier, those decisions are based on a number of factors, including the accumulated service life and damage hours.

If the ongoing service life extension program is adequately funded and no further technical problems are encountered, it is currently expected to be completed in fiscal year 1997. Our projections for the C-141 fleet in terms of service life hours and damage hours (see figs. 4.1 and 4.2) shows that, by the end of fiscal year 1998, 204 of the 206 remaining aircraft will have more than 30,000 hours in terms of service life hours and all 206 aircraft will have more than 30,000 damage hours. At that time, 74 aircraft, or about 36 percent of the remaining fleet, will have more than 40,000 service life hours, and 133 aircraft, or 65 percent of the remaining fleet, will have more than 40,000 damage hours. While none of the C-141s will have more than 45,000 service life hours by the end of fiscal year 1998, 16 C-141s will have more than 45,000 damage hours by that time.

These projections are based on the actual flying hours as of the end of June 1991, the projected flying hours for the balance of fiscal year 1991, and the flying hour programs for fiscal years 1992 through 1998 that were included in the President's budget for fiscal year 1992. The service life projections consider one flying hour equaling one service life hour. The

damage hours were projected based upon the actual damage hours on each aircraft as of the end of June 1991. We then applied the actual and planned mission severity factors of 1.6 for the balance of fiscal year 1991, 1.15 for fiscal years 1992 and 1993, and 1.41 for fiscal years 1994 through 2010 to each aircraft to project damage hours for those fiscal years. If more stressful flying is done and the severity factor is greater than planned, the damage hours to the aircraft structure will increase and the aircraft will age at a faster rate than we projected.

Figure 4.1: Projected Service Life Hours for 206 C-141 Aircraft

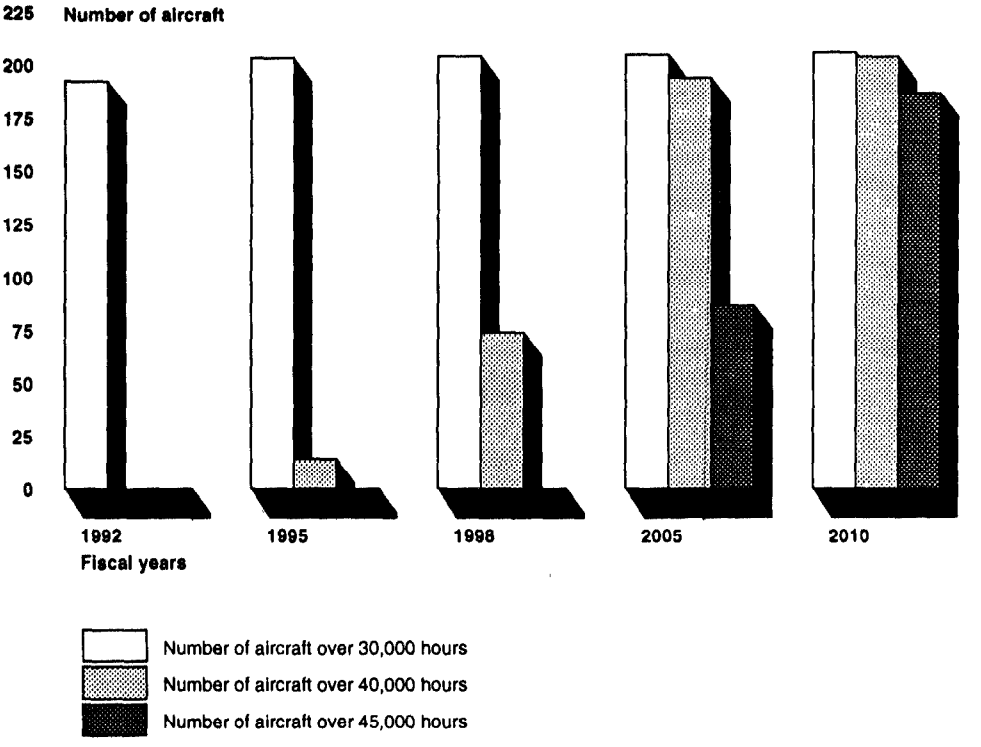
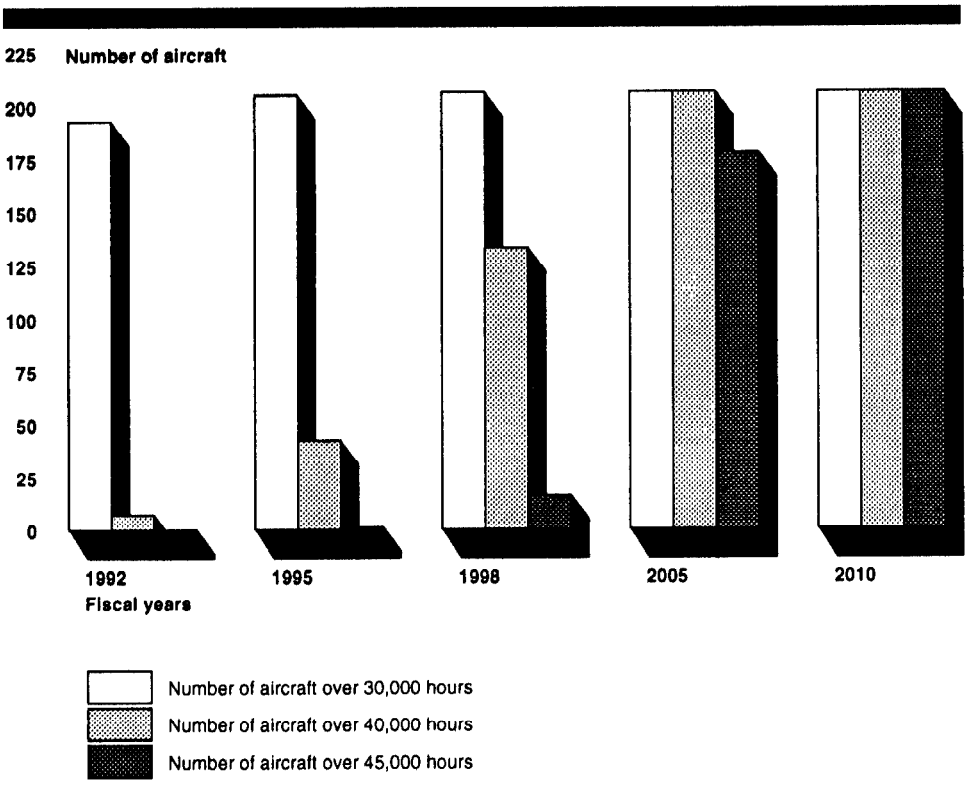


Figure 4.2: Projected Damage Hours for 206 C-141 Aircraft



Further Extension of the C-141 Service Life

On May 12, 1992, the Office of the Inspector General for the Department of Defense issued a report entitled Cost-Effectiveness Analyses for the Air Force C-17 Program. The Inspector General reported that the Air Force's cost-effectiveness analyses performed in support of the C-17 program were limited in that a C-141 service life extension program to 60,000 hours, as a complement to the 120 aircraft C-17 program, was not adequately considered as a means of reducing long-term airlift costs associated with fulfilling mission needs identified in the Mobility Requirements Study. Accordingly, the Inspector General recommended that the Under Secretary of Defense for Acquisition, among other things, direct the Air Force to conduct a cost and operational effectiveness analysis of the C-17 program. The Inspector General also recommended that the Secretary of the Air Force (1) convene the Scientific Advisory Board to determine the technical feasibility of a service life extension program to 60,000 hours and (2) assess the need for such a program based on the Board's recommendation, the results of the Mobility Requirements Study, and the cost and operational effectiveness analysis of the C-17 program.

In commenting on a draft of the report, DOD did not agree that a cost and operational effectiveness analysis was needed, citing an ongoing cost-effectiveness review of the C-17 program required by the Congress. Also, the Air Force did not agree with the Inspector General's recommendation, stating that another assessment of extending the C-141's service life to 60,000 hours was unnecessary. In addressing those comments, the Inspector General countered that a decision is required now on the future of the airlift fleet and to delay would preclude the option of extending the useful life of the C-141 to 60,000 hours and default to additional C-17s. The DOD Inspector General added that the ongoing cost-effectiveness analysis of the C-17 program may be a potentially viable means of assessing a complementary mix of C-17 and "extended" C-141 aircraft. However, the Inspector General pointed out that a "complementary" alternative was not being considered in the cost-effectiveness analysis. On October 1, 1992, DOD released this report to the Congress. It did not address the issue of further extension of the C-141's service life as a complement to the C-17.

The Air Force had previously rejected the option of extending the service life of the C-141 beyond the planned extension of 45,000 hours to 60,000 hours. We were told that the two primary reasons were the estimated costs of the program and the Air Force's concern with maintaining an old airframe with very little technological advances.

In the Conference Report on the National Defense Authorization Bill for Fiscal Year 1993, the conferees agreed to several provisions on the C-17 program. One of those provisions directed that no fiscal year 1994 production funds would be available until, among other things, the Scientific Advisory Board investigates the possibility of a C-141 service life extension program.

Conclusions

The Air Force has a serious problem with its current and projected airlift fleet and may fall considerably short of meeting its airlift goals in the future. The current backbone of the airlift fleet—the C-141—is in serious trouble, and its ongoing service life extension program—to 45,000 hours—continues to be delayed because of the lack of funding priority. As a consequence, the C-141 fleet will be approaching an average of 45,000 damage hours as it is upgraded to 45,000 service life hours. Although the Air Force airlift goals assume that a substantial portion of the C-141 fleet will remain in the inventory until at least the year 2010, we are concerned about the realism of that assumption, given the deterioration of the C-141

fleet. Even if some of the aircraft remain in the inventory until that time, their use will most likely have to be severely constrained.

We believe that the congressionally-required investigation by the Air Force Scientific Advisory Board into the possibility of a further extension of the C-141's service life, beyond 45,000 hours, is very timely. That investigation, intended to be a comprehensive analysis of how the C-141 can and should be used in the future to fill airlift needs, should provide an opportunity to review (1) the current technical and funding status of ongoing C-141 repairs, (2) the current technical and funding status of the C-141 service life extension program to 45,000 hours and how that work relates to any further service life extension, and (3) the Air Force's current plans for retiring a portion of the C-141 fleet and how the remaining C-141s will be used and maintained.

Comments From the Department of Defense

ACQUISITION

OFFICE OF THE UNDER SECRETARY OF DEFENSE

WASHINGTON, DC 20301-3000

November 24, 1992

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

Dear Mr. Conahan:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report entitled--"MILITARY AIRLIFT: Structural Problems Did Not Hamper Success of C-141 in Operation Desert Shield/Storm," dated October 27, 1992 (GAO Code 392592/OSD Case 9250). The Department concurs with the report without further comment.

The Department appreciates the opportunity to comment on the draft report.

George R. Schneiter
Director
Strategic and Space Systems

Major Contributors to This Report

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