United States General Accounting Office

GAO

Report to the Chairman, Committee on the Budget, House of Representatives

September 1996

AIR FORCE BOMBERS

Options to Retire or Restructure the Force Would Reduce Planned Spending

GAO/NSIAD-96-192

GAO

United States
General Accounting Office
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National Security and
International Affairs Division

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September 30, 1996

The Honorable John R. Kasich
Chairman, Committee on the Budget
House of Representatives

Dear Mr. Chairman:

This report discusses the basis for the Department of Defense's bomber force requirements and options for reducing planned spending on bombers. The information in this report should be useful to your Committee in its deliberations on future budget levels for the Department of Defense.

We are sending copies of this report to other interested congressional committees; the Secretaries of Defense and the Air Force; and the Director, Office of Management and Budget. Copies will also be made available to others on request.

If you or your staff have any questions about this report, please call me on (202) 512-3504. Major contributors to this report are listed in appendix III.

Sincerely yours,

Richard L Davis

Richard Davis
Director, National Security
Analysis

Executive Summary

Purpose

Although bombers currently in the force were initially designed and procured primarily to meet nuclear war-fighting requirements, since the end of the Cold War the Department of Defense (DOD) has placed increased emphasis on the role of bombers in future conventional conflicts. In recent years, the Congress has expressed numerous concerns about the size and capabilities of the planned bomber force and the long-term affordability of DOD's plans to maintain and modernize airpower assets, including the bomber force. In response to a request from the Chairman of the House Budget Committee, GAO assessed (1) the basis for DOD's bomber force requirements, including an analysis of recent DOD and Air Force studies supporting the planned force structure; (2) the Air Force's progress in implementing the new conventional concept of operations for using bombers; and (3) the costs to keep bombers in the force and enhance their conventional capabilities. As part of this work, GAO also identified and assessed the potential cost savings and effects on military capability of four alternatives for reducing bomber costs, including retiring or reducing the B-1B force, and examined information related to the issue of procuring additional B-2s.

Background

The U.S. bomber force consists of B-2s, B-1Bs, and B-52Hs. DOD plans to retain all three bombers well into the next century. Development and production of the B-2 bomber, which relies on stealth technologies to enhance its survivability, is scheduled to be completed in 2000. B-1B bombers entered the force between 1986 and 1988 but have experienced numerous problems over the past decade, particularly with regard to defensive avionics. The last B-52H entered the force in 1962. The Air Force has upgraded the B-52H force over the years and, on the basis of engineering studies, estimates that the B-52H will be structurally sound until about 2030.

The end of the Cold War has permitted the United States to reduce the number of bombers significantly from a total of about 360 bombers in 1989. Since 1990, DOD and the Air Force have conducted four major studies of heavy bomber requirements that have helped shape DOD's planned bomber force—the Nuclear Posture Review, the Bottom-Up Review, the Air Force's Bomber Roadmap, and the congressionally mandated 1995 DOD Heavy Bomber Force Study. Largely on the basis of these studies, DOD plans to retain 187 bombers in its inventory through the early part of the next century compared with the current inventory of 202 (as shown in table 1).

Table 1: Current and Planned Inventory of Bombers

	Current inventory 1996		Planned inventory 2001	
	Total inventory[a]	Operational aircraft[b]	Total inventory	Operational aircraft
B-2	13	6	21	16
B-1B	95	60	95	82
B-52H	94	56	71	56
Total	**202**	**122**	**187**	**154**

[a]"Total inventory" includes aircraft funded for flying, test and maintenance backup aircraft, and aircraft held in reserve for later use.

[b]"Operational aircraft" includes only aircraft funded for flying.

Source: Department of the Air Force.

B-2s and B-52Hs will be available for either conventional or nuclear missions, while B-1B bombers will have a conventional role only. In contrast with its practice during the Cold War, the Air Force has placed some B-1Bs and B-52Hs in the Air National Guard and the Air Force Reserves. Also, the Air Force has placed 27 B-1Bs in reconstitution reserve status for the next few years until B-1Bs are upgraded to deliver additional conventional weapons. These aircraft are rotated through the flight schedule and maintained, but the units that operate them do not receive funding for aircrews or flying hours. Therefore, the Air Force would not have sufficient numbers of crews to operate them during wartime. Once the B-1Bs are upgraded, the Air Force plans to reduce the number of B-1B reconstitution reserve aircraft by establishing two additional squadrons of operational B-1Bs and funding additional crews. This will increase the number of operational aircraft from 60 to 82.

In 1992, the Air Force determined that the conventional capabilities of its bombers were not sufficient to destroy critical ground targets during the initial stages of a conventional conflict. Therefore, the Air Force developed a plan to provide the bomber force with the capability to drop additional unguided gravity weapons and precision-guided munitions. These enhancements are scheduled to be completed in 2008. According to the Air Force, bombers are unique in that they can attack targets anywhere in the world from bases in the United States and can carry large quantities of weapons.

In recent years, DOD and the Congress have debated whether to buy additional B-2s beyond those already funded. The Congress made available $493 million in fiscal year 1996 that DOD plans to use to convert the first

B-2 test aircraft into an operational bomber, providing a total of 21 B-2s. DOD's position is that procuring additional B-2s is not cost-effective compared with other alternatives, such as procuring additional precision-guided munitions and upgrading the B-1B.

Results in Brief

Senior DOD officials, including the Chairman of the Joint Chiefs of Staff, have stated that DOD cannot afford all of the services' stated requirements and that difficult decisions must be made on which investment programs to cancel so that DOD can develop and implement a long-term, sustainable recapitalization plan. GAO's analysis shows that the services have ample capabilities to attack targets that are likely to be assigned to bombers and plan to expand their capabilities over the next several years, including improvements to the B-1Bs. While DOD needs a level of redundancy to provide commanders in chief with a safety margin and flexibility, it may not need to upgrade its capabilities to the extent currently planned. GAO's analysis shows that DOD has not made a compelling case that it needs to retain and upgrade 187 bombers to support future war-fighting requirements. While there are a number of ways to reduce capabilities to strike ground targets, a smaller bomber force may be one option to reduce overlap that would result in an acceptable loss to DOD's overall war-fighting capability.[1] In light of the significant cost savings that could be achieved, reducing the size of DOD's planned bomber force may be a sound decision that would help provide DOD with a source of funds to recapitalize its forces.

DOD and Air Force studies of conventional bomber requirements have significant limitations in their approach and methodology and, in some cases, include questionable assumptions that may overstate DOD's need for bombers. None of the studies have examined the cost-effectiveness of bombers versus other alternatives such as fighter aircraft and sea- and ground-based missiles, even though DOD has concluded that it currently has sufficient capabilities to attack ground targets associated with two major regional conflicts and plans to invest billions of dollars over the next 20 years to improve these capabilities. Also, commanders in chief currently would use significantly fewer bombers than the Bottom-Up Review cites as necessary for a major regional conflict. In response to a Roles and Missions Commission conclusion that DOD may have greater quantities of strike aircraft and other deep attack weapons systems than its needs, DOD has initiated a Deep Attack Weapons Mix Study that is

[1]Other options to reduce ground attack capabilities include reducing the number of land- or sea-based tactical aircraft and missiles.

expected to address some of the shortcomings of prior studies and could identify opportunities to reduce some of the services' extensive and overlapping capabilities, including bombers.

The Air Force faces numerous challenges in implementing its new operational concept for using bombers in conventional conflicts. Testing of the B-2 has identified deficiencies in key areas, such as low observability. Moreover, Air Force plans to upgrade the B-1B's defensive avionics suite, which will be critical if the B-1B is to operate during the early days of a conventional war, have undergone significant change since 1992 and have not yet been finalized. In addition, the Air Force has not resolved issues affecting the bombers' ability to deploy to and operate from overseas locations. Specifically, the Air Force has not ensured that (1) the B-1B fleet can achieve and sustain a 75-percent mission capable rate, (2) bomber units have sufficient personnel to sustain expected wartime sortie rates, and (3) bombers have adequate spares to sustain operations until an air supply bridge is established.

For fiscal years 1996 through 2001, DOD has budgeted about $17 billion to modernize and operate its heavy bomber force. Because DOD's plans to modernize combat airpower may be prohibitively expensive, DOD is seeking ways to reduce costs. With this in mind, GAO has identified four options to reduce or restructure the bomber force that would achieve cost savings while retaining extensive aggregate airpower capabilities. The option to retire the B-1B force would save about $5.9 billion in budget authority for fiscal years 1997 to 2001.[2] This option would decrease DOD's inventory of long-range airpower assets and increase U.S. forces' dependency on other capabilities and therefore the risk that some targets might not be hit as quickly as desired. However, it is plausible to expect that the targets could be hit by other aircraft and missiles in light of (1) analyses by GAO and the Commission on Roles and Missions that indicate that DOD may have more than ample ground-attack capability and (2) analyses that most targets in a two major conflict scenario would be within the range of other forward-based tactical aviation assets and missiles. Another option is to place 24 more B-1Bs in the Air National Guard, which would result in a 50/50 active/reserve ratio when attrition and backup aircraft are excluded, would preserve the capabilities of the planned bomber force but would save about $70 million in budget authority over the same 5-year period.

[2]The Congressional Budget Office estimated the cost savings for GAO's four options.

Although not part of DOD's plan, both DOD and the Congress have considered the need for additional B-2s in recent years. Substantial future costs could be avoided if the size of the B-2 force is capped at 21 aircraft as DOD currently plans. Additional B-2 procurements would exacerbate DOD's efforts to develop and implement a long-term recapitalization plan.

Principal Findings

DOD Has Not Adequately Supported Its Stated Requirements for Using Bombers in Conventional Conflicts

GAO believes that DOD has not demonstrated convincingly that it needs to retain and upgrade 187 bombers to meet war-fighting requirements in light of (1) the limitations of three key DOD and Air Force studies that helped determine requirements for using bombers in conventional conflicts, (2) unified commanders in chief plans for using bombers, and (3) GAO's analysis of DOD's aggregate ground-attack capabilities. According to DOD, less than half of DOD's planned bomber force—66 B-52Hs and 20 B-2s—will be needed for the nuclear role.

Studies Shaping Requirements Have Significant Limitations

DOD's decision to keep 187 bombers in the force, a significantly larger number than required to meet nuclear requirements, was shaped largely by the conclusions of the Bottom-Up Review, the Air Force's Bomber Roadmap, and the 1995 DOD Heavy Bomber Force Study, and reflects DOD's view that long-range bombers are needed primarily to supplement the conventional capabilities of other ground-attack assets such as Air Force and Navy tactical fighters and missiles.

These three studies have significant limitations in their methodology and, in some cases, rely on questionable assumptions that may overstate DOD's requirements for bombers. None of the studies addresses the Commission on Roles and Missions concern that DOD may have more ground-attack capability than it needs when the contributions of all the services' weapon systems are considered. Moreover, the studies did not examine whether other less costly alternatives exist to accomplish conventional missions that would likely be assigned to bombers. DOD's Bottom-Up Review concluded in late 1993 that 100 bombers were needed for a major regional conflict and up to 184 bombers should be maintained in the inventory. However, this review did not model a range of bomber force sizes and did not examine whether precision-guided munitions expected to enter the

inventory after 1999 could potentially reduce requirements for fighters and bombers. In addition, the Air Force's Bomber Roadmap, which established a requirement for 210 bombers, assumed that (1) other assets such as tactical aircraft and cruise missiles would play a limited role during the initial phases of a major regional conflict, thereby requiring that bombers strike all of the time-critical targets during the first 5 days and (2) some bombers would need to be withheld for a nuclear contingency. Both of these assumptions are inconsistent with DOD planning guidance.

The DOD Heavy Bomber Force Study, completed in May 1995, is the most comprehensive of the DOD and Air Force studies to date. The study assumed that each of the services plays a major role in responding to major regional conflicts, modeled various scenarios and bomber forces sizes, and examined how changes in key assumptions such as shorter warning time and limited tactical aircraft availability would affect the need for bombers during the early stages of a campaign. Under all of the scenarios examined, including one option for a smaller bomber force based on retiring the B-1B force, modeling showed that the United States would win two nearly simultaneous major regional conflicts. Aircraft attrition in these scenarios varied depending on the number and types of bombers modeled. However, this study did not examine whether fighters or long-range missiles could accomplish the mission more cost-effectively than bombers.

Unified Commands See Limited Role for Bombers

Although Unified Command officials agreed that bombers would be valuable in future conflicts, they expect to use significantly fewer than the 100 bombers cited by the Bottom-Up Review and endorsed by the other studies. Commanders in chief might choose to include more bombers in their plans once they are upgraded. However, none of the commanders in chief expressed concern that the smaller number of bombers included in current war plans is a limiting factor that would adversely affect the outcome of a future conflict.

When viewed in the aggregate, the services have numerous, overlapping ways to attack ground targets in major regional conflicts. Planned modernization programs over the next two decades will further add to already substantial capabilities, leading to questions about whether DOD needs or can afford all of its planned capabilities. Commanders in chief routinely apportion more than 100 percent of the targets to the services to provide a margin of safety and ensure flexibility. Moreover, our analysis of DOD's Capabilities Based Munitions Requirements database for two major

regional conflicts and Air Force modeling of the air campaign for two major regional conflicts indicated that almost all of the bombers' planned targets could be destroyed by other aircraft and missiles.[3]

In response to a May 1995 recommendation of the Commission on Roles and Missions, DOD has initiated a Deep Attack Weapons Mix Study to determine the appropriate number and mix of deep attack capabilities. GAO agrees that this study is needed. As a result of GAO's review of the services' overlapping interdiction capabilities, GAO recommended in May 1996 that (1) DOD should routinely review service modernization proposals based on how they will enhance DOD's current aggregate capabilities and (2) such analyses should serve as the basis for deciding funding priorities.[4] In a subsequent testimony, GAO concluded that such assessments should (1) assess total joint war-fighting requirements; (2) inventory aggregate service capabilities, including the full range of available assets; (3) compare aggregate capabilities with joint requirements to identify excesses or deficiencies; (4) assess the relative merits of retiring alternative assets, reducing procurement quantities, or canceling acquisition programs where excesses exist or where substantial payoff is not clear; and (5) determine the most cost-effective means to satisfy deficiencies.[5]

Significant Challenges Remain in Implementing Air Force Operational Concept for Bombers

The Air Force's ability to implement its conventional concept of operations for bombers depends on its ability to successfully complete its bomber modernization program and ensure that bombers have the ability to operate for sustained periods at overseas locations. Demonstrating these capabilities poses a significant challenge for the B-2 and the B-1B, both of which were originally designed with limited conventional capabilities and deployment requirements.

Delays in the B-2 testing program due to late aircraft deliveries and problems in integrating software create the potential that further deficiencies that are operationally important or costly to correct could be identified. After 15 years of development and evolving mission requirements, the Air Force has yet to demonstrate that the B-2 will meet

[3]The Air Force Studies and Analyses Agency modeling of the two major regional conflict scenario was provided as input into the Joint Chiefs of Staff Nimble Dancer II wargame.

[4]U.S. Combat Air Power: Reassessing Plans to Modernize Interdiction Capabilities Could Save Billions (GAO/NSIAD-96-72, May 13, 1996).

[5]Combat Air Power: Joint Mission Assessments Needed Before Making Program and Budget Decisions (GAO/T-NSIAD-96-196, June 27, 1996).

some of its most important mission requirements. For example, the Air Force completed radar signature flight testing for the block 30 B-2 in March 1996 and characterized test results as generally good. However, in some cases the radar signatures did not meet planned essential employment capabilities. The Air Force is analyzing signatures that did not meet requirements to determine whether further design and testing is needed.[6] As of April 1996, the Air Force had completed about 75 percent of the flight testing. Given the amount of flight testing that remains, the Air Force may not be able to meet its planned flight testing completion date of July 1, 1997.

DOD also must equip the B-1B with additional munitions and upgrade its defensive avionics system and computers. Air Force plans to upgrade the B-1B's computers and defensive avionics suite, which will be critical if the B-1B is to operate as planned during the early days of a war, have undergone significant change since 1992. Although the Air Force considers its most recent plans for upgrading the defensive avionics system to be low to moderate risk, the details of the upgrades have yet to be decided. Moreover, the Air Force will need to maintain a rigorous commitment to testing to ensure that the defensive avionics system works as planned and that the computer upgrades are adequately funded so that the computers can support the B-1B's conventional requirements.

Significant challenges also remain to demonstrate that the B-2 and the B-1B will be able to deploy to, and operate from, overseas locations for extended periods of time at expected sortie rates. Although the Air Force demonstrated during a 6-month operational readiness test that one squadron of B-1Bs could exceed the required 75-percent mission capable rate if properly funded, the Air Force has not demonstrated that the overall B-1B force can achieve and sustain this rate. The Air Force cannot meet its war-fighting requirement to support all B-1B and B-52H bombers allocated to war-fighting commanders in chief because of personnel shortages in some occupational specialties such as bomb assembly and bomb loading. Moreover, the Air Force plans to fund less expensive 14-day mobility readiness spares packages for B-1 and B-2 units instead of the 30-day package required for B-52Hs and most fighter units.

[6]The B-2 contractor will deliver B-2s in three configurations referred to as blocks 10, 20, and 30. The block 10 aircraft provides the Air Force with a training aircraft with limited combat capability. Subsequent blocks will provide improved capabilities.

Costs to Modernize and Sustain Bomber Force Are Significant

DOD's Fiscal Year 1997 Future Years Defense Program includes about $17 billion for bombers for the period 1996-2001. DOD plans to spend $6.3 billion, or about 37 percent, of these programmed funds for investment, and $10.7 billion, or 63 percent, for operations and support costs. The total cost to modernize DOD's heavy bomber force is likely to exceed $7 billion by 2008, when B-1B upgrades are completed. This total includes $6.3 billion in modernization funds included in DOD's Fiscal Year 1997 Future Years Defense Program, and an additional $800 million beyond 2001 to complete B-1B modifications. The Air Force is studying options to upgrade the B-2 force beyond the block 30 configuration which, if approved, would require additional modernization funds.

The B-1B force will account for the largest portion of future bomber operations and support costs. However, the B-2 will be the most costly aircraft to operate on a per aircraft basis, costing more than three times as much as the B-1B and more than four times as much as the B-52H.

Options for Reducing Bomber Costs

Because DOD faces a significant funding challenge to support and recapitalize its planned force, GAO identified four options to reduce bomber costs, and, in the context of these options, assessed the need for additional B-2s. These options are retiring the B-1B force, retiring 27 B-1Bs in reconstitution reserve, placing more B-1Bs in the Air National Guard, and keeping 6 B-1Bs at their current location rather than moving them to another location as planned. In identifying ways to reduce the cost of the bomber force, GAO focused its analysis on B-1B alternatives because DOD has concluded that the B-1B is no longer needed for the nuclear mission and costly upgrades planned for the B-1B will add to DOD's already formidable ground-attack capabilities. All four options would allow DOD to reduce costs while maintaining extensive conventional ground-attack capabilities and a capable nuclear force. Retiring or reducing the number of B-1Bs will achieve the greatest cost savings. Placing more B-1Bs in the National Guard or reversing the Air Force's plan to move six B-1Bs from Ellsworth Air Force Base in South Dakota to Mountain Home Air Force Base in Idaho would achieve lower cost savings because they do not reduce the number of bombers in the planned force. Although GAO's options focused on DOD's planned bomber force, substantial future costs could be avoided if the size of the B-2 force were capped at 21 aircraft as DOD currently plans. The cost of procuring 20 additional B-2s, the number proposed by the contractor and most often debated, would more than offset the potential savings associated with implementing one or more of GAO's options for reducing bomber costs.

Options' Opportunities for Cost Savings and Effects on Military Capability Differ

Retiring the B-1B would save about $5.9 billion in budget authority for fiscal years 1997 to 2001, according to the Congressional Budget Office. Retiring the 27 B-1Bs that are in reconstitution reserve would save about $450 million in budget authority over the same 5 years. Retiring or reducing the B-1B force would not result in a significant decrease in DOD's existing capabilities because the B-1B currently lacks an effective defensive avionics system and is capable of delivering few types of conventional weapons. Reducing the B-1B force would reduce the commanders in chief's ability to attack some targets as quickly as desired and would reduce DOD's long-range capabilities. However, these risks may be acceptable given the level of redundancy already planned in the commanders in chief's target allocation process, and the capabilities of existing assets and other planned improvements. The loss of long-range capability associated with retiring the B-1B would have the greatest impact in scenarios in which Air Force tactical aircraft are assumed to have no access or limited access to bases in theater. However, the United States has agreements with many nations to facilitate access to overseas bases in times of crisis. Also, B-2s and B-52Hs will still be available for missions that require long-range and heavy payload capabilities.

Placing 24 additional B-1Bs in the Air National Guard would save approximately $70 million in budget authority for fiscal years 1997 to 2001 because these units have fewer full-time personnel and are less costly to operate. According to Air Force officials, the reserve components' limited experience with bombers is a key reason the Air Force has not placed more bombers in the reserves. GAO examined placing 24 more B-1Bs in the Air National Guard because it would achieve a 50/50 active/reserve ratio when attrition and backup aircraft are excluded and the Air Force has placed 50 percent or more of some refueling and air mobility assets in the reserve component.

The Air Force would save about $40 million in military construction costs if it reversed its decision to move B-1Bs currently located at Ellsworth Air Force Base, South Dakota, to Mountain Home Air Force Base, Idaho. Although based at Ellsworth, this squadron is currently assigned to a composite wing at Mountain Home consisting of several types of aircraft, including F-15s and F-16s and routinely trains with the wing but does not participate in day-to-day wing operations. According to Air Force officials, collocation of the bombers with the wing will result in enhanced training. However, GAO has previously reported that the Air Force has not demonstrated the benefits of peacetime collocation of different types of aircraft.

Additional B-2s Would Exacerbate DOD's Efforts to Develop and Implement a Long-Term Recapitalization Plan

Although funding for additional B-2s is not included in DOD's plan, DOD and the Congress have considered the need to procure additional B-2s in recent years. DOD has concluded that additional B-2s are not needed to meet future nuclear war-fighting requirements, particularly in view of the nuclear weapons carrying capability limit included in the Strategic Arms Reduction Treaty II. Also, DOD's 1995 Heavy Bomber Force Study, which used defense planning assumptions, found that 20 additional B-2s had little effect on the outcome of a conventional conflict and are not needed to implement the two major regional conflict strategy. Most studies that support buying additional B-2s assume that DOD would have little warning time and limited availability of tactical aircraft to respond to future conventional conflicts. Both assumptions are inconsistent with current defense planning assumptions.

Substantial future costs could be avoided if the size of the current B-2 force is capped at 21 aircraft as DOD currently plans. Cost estimates to procure and operate an additional 20 B-2s range from $18.7 billion to $27 billion over 25 years. These additional costs would hinder DOD's efforts to develop and implement an affordable long-term recapitalization plan unless offsetting cuts in other programs were realized.

Recommendations

DOD's ongoing Deep Attack Weapons Mix Study is designed to determine the most cost-effective mix of systems needed for the deep attack mission. Given the challenges of long-term recapitalization of the force, GAO recommends that the Secretary of Defense consider options to retire or reduce the B-1B force as part of this study. Regarding the other two B-1B options, GAO recommends that the Secretary of the Air Force assess the potential to place more bombers in the reserve component and reexamine the decision to relocate six B-1B bombers to Mountain Home Air Force Base.

Bombers that remain in the force will need to be able to deploy and sustain operations at overseas locations to meet commander in chief requirements. Therefore, GAO also recommends that the Secretary of Defense require the Secretary of the Air Force to (1) provide an assessment of the risk resulting from shortfalls in meeting requirements for mobility readiness spares packages and providing personnel needed to support conventional operations, including the impact of the shortfalls on the Air Force's ability to meet commander in chief requirements for bombers and (2) prepare plans and time frames to eliminate these shortfalls or mitigate the risks associated with them.

Agency Comments and GAO's Evaluation

In written comments (see app. II) on a draft of this report, DOD partially concurred with three of the recommendations and did not concur with one. DOD partially concurred with GAO's recommendation to include options to retire or reduce the B-1B force in the Deep Attack Weapons Mix Study but disagreed with some of GAO's analysis supporting the recommendation. DOD stated that GAO used the Nimble Dancer wargame to support conclusions on bomber effectiveness but that Nimble Dancer was not intended to provide specific information about weapon system effectiveness. GAO agrees and did not use the Nimble Dancer wargame to analyze weapon effectiveness. Rather, GAO used Air Force modeling of the air campaign for two major regional conflicts, which was provided to the Joint Staff as input to Nimble Dancer, to show that targets assigned to the B-1B are not unique to the B-1B.

DOD's comments also state that GAO implied that future precision munitions will be such a large force multiplier that they justify retiring the B-1B now. DOD acknowledges, however, that precision munitions are a fundamental enhancement to combat effectiveness. GAO believes that the capabilities of precision munitions should be considered in making force structure decisions and notes that the President, in redirecting the Deep Attack Weapons Mix Study in February 1996, highlighted the potential that the increasing capabilities of weapons could allow some consolidation of the aircraft, ships, and missiles that will deliver these weapons. GAO believes that DOD may be able to avoid unnecessarily expending significant funds to improve ground-attack capabilities that DOD already considers sufficient. Although DOD's comments state that options to retire or reduce the B-1B force will be included in the study, DOD officials noted at an exit conference that the list of options has not been finalized and time constraints may require DOD to reduce the number of options currently on the list. Consequently, GAO is still including a recommendation.

DOD partially concurred with the recommendation that the Secretary of the Air Force provide the Secretary of Defense with an assessment of the risk resulting from shortfalls in the B-2 and the B-1B mobility readiness spares packages and personnel needed to support conventional operations. DOD agreed that there is a personnel shortfall and is currently evaluating several options to address it. DOD did not agree that there is a shortfall in the mobility readiness spares packages for the B-2 and the B-1B and indicated that, after detailed review and analysis, it decided that a 14-day versus a 30-day package is appropriate for the B-2 and the B-1B based on logistics initiatives. During GAO's review, Air Combat Command and Air Force headquarters officials consistently stated that the decision to fund a

14-day package was budget driven and that they were concerned that it would not be sufficient. DOD and Air Force officials did not provide documentation that logistics initiatives were the basis for its decision. Therefore, GAO still believes that further analysis is needed to assess the risk associated with 14-day mobility readiness spares packages.

DOD did not agree with the recommendation that the Secretary of the Air Force assess the potential to place more bombers in the reserve component and reexamine the decision to relocate six B-1Bs to Mountain Home Air Force Base. DOD stated that the bombers' mission of striking targets on the first days of a conflict would stress reserve units' capacity to respond within timely constraints, due to call-up and mobilization requirements. However, in response to congressional inquiries about the initial assignment of bombers to reserves, the Air Force stated that there would be no loss of war-fighting capability with such assignments. Similarly, RAND reported in 1993 that the Air Force reserve components train to readiness standards similar to those for active units. GAO still believes that placing additional B-1Bs in the reserves warrants consideration and could result in significant annual recurring savings.

With respect to moving bombers to Mountain Home Air Force Base, GAO believes that DOD has not demonstrated that the benefits associated with the composite wing concept outweigh the increased cost to maintain small numbers of dissimilar aircraft at the same location compared with traditional basing concepts. In light of the construction costs that will be incurred and the constraints that will affect B-1B operations and maintenance for several years after the move, GAO still believes the move should be reconsidered.

DOD also provided GAO with technical comments on the report and where appropriate, GAO changed and updated information in the report.

Contents

Figures

Abbreviations

AGM	Air-to-Ground Guided Missile
BUR	Bottom-Up Review
CINC	commander in chief
DOD	Department of Defense
GAO	General Accounting Office
FYDP	Future Years Defense Program
IDA	Institute for Defense Analysis
JDAM	Joint Direct Attack Munition
START	Strategic Arms Reduction Treaty
WCMD	Wind Corrected Munitions Dispenser

Introduction

At the height of the Cold War, the United States envisioned a force of over 400 heavy bombers to deter against the Soviet nuclear threat and to be prepared to launch long-range nuclear strikes. The end of the Cold War, marked by the breakup of the Soviet Union and negotiation of strategic arms limitations treaties, drastically reduced requirements for long-range bombers and resulted in a shift of the bombers' primary role from nuclear to conventional missions. Since the early 1990s, Department of Defense (DOD) and the Air Force have reduced the size of the bomber force, begun to implement a new concept of operations to use bombers in conventional conflicts, and embarked on a program to upgrade the bombers' conventional capabilities.

Types of Bombers in DOD's Inventory

The U.S. heavy bomber force consists of B-2s, B-1Bs, and B-52Hs. DOD plans to retain all three types of bombers well into the 21st century. Each type has a unique history that has been shaped in part by significant congressional interest in bomber issues. We have issued numerous reports on bomber issues in response to congressional concerns; these reports are listed at the end of this report.

In 1978, DOD began to design the B-2 as a stealthy bomber to penetrate enemy defenses for both nuclear and conventional missions. The B-2 is a two-crew aircraft that incorporates stealth (low-observable) technologies to enhance survivability. In 1981, the Air Force planned to buy 132 B-2 aircraft, but the 1994 Defense Authorization Act limited the procurement to 20 aircraft with a cost ceiling of $28.968 billion in fiscal year 1981 constant dollars. The 1996 Defense Authorization Act removed this cost ceiling, and the Congress made available an additional $493 million that will be used to convert the first B-2 test aircraft into an operational B-2. Today, 21 aircraft are planned at a cost of about $45 billion in then-year dollars. The first B-2 was delivered in 1989, and the last block 30 aircraft is scheduled to be completed in 2000. The contractor will deliver the B-2s in three configurations (referred to as blocks 10, 20, and 30), and each successive block possesses improved capabilities. By 2000, the Air Force plans to have 21 B-2s in the block 30 configuration in its inventory.

In 1970, the Air Force began to develop the B-1 bomber for strategic nuclear missions as a high-speed aircraft designed to penetrate Soviet airspace and evade Soviet radar by flying low to the ground. The B-1 program experienced difficulties from its inception, and in 1977, the program was canceled. But, in 1981, DOD revived the B-1 program, approving production of the B-1B to be part of a two-bomber program to

replace the aging B-52 fleet. The B-1B was intended to serve as a penetrating bomber until the B-2 bomber was deployed in the 1990s, at which time the B-1B was expected to assume a standoff role. The first squadron of B-1Bs became operational in October 1986. The contractor delivered the 100th and final B-1B in May 1988. As a result of crashes, 95 B-1Bs remain. Throughout its existence, the B-1B has had technical problems, particularly with its defensive avionics system.

B-52 bombers, which were first introduced in 1954, were produced in eight configurations (A through H) with the last H aircraft delivered in October 1962. While 744 B-52s were built, only 94 remain. During the decades of the Cold War, B-52s were dedicated primarily to deterring nuclear war. However, B-52Gs were the first missile-capable B-52 bombers and were used in conventional roles in Vietnam and the Persian Gulf. During Operation Desert Storm, B-52Gs dropped approximately one-third of the total tonnage of bombs delivered by U.S. air forces striking wide-area troop concentrations, fixed installations, and bunkers and are credited with destroying the morale of Iraq's Republican Guard. Following Desert Storm, the Air Force retired the B-52Gs and provided B-52Hs with enhanced conventional capabilities. While the 744 B-52s originally cost a little over $4.5 billion (an average unit cost of $6.1 million), over $41 billion has been spent over more than 40 years for their development, procurement, modernization, and service life extension. On the basis of engineering studies, the Air Force estimates that the B-52H will be structurally sound until about 2030.

Planned Changes in Bomber Force Structure

Since 1992, DOD and the Air Force have completed four major studies that have addressed bomber requirements—the Nuclear Posture Review, the Bottom-Up Review (BUR), the Air Force Bomber Roadmap, and the congressionally mandated 1995 Heavy Bomber Force Study. On the basis of these studies, DOD plans to make changes (shown in table 1.1) to the bomber force structure by 2001.

Table 1.1: Current and Planned (for 2001) Bomber Force

Bomber	Current inventory[a]	Current operational inventory[b]	Planned inventory	Planned operational inventory
B-2	13	6	21	16
B-1B	95	60	95	82
B-52H	94	56	71	56
Total	**202**	**122**	**187**	**154**

[a]Number of aircraft funded for flying, test and maintenance backup aircraft, and aircraft held in reserve for later use.

[b]Number of aircraft funded to fly.

Source: Department of the Air Force.

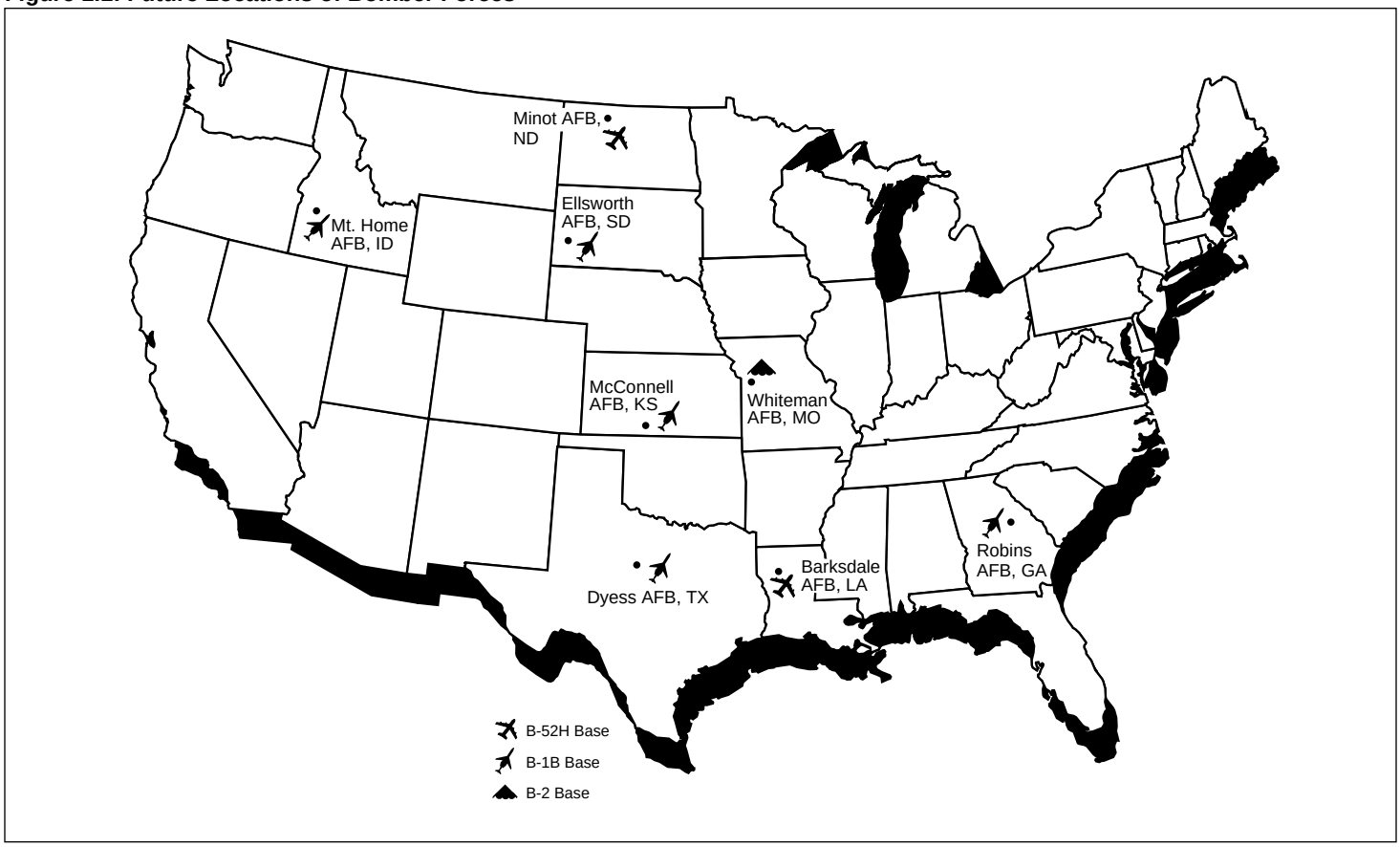
Of the planned operational aircraft, 130 bombers will be available for conventional and nuclear missions and 24 will be used for training. The remaining 33 aircraft are test and backup aircraft.

The Air Force has chosen to fully fund the operation of only 60 B-1Bs for the next few years, compared with plans to fund 82 beyond fiscal year 2000. In the short term, the Air Force has classified 27 of 95 B-1Bs as "reconstitution aircraft." These aircraft are not funded for flying hours and lack aircrews, but they are based with B-1B units, flown on a regular basis, maintained like other B-1Bs, and modified with the rest of the fleet. B-1B units will use flying hours and aircrews that are based on 60 operational aircraft to rotate both the operational aircraft and the reconstitution aircraft through its peacetime flying schedule. However, because the Air Force has chosen not to fund aircrews for its reconstitution reserve aircraft, placing aircraft in reconstitution reserve reduces the number of aircraft the Air Force can support during wartime. In fiscal year 1997, the Air Force plans to begin reducing the number of reconstitution reserve aircraft by establishing two additional squadrons of B-1B aircraft and funding additional aircrews and flying hours.

Since the Cold War ended, DOD has transferred some long-range bombers to the Air Force reserve components for the first time. In 1994, the Air Force Reserves and Air National Guard established 1 B-52H squadron with 8 aircraft and 1 B-1B squadron with 10 aircraft. The Air National Guard will establish one additional B-1B squadron of eight aircraft in the near future.

All bombers will be based in the continental United States. The Air Force plans to expand the number of B-1B bases from three to five beginning in fiscal year 1996. Specifically, the Air Force plans to move six B-1Bs to Mountain Home Air Force Base in Idaho and establish a new Air National Guard squadron of B-1Bs at Robins Air Force Base in Georgia. Another Air National Guard squadron of B-1Bs is located at McConnell Air Force Base in Kansas. Figure 1.1 shows the locations of the future bomber force.

Figure 1.1: Future Locations of Bomber Forces



Source: Department of the Air Force.

B-52H's and B-2's Nuclear Role

In 1991, the President of the United States took the bombers off nuclear alert status. Subsequently, in January 1993, the Presidents of the United States and the Russian Federation signed the Strategic Arms Reduction

Treaty (START) II building on agreements reached in START I signed July 1991. The treaty sets equal ceilings on the number of nuclear weapons that can be deployed by either party. If ratified by both countries, the START II treaty would reduce the deployable nuclear warheads to no more than 3,500 by the year 2003. In assessing bomber requirements in light of the new limits, DOD plans to remove the B-1B from the nuclear role. The B-2s and B-52Hs will retain the nuclear mission. B-52Hs assigned to the Air Force Reserve remain available for nuclear missions, but they will be flown by active duty pilots if assigned nuclear missions.

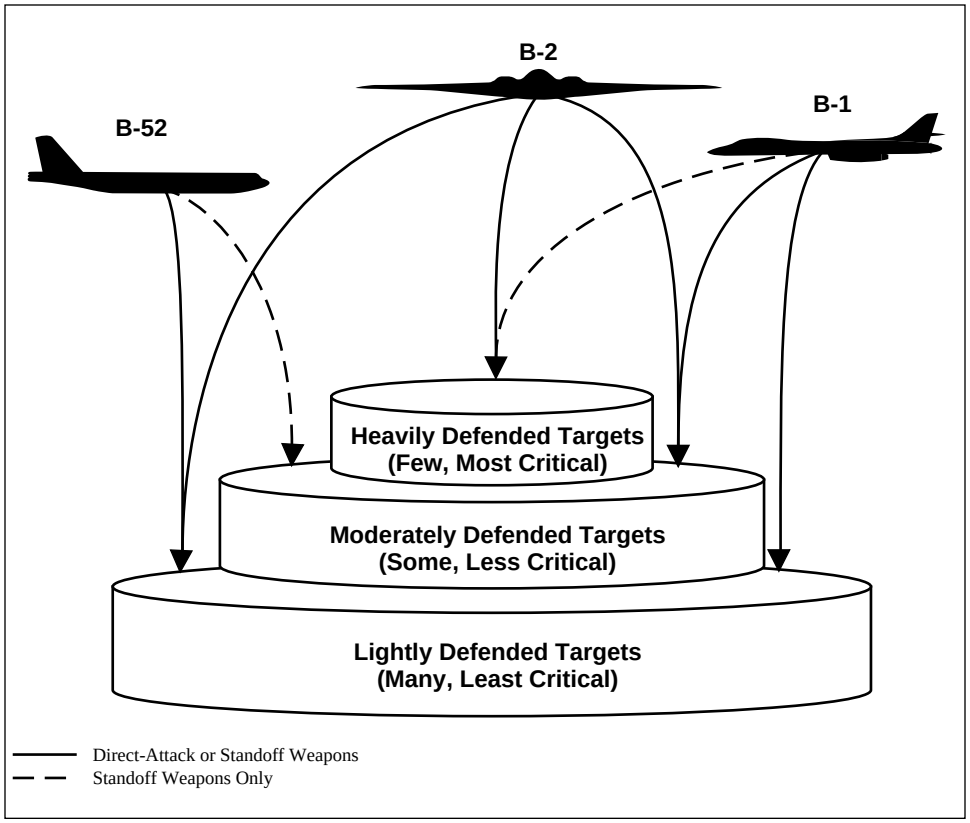
Air Force's Conventional Concept of Operations for Bombers

According to the Air Force Bomber Roadmap, bombers will provide the majority of the firepower during the initial and sustained operations phases of major regional conflicts. From bases in the United States, the Air Force expects the bombers to fly long duration, round-trip missions of up to 36 hours to make initial attacks within 24 hours of being tasked. Within a few days of the start of a conventional conflict, bombers will be expected to deploy to forward locations for sustained operations, flying shorter and more frequent missions. The goal of the bomber missions will be to halt invading enemy armored forces and disrupt the enemy's ability to wage war by attacking time-critical targets quickly, using a combination of direct attack and standoff munitions. Some bombers deployed to a major regional conflict will be expected to swing to a second regional conflict if needed.

Each bomber will play a different role in a major regional conflict. The Air Force envisions the B-2 as the leading edge of the initial response to conflict because of its projected stealthiness and weapons delivery precision. The B-2 will be expected to fly into heavily defended areas to attack highly valued targets as well as enemy ground troops. The Air Force will assign both standoff and penetrating missions to the B-1B in medium-to-high threat environments and will expect the B-1B to destroy the bulk of the defended, time-critical targets early in the conflict using direct attack and standoff munitions. The B-52H will be primarily a standoff bomber in the early phases of conflict, using precision-guided munitions such as conventional air-launched cruise missiles, and will provide massive firepower by directly attacking targets in low- to medium-threat environments using munitions such as the Joint Direct Attack Munition.[1] Figure 1.2 shows the Air Force's planned employment of the bombers.

[1]The "Joint Direct Attack Munition" is a 2,000-pound MK-84 unitary warhead bomb modified with a kit that includes steerable fins, a global positioning system receiver, and an intertial navigation system to increase the range and accuracy of the weapon.

Figure 1.2: Planned Bomber Employment Based on Threat



Source: Department of the Air Force.

Additional Investment in Bombers Spurred by Bomber Concept of Operations

In addition to defining the new concept of operations for bombers, the Air Force's 1992 Bomber Roadmap established an investment strategy to enhance the conventional capabilities of the bombers. The study recognized that all three bombers currently have limited conventional capabilities, the B-1B defensive avionics system needs to be upgraded, and the B-2 and B-1B bombers lack sufficient mobility readiness spares packages to meet wartime requirements. The 1992 Bomber Roadmap estimated B-1B and B-52H upgrades would cost about $3 billion. The costs to integrate conventional munitions on the B-2 are included in the B-2 program cost. In 1993, we concluded that B1-B upgrade costs were underestimated by billions of dollars because they did not include costs to fix B-1B operational problems, acquire an effective B-1B defensive avionics system, and acquire adequate mobility readiness spares packages.[2]

[2]Strategic Bombers: Adding Conventional Capabilities Will Be Complex, Time-Consuming, and Costly (GAO/NSIAD-93-45, Feb. 5, 1993).

B-2 modifications involve integrating conventional munitions on the aircraft and developing a deployable mission planning system to accommodate rapid changes in scenarios and mission routes. The block 10 B-2, currently in the Air Force's inventory, can carry only gravity bombs, but after all modifications are complete, it will be able to carry additional gravity weapons and some advanced munitions.

The B-1B currently can drop only gravity weapons and, because of problems with its defensive avionics system, would be limited to low-threat environments. The Roadmap's B-1B Conventional Munitions Upgrade Program addresses these shortfalls in a phased approach. By 1997, the aircraft will be certified to use a family of cluster munitions, but its capability to employ advanced direct attack and standoff precision munitions will not be available until after 2000. Also, the defensive avionics system upgrade will not be completed until well into the next decade.

The B-52H requires the least amount of funding to upgrade its conventional capabilities and is and will continue to be the most versatile bomber in the fleet. It is the only standoff bomber in the inventory today, and in the future, still will carry more types of weapons than either the B-1B or the B-2. Appendix I includes a description of the munitions planned for the bombers. Table 1.2 shows the current and future munitions carrying capabilities of the three bombers.

Table 1.2: Bomber Capability to Carry Conventional Munitions

	B-52H		B-1B		B-2	
Munition	**Current**	**Future**	**Current**	**Future**	**Current**	**Future**
Gravity Bombs (unguided)	X	X	X	X	X	X
Cluster Bombs (unguided)	X	X	X	X		X
Sea Mines	X	X		X		X
HAVE NAP	X	X				
CALCM	X	X				
Harpoon		X				
JDAM		X		X		X
WCMD		X		X		
JSOW				X		
JASSM		X		X		X

Source: Our analyses based on Air Force data.

Objectives, Scope, and Methodology

The Chairman of the House Budget Committee requested that we evaluate the basis for DOD's bomber force structure requirements, assess Air Force's progress to implement its new conventional concept of operations for using bombers, and determine the cost to keep the bombers in the force and enhance their conventional capabilities. As part of this review, we also identified and assessed the potential cost savings and effects on military capability of four alternatives for reducing bomber costs, including retiring or reducing the B-1B force, as well as the need for procuring additional B-2s if the B-1B force is reduced or retired.

To assess the basis for the number of bombers in DOD's planned force structure, we reviewed documents supporting the four major DOD bomber requirements studies. We discussed major study assumptions with Joint Chiefs of Staff, Office of the Secretary of Defense, Air Force, and Institute for Defense Analysis (IDA) officials to understand the significance to the study conclusions. We compared the assumptions with current defense guidance, the new bomber concept of operations, and information obtained from war-fighting commanders in chief (CINC) concerning their plans for bomber operations. Also, we assessed bomber contributions to two major regional conflicts by analyzing (1) DOD's database used in the Capabilities Based Munitions Requirements development process and (2) the results of Air Force modeling of recent DOD wargaming of the two major regional conflict scenario. In evaluating the number of bombers required for the nuclear mission, we discussed the nuclear force structure options and major study assumptions included in the Nuclear Posture Review with Office of the Secretary of Defense, U.S. Strategic Command officials, and Air Force officials.

To assess Air Force progress in implementing the concept of operations for bombers, we evaluated Air Force documents on a range of factors that are critical to effective implementation of the concept, such as the sufficiency of mobility readiness spares packages and bomber staffing levels, the operational readiness of the bombers, and technical challenges to modify the bombers for the conventional mission. We also reviewed our prior reports and those of DOD and others addressing these factors, and we discussed them with CINC staff, Air Force headquarters, Air Combat Command, and bomber unit officials to understand their significance.

To determine the cost to keep the bombers in the force and modify them, we obtained and analyzed investment and operational and support costs related to the bomber force from DOD's Fiscal Year 1997 Future Years Defense Program (FYDP). We obtained and analyzed Air Force documents

on the cost to modernize the bombers beyond the FYDP. We compared these costs with those reported in the 1995 DOD Heavy Bomber Force Study to identify any significant differences.

On the basis of our assessment of DOD's bomber requirements and force structure plans, we developed four alternatives to the planned B-1B bomber force structure and assessed the costs and risks associated with each one. In identifying options for smaller bomber forces, we limited our analysis to B-1B alternatives because the B-1B will play no role in the nuclear mission and therefore seems a more logical candidate for downsizing than either the B-52 or the B-2. Also, we examined placing 24 more B-1Bs in the Air National Guard because this would result in a 50/50 active/reserve ratio and the Air Force has placed 50 percent or more of some refueling and air mobility assets in the reserve component. We asked the Congressional Budget Office to estimate the budgetary savings of the alternatives and discussed the risks associated with the alternatives with Office of the Secretary of Defense, U.S. Strategic Command, and Air Force officials.

Because DOD and the Congress have considered the need for additional B-2s beyond the planned force in recent years and our options to retire or reduce the B-1B force may raise further questions about the need for additional B-2s, we assessed their need in light of the estimated cost of more B-2s and DOD's aggregate conventional and nuclear war-fighting capabilities. We reviewed and compared cost estimates for 20 additional B-2s developed by DOD, the B-2 contractor, the Congressional Budget Office, and IDA. To assess the impact of more B-2s on DOD's conventional war-fighting capabilities, we reviewed studies by IDA, the Congressional Budget Office, and several private organizations and compared their methodologies and key assumptions. We also assessed the contributions of B-2s by analyzing the types and number of targets assigned to B-2s in DOD's 1995 Heavy Bomber Force Study and DOD's Capabilities Based Munitions Requirements development process. To assess the impact of more B-2s on DOD's nuclear force, we discussed the need for additional B-2s with U.S. Strategic Command officials and obtained their assessment of how additional B-2s would affect compliance with nuclear warhead carrying capability limits included in the START II.

We performed our review at the Office of the Secretary of Defense; Joint Chiefs of Staff; Air Force Headquarters; the National Guard Bureau; IDA; the United States Central Command; the Central Command Air Forces; the U.S. Pacific Command; the U.S. European Command; the U. S. Strategic

Command; the Air Combat Command; the 2nd Bomb Wing, Barksdale Air Force Base, Louisiana; the 28th Bomb Wing, Ellsworth Air Force Base, South Dakota; and the 509th Bomb Wing, Whiteman Air Force Base, Missouri.

We conducted this review from November 1994 through May 1996 in accordance with generally accepted government auditing standards.

DOD Has Not Adequately Supported Stated Requirements for Bombers

DOD has not demonstrated convincingly that it needs to retain 187 bombers to meet war-fighting requirements. According to a major DOD study of nuclear requirements completed in 1994, only about 45 percent of DOD's planned bomber force—66 B-52s and 20 B-2s—will be needed for the nuclear role. DOD's decision to maintain an overall force of 187 bombers was shaped largely by three key DOD and Air Force studies—the BUR, the 1995 Heavy Bomber Force Study, and the Air Force Bomber Roadmap. None of the studies fully addresses the Commission on Roles and Missions concern that DOD may have more ground-attack capability than it needs or assesses whether other less costly alternatives exist to accomplish missions that would likely be assigned to bombers. Moreover, in concluding that DOD would need up to 100 bombers for a major regional conflict, the three studies assume that CINCs will use significantly more bombers in future conflicts. In addition, the Air Force's principal study of bomber requirements—the Bomber Roadmap—appears to have overstated bomber requirements by assuming that a significant portion of the bomber force will need to be reserved solely for nuclear missions, although DOD has taken bombers off nuclear alert and considers all bombers to be available for conventional operations.

Our analysis shows that DOD has extensive, overlapping capabilities to conduct ground attack. While DOD needs a level of redundancy and overlap to provide CINCs with a safety margin and flexibility, it may not need to upgrade its capabilities to the extent currently planned. Despite recent downsizing, the services continue to operate about 5,900 advanced fixed-wing combat aircraft and helicopters, as well as other advanced airpower assets that will be used to attack the same types of targets as bombers during conventional conflicts. Although bombers are unique in that they carry large quantities of munitions over long distances, they do not provide a unique contribution to destroy most types of targets they would likely be assigned. In response to a finding by the congressionally chartered Commission on Roles and Missions of the Armed Forces that DOD may have more ground attack capability than it needs, DOD is reassessing its requirements for ground attack assets, including bombers, across the services.[1]

[1]U.S. Combat Air Power: Reassessing Plans to Modernize Interdiction Capabilities Could Save Billions (GAO/NSIAD-96-72, May 13, 1996).

Nuclear Mission Will Require Less Than Half of DOD's Planned Bomber Force

In 1994, DOD conducted the Nuclear Posture Review, the first such review in 15 years, to determine the number of bombers needed for the nuclear mission assuming that START I and II agreements would be implemented by 2003. The review concluded that the United States should retain 66 B-52Hs and no more than 20 B-2s for the bomber leg of the nuclear triad after analyzing several combinations of ballistic missile submarines, intercontinental ballistic missiles, and bombers that, together, could carry 3,500 warheads stipulated as the maximum allowable warhead carrying capability in START II. DOD tentatively plans to allocate 1,320 of these warheads to the bomber force. The review also concluded that B-1Bs were not needed for the nuclear role, and according to DOD officials, did not specify that any bombers be dedicated solely to the nuclear mission.

In mid-1995, DOD determined that it would reduce its B-52H force from 94 to 66 and limit the number of B-2s to 20, consistent with the results of the Nuclear Posture Review. However, DOD subsequently decided to maintain 71 B-52Hs and convert the first B-2 test aircraft to an operational aircraft for a total of 21 B-2s. Although DOD plans to retain a larger number of B-52Hs and B-2s than previously planned, the decision to retain more aircraft was not prompted by a need for a larger nuclear force structure. According to Air Force officials, the Air Force decided to increase the B-52H force to provide a larger attrition reserve force to hedge against potential future losses of B-52Hs. Moreover, the 21st B-2 is being procured because the Congress made available an additional $493 million in fiscal year 1996 for the B-2 program. Although they may not be needed for the nuclear mission, the carrying capability of these additional aircraft will count toward the START II limits. In order to stay within treaty limits if the treaty is ratified, the Air Force plans to modify some B-52Hs so that they can carry fewer than their maximum capability of 20 warheads.

Studies' Limitations May Have Caused DOD to Overstate Bomber Requirements

Although none of the studies (BUR, the Air Force Bomber Roadmap, and the 1995 Heavy Bomber Force Study) concluded specifically that DOD should maintain 187 bombers, taken together, they played a major role in DOD's decision to keep 187 bombers in the force and modify them for the conventional role. However, all three studies have significant limitations that may overstate DOD's need for bombers. For example, none of the studies assessed the cost-effectiveness of bombers compared with that of other deep attack assets (such as tactical fighter aircraft and missiles) in DOD's inventory. In addition, BUR did not adequately consider the potential contributions of precision-guided weapons and new weapon systems in development. Moreover, the Bomber Roadmap used some questionable

assumptions. For example, it assumed that (1) bombers would be the only assets available during the initial days of a conflict to attack time-critical targets and (2) a significant number of bombers would need to be dedicated solely to nuclear missions. In concluding that about 100 bombers would be needed for the first major regional conflict, all three studies assumed that CINCs would use significantly more bombers than they plan to use today and deploy them earlier in future conflicts. However, this assumption appears questionable because DOD currently categorizes its ability to execute the two major regional conflict strategy as adequate and our analysis of DOD data shows that the threat is not expected to increase significantly within the next decade.

BUR Requirement Based on Limited Analysis

BUR, completed in 1993, concluded that 100 bombers would be adequate for a major regional conflict and that some of these bombers would shift to a second conflict if needed. BUR further concluded that a total inventory of up to 184 bombers was needed to meet nuclear and conventional requirements. Joint Chiefs of Staff and Office of the Secretary of Defense officials told us that BUR's conclusion that 100 bombers would be adequate for a major regional conflict was based on several factors—including the number of bombers used in Desert Storm and military judgment. However, DOD did not conduct detailed analysis or modeling to determine how a range of alternative bomber forces would fare in the context of two nearly simultaneous major regional conflicts. Moreover, DOD did not examine the cost-effectiveness of using bombers to destroy ground targets compared with the cost-effectiveness of using other deep-attack assets.

In 1995, we reported on BUR's methodology and concluded that DOD had not fully analyzed key BUR assumptions about the availability of forces, supporting capabilities, and force enhancements needed to execute the two major regional conflict strategy.[2] BUR assumed that some specialized assets such as bombers would swing to a second major regional conflict, but as noted in our prior report, DOD did not analyze the specific types and numbers of assets that would swing, the timing of the swing, or logistical requirements. Also, BUR projected force requirements only to the 1999 time frame, prior to the completion of bomber modifications and the fielding of many new precision weapons (such as the Joint Direct Attack Munition and Joint Standoff Weapon) that should greatly improve fighter and bomber effectiveness and potentially reduce the number of bombers and fighters needed to fight two major regional conflicts.

[2]Bottom-Up Review: Analysis of Key DOD Assumptions (GAO/NSIAD-95-56, Jan. 31, 1995).

Bomber Requirements Asserted by the Air Force Bomber Roadmap Based on Questionable Assumptions

The Air Force Bomber Roadmap—first published in 1992 and updated in 1995—established the Air Force's conventional concept of operations for bombers to provide initial attacks and sustained firepower for major regional conflicts and identified and set into a motion a bomber modernization plan to upgrade the bombers' conventional capabilities. The Roadmap established a requirement for 210 bombers, 23 more than DOD plans to retain in the force, through 2004 as shown in table 2.1.

Table 2.1: Air Force Bomber Roadmap Requirements

Operational bombers[a]	
Available to deploy to major regional conflict	100
Dedicated nuclear withhold[b]	66
Trainers	24
Total operational bombers	**190**
Backup and test bombers	**20**
Total bomber requirement	**210**

[a]"Operational bombers" are those funded for flying. The Air Force refers to these aircraft as primary authorized inventory and includes bombers that are combat-capable and designated for training.

[b]Bombers held in reserve for the nuclear mission and unavailable for conventional missions.

Source: Air Combat Command Bomber Roadmap, January 1995.

DOD has decided to keep only 187 bombers in the force because it considers other programs that compete with bombers for the Air Force's share of projected budgets to be higher priority. However, in 1995, the Commander of the Air Combat Command, who is responsible for developing the Roadmap, testified that, on the basis of the Air Force's analysis, he believed DOD's planned force may be too small.

Our analysis of the Bomber Roadmap showed that it may overstate requirements because it included three questionable assumptions. First, the Air Force accepted the BUR's conclusion that 100 deployable bombers would be needed for a major regional conflict without conducting detailed modeling to validate this number. Second, the Air Force identified a requirement to dedicate 66 bombers for the nuclear mission even though DOD has removed bombers from nuclear alert and considers all bombers available for conventional missions. Third, the Air Force assumed that only bombers would be available to strike a notional set of over 1,250 time-critical target elements (aim points for about 240 targets) based on the military's experience in Desert Storm. The Roadmap analysis showed that the current bomber force could strike only about 24 percent of the

time-critical target elements in the first days, but, in 2001, upgraded bombers will be able to strike all of the target elements.

With respect to the third issue, the Air Force did not take into account the contributions of other deep attack assets (such as Air Force and Navy tactical fighters and missiles) that could attack some of these same targets. We pointed out this shortcoming in our 1993 report on DOD's bomber modernization plan.[3] In response to our report, DOD responded that the Bomber Roadmap was not a coordinated DOD-wide effort, but an Air Force plan for equipping bombers. The 1995 updated Roadmap again did not address this shortcoming, even though current DOD planning guidance assumes that Air Force and Navy tactical aircraft would arrive early enough in theater to attack targets during the halt phase of a major regional conflict.

DOD's 1995 Heavy Bomber Force Study Did Not Compare Bombers With Other Deep Attack Assets

The National Defense Authorization Act for Fiscal Year 1995 and the DOD Appropriations Act of 1995 required DOD to study bomber requirements and provide an independent cost-effectiveness analysis of Air Force bomber programs. The overall objective of the study was to assess bomber force requirements (on the basis of Defense Planning Guidance) for two nearly simultaneous major regional conflicts in 1998, 2006, and 2014, and to analyze the cost-effectiveness of alternative Air Force bomber forces in achieving U.S. military objectives. DOD contracted with IDA, a Federally Funded Research and Development Center, for the study. IDA used DOD's then-projected force structure of 182 bombers, Defense Planning Guidance scenarios, and DOD planning factors for force deployments, and weapons inventories for each of the 3 years as its baseline case to analyze and compare the cost-effectiveness alternative bomber forces. The study also analyzed excursions from the Defense Planning Guidance, including shorter warning times, delayed arrival times for U.S. forces, fewer available tactical aircraft, and improved enemy threats.

To assess the cost-effectiveness of alternative bomber force mixes, IDA modeled five bomber force structures ranging from a small force of 115 bombers to a large force of 210 as shown in table 2.2. The number of bombers shown is the total aircraft inventory. The actual number of bombers that DOD assumed would deploy for each alternative in the study is classified but is less than the total inventory.

[3]Strategic Bombers: Adding Conventional Capabilities Will Be Complex, Time-Consuming, and Costly (GAO/NSIAD-93-45, Feb. 5, 1993).

Table 2.2: Bomber Force Structure Alternatives Assessed in the Heavy Bomber Force Study

	Number of bombers			
Bomber force structures analyzed	**B-52Hs**	**B-1Bs**	**B-2s**	**Total**
Planned force	66	95	21	**182**
Increase B-52Hs	94	95	21	**210**
Retire B-1Bs	94	0	21	**115**
Buy 20 B-2s, retire B-1Bs	94	0	41	**135**
Buy 20 B-2s for planned force	66	95	41	**202**

Source: DOD's Heavy Bomber Force Study.

On the basis of the results of IDA's analysis, DOD concluded that (1) the planned bomber force can meet the national security requirements of two nearly simultaneous major regional conflicts for anticipated scenarios and reasonable excursions and (2) planned conventional mission upgrades to the B-1B force are more cost-effective than procuring additional B-2s. IDA's analysis showed that the United States would win two nearly simultaneous major regional conflicts for all the options modeled. However, the study concluded that DOD's planned force of 182 bombers was more cost-effective than other options, including the two smaller bomber forces modeled.

While the Heavy Bomber Force Study is the most comprehensive of the DOD and Air Force studies to date, it has one key shortcoming. Like the other studies discussed, this study did not examine whether tactical fighters or long-range missiles could accomplish the mission more cost-effectively than bombers. Bomber force structure size varied for each of the options, whereas other deep attack forces such as tactical fighters remained constant.

Unified Commanders Plan to Use Fewer Bombers Than Suggested by Studies

Although the three major studies of bomber requirements concluded that military commanders would need about 100 bombers for a major regional conflict, the CINCs currently plan to use far fewer than 100 bombers to implement their war plans. The number of bombers included in the CINCs' current war plans may be smaller than DOD envisions in part because DOD has fewer bombers in its inventory today that are funded for combat operations and because the B-1Bs currently have limited conventional capabilities. Once the bombers are upgraded, the CINCs might choose to include more bombers in their plans than they would today. However, none of the CINCs' representatives we spoke with expressed concern that

the smaller number of bombers in DOD's current inventory was a limiting factor that would adversely affect the outcome of a campaign.

Additionally, one CINC's current war plan would not require bombers to deploy as early as envisioned by DOD and Air Force studies. How quick bombers deploy to forward operating locations would depend on the CINCs' priority for airlift. In 1995, the Congressional Budget Office pointed out in its analysis of bomber force options that, even in a conflict with little warning, it is unlikely that CINCs would divert airlift to forward deploy bombers in lieu of other forces.[4] The CINCs would likely use available airlift to rush more flexible tactical aircraft and ground forces to the theater while using bombers for operations from bases within the United States at reduced sortie generation rates.

Services Have Numerous Ways to Attack Ground Targets

The services have numerous, overlapping ways to attack ground targets in major regional conflicts and have concluded that they have enough capability to carry out the national military strategy. CINCs plan for redundant target coverage when assigning targets to the services and often have many ways to attack targets using various combinations of weapons and platforms. Moreover, planned enhancements will increase DOD's capabilities substantially over the next several years, particularly its capabilities to attack ground targets. DOD has numerous other ways to attack targets that would likely be assigned to bombers in conventional operations.

Although DOD has reduced its total combat aircraft by almost 30 percent since the Persian Gulf War, the military services continue to operate over 5,900 fighter and attack aircraft and helicopters. Aircraft are increasingly being supplemented by other advanced combat airpower assets,[5] such as long-range cruise missiles, unmanned aerial vehicles, and theater air defense forces. Many of these assets will be used to interdict enemy ground targets—one of the principal missions for which bombers are being maintained and upgraded. Table 2.3 identifies other airpower assets that are assigned the interdiction mission.

[4]CBO Papers: Options for Enhancing the Bomber Force (July 1995).

[5]This includes not only fixed-wing aircraft, but also attack helicopters, long-range cruise missiles, unmanned aerial vehicles, and other assets that provide the United States the ability to maintain air superiority and to project power worldwide through the air.

Table 2.3: Other DOD Assets Used to Interdict Enemy Ground Targets

Airpower assets by service	1996 Inventory
Air Force	
F-16C/D Fighting Falcon	1,450
F-15E Strike Eagle	203
F-117A Stealth Fighter	54
A/OA-10 Thunderbolt II	369
Navy/Marine Corps	
F/A-18 Hornet	806
F-14 Tomcat	323
AV-8B Harrier	184
A-6 Intruder	63
AH-1W Cobra	176
Tomahawk	2,339
Army	
AH-64 Apache	798
Cobra/Kiowa Warrior	758
ATACMS	1,456

Source: Departments of the Army, Navy, and Air Force.

We reviewed DOD's plans to modernize its numerous combat airpower assets and concluded that some of DOD's airpower modernization programs will add only marginally to the already formidable capabilities and some should be reconsidered from a joint perspective.[6] We concluded that, although some redundancy is needed to provide the CINCs with operational flexibility, DOD may have more than ample capability to perform such missions. In May 1995, the congressionally mandated Commission on Roles and Missions of the Armed Forces also concluded that DOD may have greater quantities of strike aircraft and other deep attack weapons than it needs.[7]

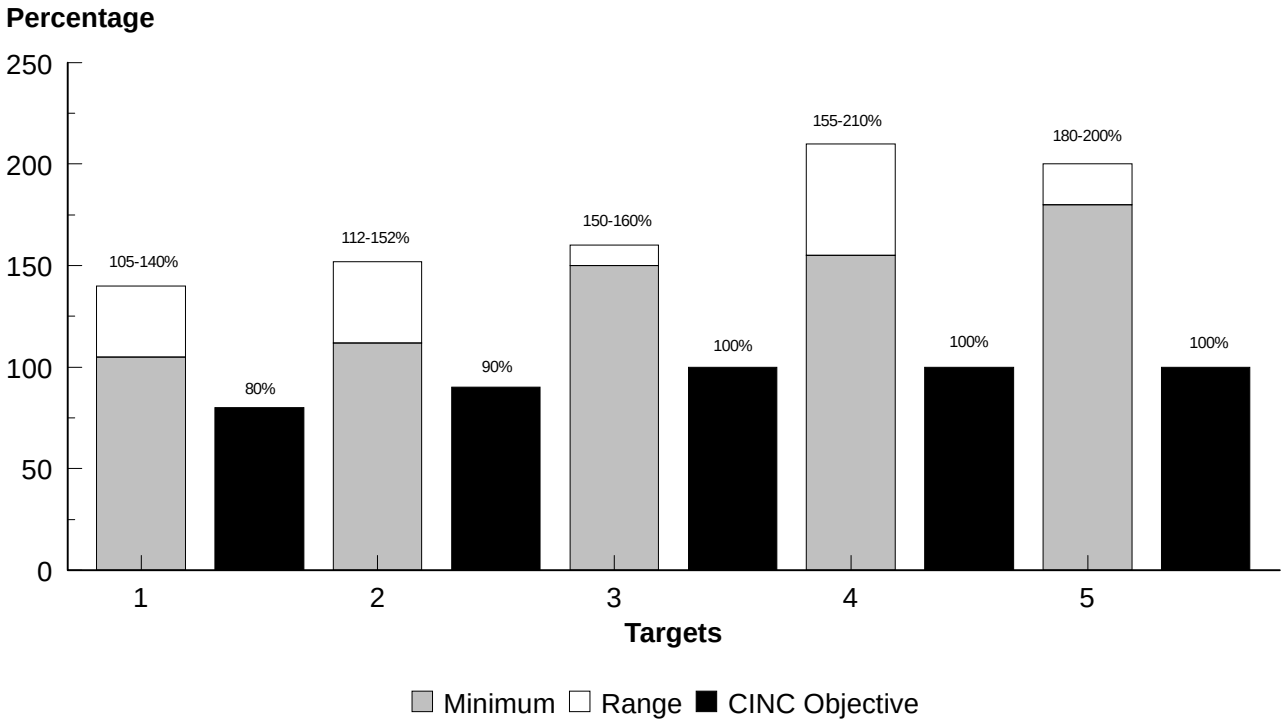
CINCs routinely apportion more than 100 percent of the targets to the services to provide a safety margin and ensure flexibility. For example, we previously reported that one CINC assigned the Army 5 to 10 percent, the Navy 20 to 30 percent, the Marines 15 to 25 percent, and the Air Force 65 to 75 percent of one target type—a total apportioned range of 105 to

[6]Combat Air Power: Joint Mission Assessments Needed Before Making Program and Budget Decisions (GAO/T-NSIAD-96-196, June 27, 1996).

[7]Directions for Defense, Report of the Commission on Roles and Missions of the Armed Forces (Washington, D.C.: GPO, May 24, 1995).

140-percent coverage—even though the CINC's objective was to destroy only 80 percent of the target quantity. Therefore, even if the services can achieve only the low end of the total apportioned range (105-percent coverage), the 80-percent destruction goal will be met. This over-apportionment creates a margin of safety and allows flexibility to ensure targets will be hit even if some expected capabilities are not available. However, it also establishes the expectation that the services will acquire and maintain sufficient forces to provide this level of target coverage. Figure 2.1 shows the CINC's total apportionment of targets to the services compared with the CINC's destruction objective for selected targets identified for one major regional conflict. (Providing specific target names would require the figure to be classified.)

Figure 2.1: CINC's Total Apportioned Percentages for Selected Targets in One Major Regional Conflict



Source: Our analysis of DOD data.

Our analysis of DOD's Capabilities Based Munitions Requirements database for two major regional conflicts in 2002 shows that the services have numerous ways to strike ground targets that may be assigned to bombers. This database consists of Defense Intelligence Agency ground target data for the two major regional conflict scenario, and in conjunction with CINC allocations of targets to the services, is used in DOD's computation of munition requirements. It includes both strategic and interdiction targets, which are the bombers' principal targets. Strategic targets are those vital to the enemy's war-making capacity and may include manufacturing systems, communications facilities, and concentrated enemy armed forces. Interdiction targets are those ground targets generally beyond the close battle and commanders interdict these targets to divert, disrupt, or destroy them before they can effectively be used against friendly forces.

We analyzed strategic and interdiction targets assigned to the Air Force to determine whether there were any bomber-unique target types (considering all Air Force aircraft but excluding other services' assets that may also be assigned to hit the same types of targets as bombers). We found three bomber-unique targets in the first conflict and eight in the second conflict as shown in table 2.4. The B-2 and B-1B unique targets types were strategic targets. Most of the B-52H unique target types also were strategic targets.

Table 2.4: Number of Target Types Assigned to Bombers and Number of These Targets Also Assigned to Other Air Force Aircraft in 2002

	Major regional conflict 1			Major regional conflict 2		
Bomber type	Number of target types assigned to bombers	Number of these target types assigned to other Air Force aircraft	Number of bomber-unique target types	Number of target types assigned to bombers	Number of these target types assigned to other Air Force aircraft	Number of bomber-unique target types
B-2	15	15	0	9	7	2
B-1B	11	10	1	11	11	0
B-52H	11	9	2	21	15	6

Source: Our analysis of DOD's Capabilities Based Munitions Requirements database.

However, when considering all of the services' ground attack assets, Air Force modeling of the two major regional conflict scenario showed that there were no unique bomber target types.

DOD Is Assessing Deep Attack Requirements for All Services

In response to a May 1995 recommendation from the Commission on the Roles and Missions,[8] DOD initiated a Deep Attack Weapons Mix Study to assess deep attack requirements across the services. The Commission recommended that DOD conduct a DOD-wide cost-effectiveness study to determine the appropriate number and mix of deep attack capabilities currently fielded and under development by all services.

The President of the United States has directed that the study examine trade-offs between long-range bombers, land- and sea-based tactical aircraft, and missiles that are used to strike the enemy's rear. The President also directed that it focus on the potential that the growing inventory and the increasing capabilities of weapons could allow some consolidation of the ships, aircraft, and missiles that will deliver them. The first part of the study, to be completed in late 1996, will analyze weapons mix requirements for DOD's planned force in 1998, 2006, and 2014 and determine the impact of force structure changes on the weapons mix. The second part of the study will analyze trade-offs among elements of the force structure, such as bombers and tactical aircraft, for the same years and is to be completed in early 1997.

In May 1996, we recommended that DOD should routinely review service modernization proposals based on how they will enhance DOD's current aggregate capabilities and that such analyses should serve as the basis for deciding funding priorities.[9] Moreover, in a recent testimony, we concluded that such assessments should (1) assess total joint war-fighting requirements; (2) inventory aggregate service capabilities, including the full range of available assets; (3) compare aggregate capabilities to joint requirements to identify excesses or deficiencies; (4) assess the relative merits of retiring alternative assets, reducing procurement quantities, or canceling acquisition programs where excesses exist or where substantial payoff is not clear; and (5) determine the most cost-effective means to satisfy deficiencies.[10]

Conclusions

DOD has not made a compelling case that it needs to maintain and upgrade 187 bombers in light of the services' already extensive and overlapping

[8]The Commission was authorized in the National Defense Authorization Act for Fiscal Year 1994 (P.L. 103-160, Nov. 30, 1993).

[9]U.S. Combat Air Power: Reassessing Plans to Modernize Interdiction Capabilities Could Save Billions (GAO/NSIAD-96-72, May 13, 1996).

[10]Combat Air Power: Joint Mission Assessments Needed Before Making Program and Budget Decisions (GAO/T-NSIAD-96-196, June 27, 1996).

capabilities to attack ground targets. Because the studies do not adequately consider the potential that DOD may need to reduce its overall ground attack capabilities and other airpower assets may be more cost-effective in providing ground attack than bombers, they do not provide a sound basis for DOD's conclusion that it needs 187 bombers. Once the bombers are upgraded, their contribution to conventional conflicts may be smaller than assumed by the studies if the CINCs maintain their plans to use fewer than 100 bombers for a major regional conflict and do not place higher priority on airlifting bombers to forward operating locations.

DOD's Deep Attack Weapons Mix Study will provide DOD with an opportunity to address the methodological shortcomings of its prior studies and identify options to reduce some of its extensive ground attack capabilities, including bombers. The success of this study depends on how well DOD components will be able to work together to produce an objective analysis of DOD's airpower and weapons requirements that results in a force that is both adequate and affordable within the context of projected DOD budgets.

Significant Challenges Remain to Implement Air Force's Operational Concept for Bombers

The Air Force faces significant challenges in implementing its conventional concept of operations for bombers established by the Bomber Roadmap. The Air Force's ability to implement the concept depends on its ability to successfully complete its bomber modernization program, achieve and maintain an acceptable mission capable rate,[1] and ensure that the bombers can sustain operations from forward operating locations. The B-2 has not demonstrated that it can meet some of its most important conventional mission requirements, and most B-1B modernization programs will not be completed until about 2006. The B-1B, which is expected to be the backbone of the conventional bomber force, has experienced difficulty in maintaining acceptable mission capable rates. Moreover, demonstrating the capability to operate at overseas locations poses a significant challenge for the B-2 and the B-1B, both of which were originally designed with limited conventional capabilities and deployment requirements. For example, limited mobility readiness spares packages for the B-2 and B-1B and shortages in some military occupations for the B-1B and B-52H may hinder the deployment and sustainability of these bombers.

Bomber Modernization Efforts Face Technical and Schedule Challenges

The Bomber Roadmap established a plan to upgrade the conventional capabilities of the bombers to enable them to deliver (1) additional types of unguided munitions currently in DOD's inventory and (2) new high-altitude, all-weather precision munitions that DOD is developing for the bomber force and Air Force and Navy tactical aircraft. The plan also provides for defensive system upgrades for better protection against enemy air defense systems for the B-1B and new radios for all bombers to allow them to better communicate in the tactical environment. The B-52H modification program is almost completed. However, the B-2 and B-1B programs will not be completed until about 2000 and 2008, respectively. The Air Force faces significant technical challenges in completing the 21 B-2s authorized by the Congress, modernizing the B-1B, and demonstrating that they will meet operational requirements.

B-2 Has Not Demonstrated That It Can Meet Some Important Mission Requirements

The B-2's principal mission changed from nuclear to conventional in late 1992 when the Air Force decided to incorporate precision-guided munitions on the bomber. Its operational requirements specify that the B-2 weapon system have low observable characteristics and sufficient range and payload to deliver nuclear or conventional weapons anywhere in the

[1]The "mission capable rate" is the percentage of time the bombers are available for missions. The Air Force considers a bomber to be mission capable if it can perform at least one of its assigned peacetime or wartime missions.

world requiring the blending of conventional and state-of-the-art technologies. This blending of aircraft technologies make the B-2 a complex and costly aircraft to develop and produce. In 1987, the Air Force gained approval to procure the B-2 concurrently with development and testing. The Air Force is accepting the B-2 in three configuration blocks with each new block acquiring additional capabilities that must be demonstrated in flight testing.

The first B-2 deliveries are block 10 configurations for which flight testing has been completed. The block 10 configuration provides the Air Force with a training aircraft with limited combat capability. The block 20 configuration will include an interim precision strike capability not available in the block 10, and the block 30 B-2 will have additional precision strike capability. By 2000, the Air Force plans to have 21 block 30 B-2s.

Since 1990, we have issued several unclassified reports on the Air Force's progress and problems in fielding the B-2. In August 1995, we reported that the Air Force had not yet demonstrated that the B-2 could meet some of its important mission requirements and that the contractor had experienced difficulties in delivering B-2s that meet operational requirements.[2] The report noted that B-2s were generally delivered late with significant deviations and waivers, but that the Air Force plans to correct all deficiencies as the aircraft undergo block modifications. Also, we found that flight testing has been slower than planned and that the Air Force's projections for completing testing were optimistic. We estimated that the Air Force may need an additional 55 aircraft test months to complete the planned flight testing.[3] As of April 1996, the Air Force had completed 75 percent of the flight testing; it plans to complete flight testing by July 1, 1997. However, given the amount of flight testing that remains, the Air Force may not be able to meet this completion date. The Air Force has reduced the amount of flight testing planned and is assessing further reductions in order to meet the planned completion date.

Early test results have identified potential problems in the B-2's ability to meet some important mission requirements. For example, achieving acceptable radar signatures, the most critical stealth feature needed for B-2 operational effectiveness, has been a problem. This problem resulted in the redesign and retesting of the test aircraft, and in redefinition of

[2]B-2 Bomber: Status of Cost, Development, and Production (GAO/NSIAD-95-164, Aug. 4, 1995).

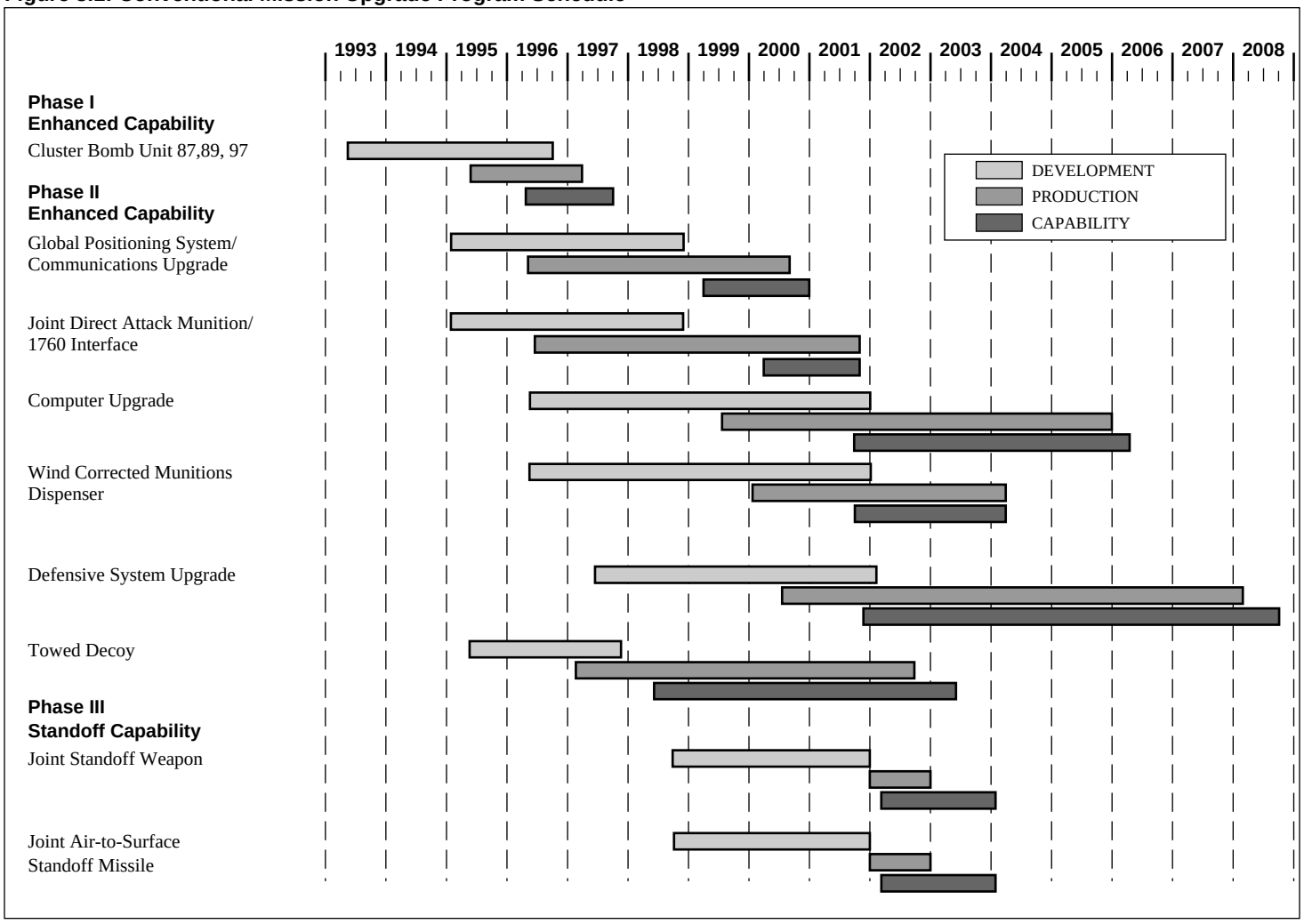
[3]An "aircraft test month" is the availability of one test aircraft for 1 month and equates to about 20 flight test hours.

acceptable radar signatures for the block 10 configuration. Subsequently, the Air Force completed radar signature flight testing for the block 30 B-2 in March 1996, and characterized test results as generally meeting predictions. However, in some cases the radar signatures did not meet planned essential employment capabilities. The Air Force is analyzing the signatures that did not meet requirements to determine whether further design and testing is needed. Also, testing revealed problems with the software and radar system for the terrain-following and terrain-avoidance system needed for low-level flight. Additional problems may be found as the concurrent testing and manufacturing proceed, potentially resulting in the delivery of B-2s with limited operational capability or the need for modifications beyond the block 30 configuration, which would require additional funds to correct.

Most B-1B Conventional Upgrades Not Completed Until 2006 and Defensive Avionics Upgrades Not Fully Defined

The B-1B has had a history of problems and was fielded with some unproven systems that did not meet user requirements including the weapon, defensive avionics, and terrain-following systems. DOD has embarked on a three-phase Conventional Munitions Upgrade Program for the B-1B that will incrementally equip it with advanced precision-guided munitions and upgraded computer and defensive avionics systems. Phase I will equip the bomber with three types of the most modern family of cluster munitions, including the combined effects munition to attack soft area targets, mines to attack armor and personnel, and sensor-fuzed weapons to attack armor. Phase II will add global positioning system technology; upgrade communications, computer, and defensive avionics systems; and enable the B-1B to carry new near-precision, short-range munitions such as the Joint Direct Attack Munition and Wind-Corrected Munitions Dispenser. Phase III will provide the aircraft with standoff capability by integrating the Joint Standoff Munition. While most of the upgrades will be completed about 2006, the defensive avionics upgrades will not be completed until about 2008 (as shown in fig. 3.1).

Figure 3.1: Conventional Mission Upgrade Program Schedule



Source: Department of the Air Force.

The Air Force has changed its plans to upgrade the B-1B computer and defensive avionics systems, which are crucial for integrating and employing precision munitions, because the planned computer upgrades would not fully meet operational requirements and the planned defensive avionics system was too costly. Upgrading computers and software is critical to enhancing the conventional capabilities of the B-1B. In 1995, we reviewed the Air Force's plans to upgrade the B-1B's computer and found

that the Air Force had analyzed several options ranging from simply expanding the current system's memory to installing new systems and software.[4] Because of funding priorities, the Air Force initially chose to only upgrade the memory of the current system. We concluded that simply upgrading the memory would be inadequate because it would not fully support the planned conventional mission upgrades and operational requirements. In response to our report, the Air Force decided to increase funding to replace the existing computer and convert to new software. We further concluded that it is extremely important that the Air Force not revert to a computer upgrade approach for the B-1B based on cost alone but ensure that sufficient resources are allocated so that the computers support the planned B-1B conventional capability enhancements. The Air Force currently estimates that the computer upgrade design phase will be completed in January 1997 and the upgrades will be completed about the middle of fiscal year 2006.

In 1988, the Air Force determined that the B-1B defensive avionics system was flawed and could not meet contract specifications. The specifications were relaxed to support the B-1B's nuclear role as a low-altitude penetrator against Soviet air defenses. In 1992, the Bomber Roadmap noted that an effective defensive avionics system is more crucial for conventional missions because of the diversity and number of threats that the B-1B may encounter. In 1993, DOD began to evaluate defensive avionics systems requirements and alternatives and developed a two-phase approach to upgrade the defensive avionics system to incrementally add capabilities based on when enemy threat systems are expected to become operational. DOD planned for limited operational capability in 2003 and full operational capability in 2007. In 1995, the defensive avionics system upgrade was again redirected to another less costly two-phased approach that incorporates off-the-shelf components already being used on other aircraft and technology from other programs. The Air Force plans for the first phase to provide capabilities adequate for the threat expected through 2002 and the second phase to provide full capability against more advanced threats in 2008.

The Air Force currently is modifying the operational requirements documents for the defensive avionics system and has not completed the required cost and operational effectiveness analysis for it. This analysis was initially to be completed in the fall of 1995, and the Air Force currently expects it to be completed in October 1996. In a December 1995 letter to

[4]Embedded Computers: B-1B Computers Must Be Upgraded to Support Conventional Requirements (GAO/AIMD-96-28, Feb. 27, 1996).

the Secretary of the Air Force commenting on the conventional upgrade program, we noted that the B-1B was fielded with a defensive avionics system that did not meet user requirements in large part because testing was sacrificed to meet the schedule of fielding the system. We observed that the Air Force's current plan appears to include an adequate testing program. However, we cautioned that the planned testing program needs to be maintained even if it means extending the program's completion.

B-1B Has Experienced Operational Readiness Problems

It has historically been difficult for the B-1B force to maintain an acceptable mission capable rate. These rates directly impact the number of sorties that can be flown over a period of time. In the Defense Authorization Act for Fiscal Year 1994, the Congress expressed its concern about the low B-1B mission capable rate by requiring the Air Force to conduct a B-1B Operational Readiness Assessment to determine whether one B-1B wing could achieve and maintain the 75-percent mission capable rate for 6 months, if fully supported with personnel, spare parts, maintenance equipment, and logistical support. The Air Force conducted the assessment between June 1, 1994, and November 30, 1994, and issued its final report to congressional defense committees on February 28, 1995. We, at the direction of the Congress, monitored and reported on the assessment and found that it was complete and comprehensive and that the data it generated was credible. The Air Force reported that during the assessment, the 28th Bomb Wing achieved an 84-percent mission capable rate. At the end of the assessment, the rate for the entire B-1B fleet was about 65 percent. The report pointed out that the assessment showed that the B-1B support structure, if fully funded, could keep the B-1B in a mission capable status but that it was not a measure of B-1B's effectiveness in executing assigned missions. For the 2 years prior to this assessment, the B-1B fleet mission capable rate averaged about 57 percent. The rates have improved over time and, in the first 6 months of fiscal year 1996, averaged about 72 percent.

The Air Force concluded that, with an additional $11.2 million for management actions and reliability and maintainability improvements, the B-1B fleet has the potential to achieve and sustain a 75-percent mission capable rate by 2000 if already ongoing initiatives and continued funding for spare parts are completed. In response, the Congress included $11.2 million in the Air Force's fiscal year 1996 budget to improve the B-1B's mission capable rate. However, on the basis of our analysis of the operational readiness assessment, we reported that the $11.2 million estimate was optimistic and that the Air Force cannot predict how

successful the ongoing or planned initiatives will be.[5] Therefore, the potential cost to achieve and sustain a 75-percent mission capable rate is unknown.

Difficulties Supporting Bombers at Forward Operating Locations

Significant challenges remain in demonstrating that the numbers of B-2s and B-1Bs envisioned for use in conventional conflicts will be able to operate from forward operating locations for sustained periods of time. For example, whereas nuclear missions require a single-sortie penetration of enemy airspace, conventional missions require repetitive sorties, the ability to deploy to forward operating locations relatively close to the conflict, and the ability to sustain operations for an extended period of time. Mobility readiness spares packages, which allow the bombers to operate from remote locations without resupply until a supply line is established, were not initially authorized for B-2 and B-1B units because they were not needed for the nuclear mission. Also, personnel requirements were geared primarily to nuclear operations.

Officials at one war-fighting command told us that they raised concerns to the Air Force about the reliability, deployability, and supportability of the B-1B in developing their war plans and that they initially preferred the B-52H. These concerns related to B-1B's historically low mission capable rate, insufficient mobility readiness spares packages, and personnel shortfalls. But, at the urging of the Air Force, the war-fighting command has included some B-1Bs in their war plans.

Mobility Readiness Spares Packages

Historically, the Air Force has equipped deploying aircraft units with mobility readiness spares packages that would support them in combat operations for a 30-day period without the need for resupply. This 30-day period allows time for the Air Force to establish a resupply system as airlift becomes more readily available. In 1993, we reported on adding conventional capabilities to the bombers and noted that 30-day packages were critical to sustaining B-52G operations in Operation Desert Storm.[6] Currently, tactical fighter and B-52H units are authorized 30-day packages. However, the Air Force plans to provide B-2 and B-1B units with packages that will support them for only a 14-day period. Air Combat Command logistics officials responsible for managing the packages believe that the

[5]B-1B Bomber: Evaluation of Air Force Report on B-1B Operational Readiness Assessment (GAO/NSIAD-95-151, July 18, 1995).

[6]Strategic Bombers: Adding Conventional Capabilities Will Be Complex, Time-Consuming, and Costly (GAO/NSIAD-93-45, Feb. 5, 1993).

14-day kits may not be adequate to sustain combat operations until resupply systems are in place. However, the Air Force has not funded 30-day packages because it views other programs as higher priorities.

The Air Force has budgeted $98.1 million in the fiscal year 1997 FYDP to procure additional B-1B parts and equipment for the 14-day packages currently authorized. According to Air Force officials, this amount should fully fund these packages. The 1997 FYDP does not include funds for additional packages to support the additional B-1B units that the Air Force will establish with the reconstitution reserve aircraft.

The Air Force, also plans to fund 14-day mobility readiness spares packages for B-2 units, using funds appropriated for the B-2 program. According to Air Force officials, the size and cost of the packages have not been determined yet because the Air Force has limited experience with the B-2 and cannot yet predict effectively what parts are likely to break and, therefore, should be included in the packages. The Air Force has formed a team of B-2 logisticians and maintenance personnel to determine the mobility readiness spares package requirements for the B-2. By 2000, the Air Force expects to be able to deploy 16 block 30 B-2s with 14-day packages. However, it is not clear that 14-day packages will be adequate, particularly given that some B-2s will be expected to swing to a second major regional conflict if the need arose.

Personnel Shortages

The Air Force currently cannot meet its war-fighting requirement to support the full complement of B-1B and B-52H bombers allocated to war-fighting CINCs because of personnel shortages in some occupational specialties, especially bomb assembly and bomb loading. The shortages will increase significantly in fiscal years 1999 to 2001 after the Air Force has established additional B-1B squadrons using the reconstitution reserve aircraft. By 2003, the Air Force estimates it will need about 1,600 more personnel than available (as shown in table 3.1).

Table 3.1: Initial Air Force Projections of Additional Personnel Needed to Meet Conventional Wartime Bomber Deployment Requirements

	Fiscal year 1998	Fiscal year 2001-03
B-52 ShortagesB-52 Shortages		
Bomb loaders	72	72
Bomb assemblers	191	191
Others	145	145
B-52 Total	**408**	**408**
B-1 Shortages		
Bomb loaders	69	150
Bomb assemblers	67	275
Others	76	742
B-1 Total	**212**	**1,176**
Total	**620**	**1,584**

Source: Air Combat Command.

DOD did not include funding in the fiscal year 1997 FYDP to resolve these personnel shortages. Moreover, the Air Force's program objective memorandum for fiscal year 1998 did not include funding to alleviate them. The Air Force has tasked the Air Combat Command to develop a plan and identify funding requirements to eliminate the shortages using either active or reserve personnel or a combination of both. The numbers in table 3.1 may change somewhat once the Air Combat Command completes a more detailed review of its requirements.

Conclusions

The Air Force faces significant challenges in successfully implementing its conventional concept of operations to use bombers in two major regional conflicts. The Air Force has not yet demonstrated that the B-2 can meet some of its most important operational requirements. B-2 testing to date has revealed some problems, and continued testing concurrent with production could result in the delivery of B-2s with limited conventional capabilities or that require additional modification. The B-1B computer and defensive system upgrades have been recently redirected and will not be fully completed until 2006 and 2008, respectively. The Air Force's planned testing programs for the B-2 and B-1B need to be fully implemented to ensure that operational requirements are met.

The Air Force also faces operational challenges in deploying bombers to forward operating locations early in the conflict and sustaining their operations. If the B-1B force cannot achieve and sustain a 75-percent

mission capable rate, it will not be able to generate the number of sorties envisioned by the Bomber Roadmap. While the B-1B Operational Readiness Assessment showed that one fully supported wing of B-1Bs can achieve and sustain at least a 75-percent rate, it is still not known whether the entire B-1B force can achieve that rate by 2000. The Air Force has not resolved the bomber personnel shortages in order to meet CINCs requirements for deployed bombers. Also, the bombers may not be able to sustain operations before a resupply system is in place because the Air Force plans to fund 14-day mobility readiness spares packages for the B-2 and B-1B instead of 30-day packages.

Recommendations

Bombers that remain in the force will need to be able to deploy and sustain operations at overseas locations to meet CINC requirements. Therefore, we recommend that the Secretary of Defense require the Secretary of the Air Force to (1) provide an assessment of the risk resulting from shortfalls in meeting requirements for mobility readiness spares packages and providing personnel needed to support conventional operations overseas, including the impact of the shortfalls on the Air Force's ability to meet CINC requirements for bombers and (2) prepare plans and time frames to eliminate these shortfalls or mitigate the risks associated with them.

Agency Comments and Our Evaluation

In written comments on a draft of this report, DOD partially concurred with the recommendation that the Secretary of Defense require the Secretary of the Air Force to (1) provide an assessment of the risk resulting from shortfalls in meeting requirements for mobility readiness spares packages and providing personnel needed to support conventional operations, including the impact of the shortfalls on the Air Force's ability to meet commander in chief requirements for bombers and (2) prepare plans and time frames to eliminate these shortfalls or mitigate the risks associated with them. DOD agreed that there is a shortfall in personnel impacting the Air Force's ability to meet requirements. The Air Force is evaluating several options to resolve the personnel issue.

DOD did not agree that there is a shortfall in the mobility readiness spares packages. DOD noted that, after careful review and analysis, it made a conscious decision to field 14-day versus 30-day packages for the B-1B and B-2. DOD said that the new logistics emphasis on rapid transportation versus large and expensive inventories is consistent with 14-day packages. Also, DOD noted that it incorporated DOD's strategic logistics initiative in

B-1B and B-2 mobility readiness spares package computations. Neither Air Force nor DOD officials provided evidence that the decision was based on logistics initiatives, however. Moreover, DOD's position is contrary to information we obtained from the Air Combat Command and Air Force headquarters concerning this issue. Officials at both levels expressed concern that the 14-day packages were insufficient to meet requirements and that the decision to fund only the 14-day package was budget driven.

Costs to Operate and Modernize the Planned Bomber Force Are Significant and Will Increase

DOD's fiscal year 1997 FYDP includes about $17 billion to operate, sustain, and modernize the planned bomber force for 1996 through 2001. As shown in table 4.1, $6.3 billion, or 37 percent, reflect investment costs,[1] while $10.7 billion (63 percent) reflect amounts planned to operate and support bombers.[2] Spending on operations and support funding is expected to increase significantly after 2001, once the Air Force has established two new squadrons of B-1Bs and has completed the B-2 program. Cost estimates developed by IDA for the 1995 Heavy Bomber Force Study show that the B-1B force will account for the largest portion of future bomber operation and support costs but that the B-2 will be by far the most costly bomber to operate on a per aircraft basis, costing over three times as much as the B-1B and over four times as much as the B-52H.

The total cost to modernize DOD's heavy bomber force is likely to exceed $7 billion by 2008. In addition to spending over $6 billion between fiscal years 1996 and 2001 to modernize the bomber force, the Air Force expects to spend almost $800 million beyond 2001 to complete modifications to the B-1B. Moreover, the Air Force is studying options to upgrade the B-2 force beyond the block 30 configuration which, if approved, would result in additional investment costs beyond those programmed in the fiscal year 1997 FYDP.

Table 4.1: Fiscal Year 1997 FYDP Funding for Heavy Bombers

Dollars in billions 1996-2001

Bomber	Operations and support	Investment	Total
B-2	2.8	4.1	**6.9**
B-1B	4.7	1.9	**6.6**
B-52H	3.2	0.3	**3.5**
Total	**10.7**	**6.3**	**17.0**

Source: Our analysis of the fiscal year 1997 FYDP.

Operations and Support Costs Will Grow

Operations and support costs included in the fiscal year 1997 FYDP support a smaller number of operational bombers during the initial years, then grow to support a larger force once the Air Force establishes two new B-1B squadrons and additional B-2s enter the inventory. For example, in fiscal year 1996, the fiscal year 1997 FYDP reflects funding for only

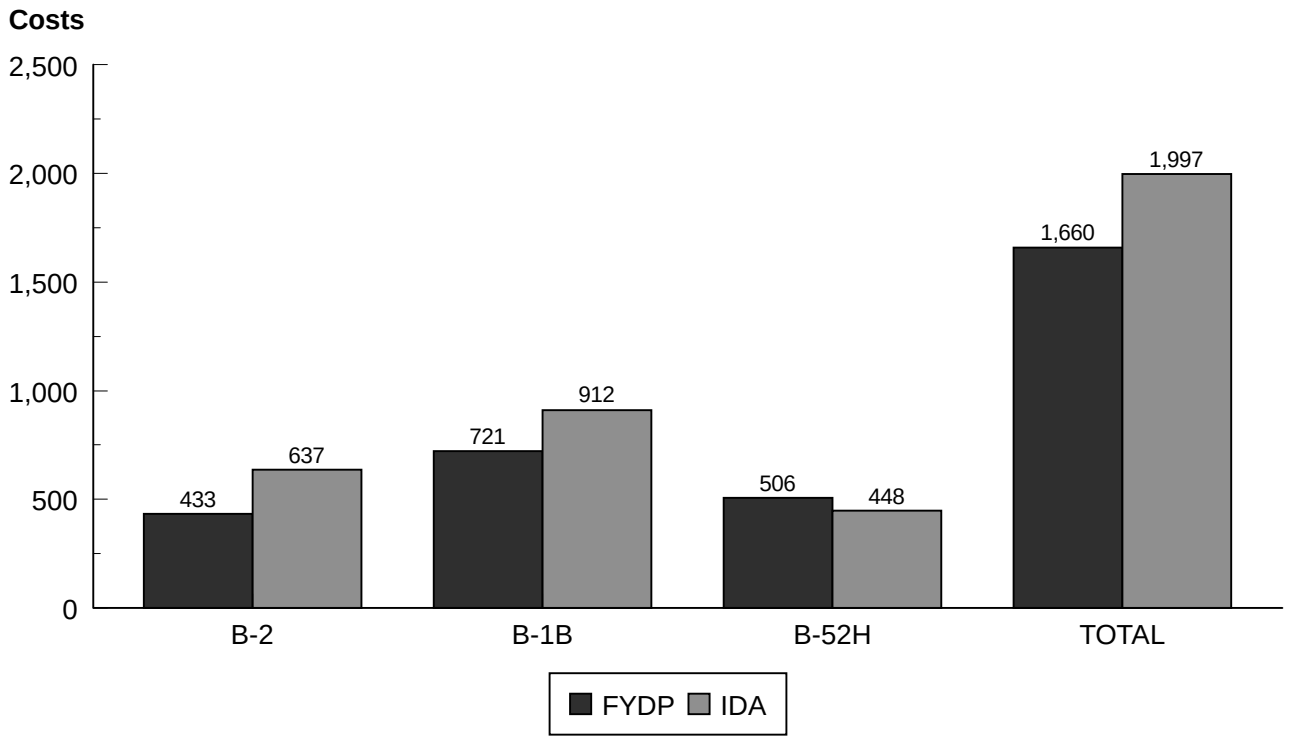
[1]"Investment costs" include funds programmed for research, development, test, and evaluation; military construction; and procurement.

[2]"Operations and support costs" include operations and maintenance and military personnel funding.

60 operational B-1Bs because the Air Force has placed 27 B-1Bs in reconstitution reserve and categorizes the remaining aircraft as test or backup assets. Operations and support costs for 2001 reflect funding for 82 operational B-1Bs. In addition, the Air Force expects to have 16 operational B-2s by 2000 versus 9 B-2s in fiscal year 1996. As more B-2 and B-1B aircraft become operational, costs for personnel, fuel, general and system support, and depot-level maintenance will increase.

According to an analysis conducted by IDA as part of the 1995 DOD Heavy Bomber Force Study, annual operations costs for DOD's planned bomber force will continue to increase beyond 2001, until the planned bomber force reaches its steady state in the year 2007 (when bomber modifications are nearly completed). The Air Force does not have as much experience operating the B-1B and the B-2 as it does operating the B-52. Thus, B-1B and B-2 long-term operations and maintenance costs are somewhat difficult to predict. However, costs to maintain the B-1B and B-2 force, particularly for items such as software maintenance, are expected to increase once these aircraft are upgraded for the conventional role and gain the capability to deliver a wider range of unguided and precision-guided weapons. As part of the 1995 DOD Heavy Bomber Force Study, IDA estimated steady state operations and support costs for each of the bombers. Figure 4.1 compares the average annual operations and support costs for each of the bombers reflected in DOD's fiscal year 1997 FYDP with IDA's estimate of annual steady state costs to operate and maintain each of the bombers.

Figure 4.1: Comparison of Average Annual Operations and Support Costs by Bomber Type (In millions of fiscal year 1996 constant dollars)



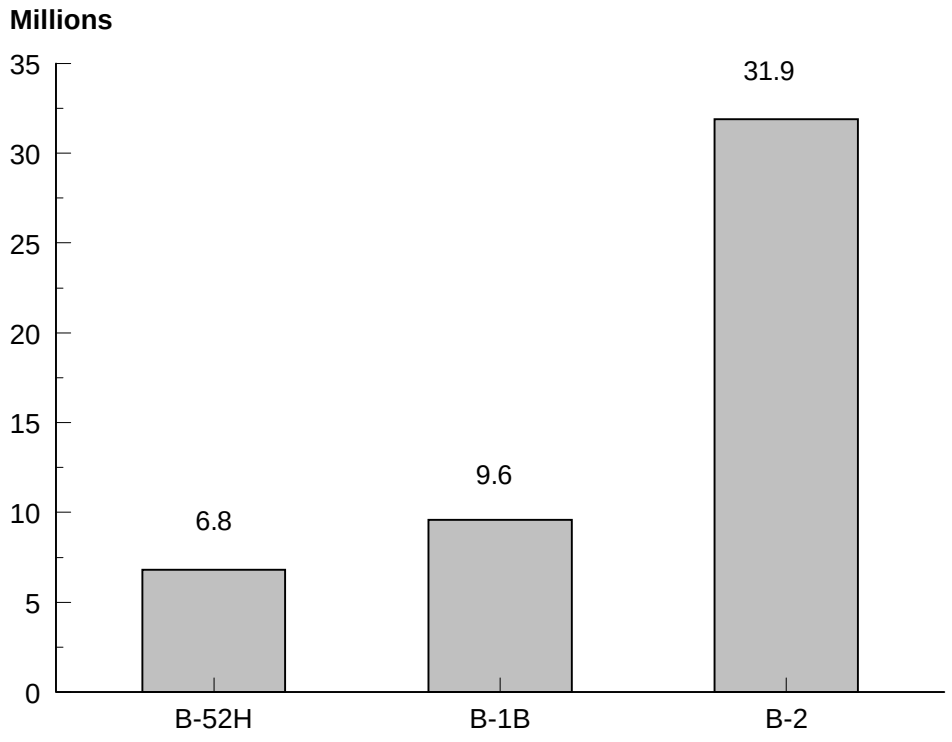
Note: Comparison is between costs reflected in DOD's 1997 FYDP and IDA's estimate of annual costs beginning in 2007.

Source: Our analysis of data from the fiscal year 1997 FYDP and IDA data supporting DOD's Heavy Bomber Force Study.

The planned bomber program will cost about $337 million more annually than the average annual costs in fiscal year 1997 FYDP, or about $2 billion more over a 6-year period. This represents an increase in costs of 20 percent.

As shown in figure 4.1, the total B-1B force will cost more than either the B-52H or the B-2 force to operate and sustain both in the near term and the more distant future. This is because DOD plans to maintain a larger B-1B force compared with the B-52H and the B-2 forces. As shown in figure 4.2, each B-2 is over three times as expensive as a B-1B and over four times as expensive as a B-52H.

Figure 4.2: Annual Operations and Support Costs Per Bomber in 2007 (in Millions of Fiscal Year 1996 Dollars)



Source: Our analysis of IDA data supporting DOD's Heavy Bomber Force Study.

Costs to Modernize the Heavy Bomber Force

The total cost to modernize DOD's bomber force will be at least $7 billion through 2008. The fiscal year 1997 FYDP includes about $6.3 billion to modernize the heavy bomber force. About 95 percent of these funds will be used to upgrade the conventional capabilities of the B-1B and complete the B-2 program. Modifications to the B-52H to enhance its conventional

capabilities and improve safety and reliability will cost only about $300 million. DOD plans to spend almost an additional $800 million beyond 2001 to complete the B-1B conventional upgrade.

B-1B Investment Costs

The costs to modernize the B-1B force between fiscal years 1996 and 2008 will exceed $2.8 billion. The Air Force plans to spend about $2.3 billion to improve the B-1B's conventional capabilities and about $0.5 billion to improve the B-1B's engine, power system, and flight safety. The estimated B-1B investment cost is shown in table 4.2.

Table 4.2: B-1B Investments

Dollars in millions

	Fiscal years 1996-2001	Beyond fiscal year 2001	Total
Conventional enhancements	1,543	799	**2,342**
Other modifications and support items	433	46	**479**
Total	**1,976**	**845**	**2,821**

Source: Our analysis of Air Force data.

B-2 Investment Costs

The fiscal year 1997 FYDP includes about $4.1 billion in research and development and procurement funds to complete 21 B-2s. The 1994 Defense Authorization Act limited B-2 program acquisition costs to $28.968 billion, expressed in fiscal year 1981 constant dollars. In August 1995, we reported that an Air Force cost estimate indicated the final cost for 20 operational aircraft will be about $28.820 billion in fiscal year 1981 dollars, or about $44.4 billion in then-year dollars. Although the legislative cost cap for the first 20 aircraft no longer applies as a result of language included in the fiscal year 1996 Defense Authorization Act, the Air Force still plans to complete the first 20 B-2s for about $44.4 billion. The Air Force plans to use $493 million in additional B-2 funds made available by the Congress in fiscal year 1996 to convert a test aircraft, known as AV-1, into the 21st operational B-2.

The Air Force is studying several options to upgrade the B-2's capabilities beyond those included in block 30 that could result in additional B-2 investments. In 1994, the Air Force began to explore options for a B-2 Multi-Stage Improvement Program by contracting with the B-2 prime contractor to study potential enhancements to the B-2. The contractor developed four options to improve the B-2's conventional capabilities and

reduce operations and support costs. The Air Force will further assess the options to determine their cost-effectiveness. Also, as part of the 1995 DOD Heavy Bomber Force Study, IDA identified several additional enhancements to the B-2 for DOD to consider. The fiscal year 1997 FYDP does not include funding for any of these options.

Conclusions

Over the next decade, DOD plans to spend billions of dollars to operate, sustain, and modernize the bomber force. In constant dollars, the costs to operate and sustain the bomber force will increase as the Air Force funds more bombers for operations and the bomber force reaches a steady state around 2007. While the B-1B will cost more in total operations and support costs on an annual basis than the other bombers because of its larger numbers, the B-2 will be by far the most expensive bomber to operate and sustain on a per aircraft basis, costing over three times as much as the B-1B and over four times as much as the B-52H.

Options for Reducing Bomber Costs

On the basis of our analysis of DOD's requirements for bombers and planned force structure, we identified four options for reducing and restructuring DOD's bomber force that would achieve cost savings while retaining extensive aggregate airpower capabilities. The first two alternatives—retiring all or a portion of the B-1B fleet—would result in a smaller bomber force than DOD currently plans. Retiring or reducing the B-1B force would not result in a significant decrease in DOD's existing capabilities given that the B-1B currently lacks an effective defensive avionics system and is capable of delivering few types of conventional weapons. Retiring or reducing the B-1B force after the conventional upgrades are completed would reduce the CINCs' ability to attack some targets as quickly as desired and would reduce DOD's long-range capability. However, DOD would retain sufficient airpower capabilities in the aggregate to destroy ground targets associated with two major regional conflicts. The third and fourth options—increasing the number of B-1Bs in the Air National Guard and reducing the number of planned B-1B bases—offer lower cost savings because they do not reduce the number of bombers in the planned force.

The options we developed, even those that call for a smaller bomber force, assume that DOD will maintain its planned force of 21 B-2s and 71 B-52Hs. These aircraft will continue to be needed for the nuclear role and therefore appear to be less suitable candidates for retirement or downsizing than the B-1B. Although both DOD and the Congress have considered the need for additional B-2s in recent years, substantial future costs could be avoided if the size of the B-2 force is capped at 21 aircraft as DOD currently plans. Procuring additional B-2s would hinder DOD's efforts to develop an affordable long-term recapitalization plan unless offsetting cuts in other programs were realized.

Restructuring or Reducing the Bomber Force Would Generate Savings

According to DOD officials, DOD must identify funds for recapitalization if it is to ensure a modern, ready force for the future. For example, many of the tactical aircraft purchased during the defense buildup in the 1980s will reach their projected retirement age over the next 10 or more years. DOD's tactical aircraft procurement plans call for much greater than expected resources in the outyears than currently planned. By the year 2001, DOD expects procurement funding to increase to $60 billion—over 40 percent higher than the administration's fiscal year 1997 budget request. This plan assumes that (1) the defense budget top line will stop its decline in fiscal year 1997 and begin to rise again, (2) DOD will achieve significant savings

from infrastructure reductions, and (3) DOD will achieve significant savings through acquisition reform.

Within the past few years, defense experts have questioned the realism of DOD's plan for achieving a balanced, modernized force that assumes no further reductions from force levels established by BUR. For example, our analysis of DOD's planned funding for infrastructure,[1] issued in April 1996, states that DOD will realize no significant net infrastructure savings between fiscal years 1996 and 2001 that can be applied to modernization. Moreover, DOD has not quantified the savings it expects to achieve from acquisition reform. In recent months, DOD's leadership has recognized that DOD may need to identify other sources of funding from within DOD's budget for high-priority modernization efforts. Among the options being considered by DOD are reducing infrastructure below levels assumed in DOD's fiscal year 1997 FYDP, transferring additional missions to the reserve component, and identifying opportunities for eliminating systems that provide redundant capabilities. DOD's Deep Attack Weapons Mix Study, which will examine the contributions of each of the services' airpower assets compared with other assets in DOD's current and projected inventory, is one such effort that may identify opportunities for reducing or eliminating redundant airpower capabilities, according to DOD officials.

Options Differ in Terms of Opportunities for Cost Savings and Effects on Military Capability

The four options we developed differ in terms of their potential for achieving cost savings and their effects on DOD's aggregate airpower capabilities. The Congressional Budget Office estimated the potential budget savings associated with the four options, using DOD's fiscal year 1996 plan as its baseline. As shown in table 5.1, option one would yield the greatest cost savings; option four the least savings. Options two through four are not mutually exclusive. Various combinations of them would save DOD more money.

[1]Defense Infrastructure: Budget Estimates for 1996-2001 Offer Little Savings for Modernization (GAO/NSIAD-96-131, Apr. 4, 1996).

Table 5.1: Five-Year Cost Savings of Four Options (fiscal years 1997-2001)

Dollars in millions

Option	Budget authority	Budget outlays
Retire 95 B-1Bs	$5,890	$5,310
Retire 27 B-1Bs	450	380
Place 24 more B-1Bs in Air National Guard	70	70
Consolidate Basing of Active B-1Bs	40	39

Source: Congressional Budget Office.

The first two options would reduce somewhat DOD's aggregate capability to attack some ground targets and would reduce DOD's inventory of long-range assets that can attack targets at significant distances without refueling. However, because significant redundancy exists in the services' ability to destroy ground targets, the United States would still have sufficient airpower capabilities to destroy ground targets associated with two major regional conflicts. The last two options would keep 95 B-1Bs in the force and therefore would have negligible impact on DOD's conventional capabilities. Because the B-1B will be taken out of the nuclear role in the near future, none of the options will have an effect on DOD's planned nuclear force, even if START II is not ratified.

Option 1: Retire DOD's B-1B Force

As discussed in chapter 2, DOD's principal studies of bomber requirements have significant limitations in their methodology and in some cases include questionable assumptions that may overstate DOD's need for bombers in conventional conflicts. Moreover, our 1996 review of DOD's air power capabilities and the Commission on Roles and Missions concluded that DOD appears to have more than ample capability to destroy ground targets.[2] In October 1995, the Chairman of the Joint Chiefs of Staff stated that he will challenge the Joint Requirements Oversight Council to propose innovative recommendations to maintain U.S. war-fighting capability without necessarily maintaining the same number of systems. The Chairman's report further stated that DOD cannot afford all of the validated requirements in the queue and that tough decisions must be made on which modernization programs to go ahead with and which to

[2]Combat Air Power: Joint Mission Assessments Needed Before Making Program and Budget Decisions (GAO/T-NSIAD-96-196, July 27, 1996).

cancel so that DOD can develop and implement a long-term, sustainable recapitalization plan.

Retiring the B-1B is one option that would somewhat reduce DOD's aggregate conventional airpower capabilities and result in significant cost savings—about $5.9 billion in budget authority for fiscal years 1997-2001. Eliminating the B-1B force would decrease DOD's inventory of long-range airpower assets and increase U.S. forces' dependency on other capabilities and, therefore, the risk that some targets might not be hit as quickly as desired. However, it is plausible to expect that the targets could be hit by other U.S. military assets. B-2s and B-52Hs would still be available for missions requiring long-range and large payload capabilities.

Risk Associated With Retiring B-1Bs May Be Acceptable in Light of the Multiple Ways to Strike Targets Assigned to B-1Bs

Our analysis of Air Force modeling of the air campaign for two major regional conflicts in the 2001-2005 time frame showed there are no unique B-1B targets. Table 5.2 shows that DOD has numerous ways to attack the target the B-1B would strike most frequently during the first 7 days of a conflict.

Table 5.2: Multiple Ways to Hit B-1B's Most Frequent Target During the First 7 Days of a Conflict

Munition	B-1B	B-2	B-52	F-15E	F-16	MLRS
GBU-12				X	X	
GBU-15				X		
GBU-24				X	X	
MK-82	X	X			X	
MK-82R					X	
MK-82R/B-1B	X					
MK-84				X	X	
MK-84R					X	
M-117			X			
JDAM/MK-84	X	X	X	X	X	
AGM-65G					X	
AGM-130/BLU-109				X		
ATACMS-Block I						X
ATACMS-Block IA						X

Source: Our analysis of DOD data.

In May 1995, DOD's Heavy Bomber Force Study concluded that retiring the existing 95 B-1Bs would save $20 billion over 25 years but would not be

cost-effective because it would reduce force effectiveness appreciably. However, the DOD Heavy Bomber Force Study focused on comparing the relative cost-effectiveness of alternative bomber forces. It did not attempt to evaluate cost-effectiveness trade-offs between bombers and other force alternatives, such as carrier battle groups or Air Force tactical aircraft.

Air Force officials and documents cite several advantages to keeping B-1Bs in the force. For example, near-supersonic airspeed and maneuverability give the B-1 the ability to fly with Air Force fighter aircraft in force packages much like the F-111 did in the Gulf War—but instead of four 2000-pound weapons, the B-1 can carry as many as 24. Another advantage of using bombers in conventional conflicts is that they can be based outside the theater of operations and attack targets at greater ranges than fighter aircraft that require refueling. Retiring the B-1B could increase a CINCs' need to rely on refueling assets in planning an air campaign. However, DOD plans to improve its refueling capabilities through greater use of multi-point refueling and most likely theaters are small enough that, with available refueling support, all types of aircraft can reach most targets. The loss of long-range capability associated with retiring the B-1B would have the greatest impact in scenarios in which tactical aircraft are assumed to have no access or limited access to bases in theater. However, the United States has agreements with many nations to facilitate access to overseas bases in times of crisis. Another advantage to keeping the B-1B is that it provides mass—the ability to drop large quantities of weapons to achieve widespread destruction and, as evidenced by Desert Storm, with the B-52's psychological effect. However, even if the B-1Bs were retired, DOD would still have B-52Hs and B-2s available for this purpose in numbers comparable to those used during Desert Storm.

Retiring the B-1B would not degrade U.S. military capabilities in mission areas other than ground attack. The B-1B does not have an air-to-air capability in contrast to multi-mission platforms such as F-16s and F/A-18s, which would be assigned many of the same types of targets as B-1Bs during a conventional conflict. In addition, as noted in chapter 3, the B-1B bomber—unlike many other ground-attack assets in DOD's current inventory—has not yet demonstrated critical capabilities needed to be effective in conventional operations. Retiring the B-1B force also would have no adverse effect on DOD's nuclear mission. Unlike the B-52H and the B-2, the B-1B will no longer have a nuclear mission once B-2s enter the force. DOD officials stated that even if START II is not ratified and the United States decides to maintain a larger nuclear force than the Nuclear Posture

Review recommended, DOD would not reassign B-1Bs a nuclear role. Once the B-1B's computers are modified so that the B-1B can deliver precision conventional weapons, the B-1B will no longer have the software needed to deliver nuclear weapons. DOD could modify B-1B software and recertify personnel for the nuclear mission. However, this would require at least 18 months and would be very costly, according to DOD officials. Instead, DOD evaluated several other options for maintaining a larger force structure in the event that START II implementation is delayed, such as keeping more TRIDENT submarines than if the treaty is implemented.

Retiring the B-1B Would Result in Significant Cost Savings

Retiring the B-1B force would save about $5.9 billion in budget authority and about $5.3 billion in budget outlays for fiscal years 1997-2001. Table 5.3 identifies the annual savings for this option.

Table 5.3: Budget Savings for Retiring the Air Force's 95 B-1B Bombers

Dollars in millions

	FY1997	FY1998	FY1999	FY2000	FY2001	Total
Budget authority	$770	$1,230	$1,240	$1,270	$1,380	**$5,890**
Outlays	490	1,040	1,150	1,240	1,390	**5,310**

Source: Congressional Budget Office.

In estimating the cost savings of this option, the Congressional Budget Office assumed that the B-1B force would be retired over a 1-year period beginning immediately, resulting in smaller savings for fiscal year 1997.

Option 2: Retire 27 B-1Bs in Reconstitution Reserve

The Air Force currently has 27 aircraft in reconstitution reserve that lack aircrews and funding for operations. Beginning in fiscal year 1997, the Air Force will begin to reduce the number of unfunded reconstitution reserve aircraft and will establish two new operational B-1B squadrons by using the aircraft that are currently in reconstitution reserve and funding additional aircrews and flying hours. The Air Force has included the cost of upgrading reconstitution reserve aircraft in the B-1B Conventional Munitions Upgrade Program estimated to cost $2.3 billion from fiscal years 1996 through 2008.

If DOD perceives that the risks to retire the entire B-1B fleet outweigh the savings that could be realized, it could choose to retire 27 reconstitution reserve B-1Bs and keep 68 B-1Bs in the force, 60 of which would be funded for combat operations or training. Retiring 27 of DOD's 95 B-1Bs would

mean that DOD would have to accept some decrease in long-range capability and may not be able to strike some of the ground targets DOD planners have identified for two major regional conflicts as quickly as it could with a larger bomber force. However, this option would not result in as much of a loss in capability as retiring the entire B-1B fleet. If 27 B-1Bs were retired, DOD would still have numerous other combinations of platforms and weapons to attack the types of targets that the B-1B is planned to destroy, and DOD would retain the ability to attack ground targets associated with two major regional conflicts. In comparison with retiring all 95 B-1Bs, this option would provide the CINCs with more flexibility in planning air campaigns and basing aircraft in theater, since B-1Bs would be based somewhat farther away from the theater of operations and would not require refueling during a typical wartime mission, unless operating from the United States. This option would also provide some B-1Bs that could fly with tactical aircraft to provide massive firepower during the early phase of an air campaign. Retiring 27 B-1Bs would have no impact on DOD's ability to fulfill its nuclear mission.

Retiring the 27 B-1Bs in reconstitution reserve would save about $450 million in budget authority for fiscal years 1997-2001, according to the Congressional Budget Office. Table 5.4 identifies the annual savings for this option.

Table 5.4: Budget Savings for Retiring 27 B-1B Reconstitution Reserve Aircraft

Dollars in millions

	FY1997	FY1998	FY1999	FY2000	FY2001	Total
Budget authority	$2	$4	$4	$80	$360	**$450**
Outlays	2	4	4	60	310	**380**

Source: Congressional Budget Office.

Recognizing that reconstitution reserve aircraft place an increased maintenance workload on the squadron, the Air Force has authorized and funded four additional maintenance personnel per reconstitution reserve aircraft. Savings in the near term reflect the immediate termination of these positions. Savings increase significantly in 2000 because DOD would not establish two additional operational squadrons and could eliminate the personnel and flying-hour costs associated with these aircraft. Retiring 27 B-1Bs also would save procurement funds since DOD would upgrade only 68 B-1Bs for the conventional mission instead of 95 B-1Bs. However, the Congressional Budget Office did not include these savings in its estimate because the upgrades will occur beyond 2001.

Option 3: Place Additional B-1Bs in the Air National Guard

Placing more B-1Bs in the Air National Guard is an option that could reduce the cost to maintain DOD's bomber force while preserving the war-fighting capability of DOD's planned bomber force. By fiscal year 1998, the Air Force will have 18 B-1Bs fully trained in the conventional role and able to deploy for wartime operations. B-1Bs will no longer have a nuclear role in the near future, thus making the transfer of B-1Bs to the Air National Guard somewhat easier than transferring B-52s to the Air Force Reserve. According to DOD, the Air Force Reserve and Air National Guard have successfully met the challenges of operating fighter, transport, and tanker aircraft and should be able to readily adapt to the bomber mission.

Placing 24 more B-1Bs in the Air National Guard would save about $70 million in budget authority for fiscal years 1997 to 2001. We examined placing 24 more B-1Bs in the Air National Guard because it would achieve a 50/50 active/reserve ratio when attrition and backup aircraft are excluded and the Air Force has placed 50 percent or more of some refueling and air mobility assets in the reserve component. Greater cost savings could be achieved by placing a higher percentage of the B-1B force in the Air National Guard. However, active Air Force and Air National Guard officials stated that placing the entire B-1B force in the National Guard would not be advisable because the reserve component relies on active-duty units to develop tactics and provide a pool of trained labor. For example, more than 98 percent of the reserve components' pilots and over 70 percent of their maintenance specialists have prior active service experience, according to a RAND study on reserves.

War-Fighting Capability Would Be Maintained

On the basis of our review of DOD analyses and other studies that have examined the active/reserve mix, we believe that transferring additional B-1Bs to the Air National Guard is not likely to degrade combat effectiveness. In 1993, DOD reported to the Congress that placing B-1Bs in the Air National Guard would result in no loss of war-fighting capability. Moreover, according to RAND, air reserve combat units appear to have readiness similar to active-duty units. For example, during Desert Storm, no post-mobilization validation or significant additional training was required prior to deploying reserve component tactical fighter units. Also, many air reserve units are required to be ready to deploy within the same time as active units based in the continental United States.

Air Force officials cited the Air National Guard's limited experience with the B-1B mission as one of the key reasons the Air Force decided to place only 18 B-1B bombers in the Air National Guard instead of assigning a

larger percentage of the force to the Guard. Also, one Air Force official stated that one disadvantage of placing more B-1Bs in the Air National Guard is the risk that presidential call-up of the reserves could be delayed. According to this official, this concern has led CINCs to plan on deploying active combat aircraft units before reserve units, even though reserve units are often required to maintain a capability to mobilize within the same number of days as active units. For example, during Desert Storm, the Air Force met most of its requirements for combat aircraft first with active units, then with reserve units.

Air National Guard Units Are Less Expensive Than Active Units

A major benefit of transferring bombers to the reserve component is that reserve units have traditionally been less expensive to operate than their active duty counterparts. The decision to assign B-1B bombers to the Air National Guard was supported by cost model comparisons and cost-benefit analyses. DOD's analysis, which was completed in 1993, showed that a B-1B Air National Guard squadron consisting of 10 aircraft would cost less to operate than a comparable active squadron. These savings are attributable to two factors. First, DOD expects that an Air National Guard squadron will require fewer flying hours than an active squadron because Air National Guard units are able to recruit more experienced pilots who require less frequent training to maintain their proficiency. Personnel costs are the second major factor that account for the Air National Guard's lower cost. In comparison with active squadrons that consist primarily of active military personnel, Air National Guard units rely heavily on less-costly civilians and part-time guard personnel.

Placing an additional 24 B-1Bs in the Air National Guard, thereby achieving a 50/50 active/reserve ratio when attrition and backup aircraft are excluded, would result in a cost savings of about $70 million in budget authority for fiscal years 1997-2001, according to the Congressional Budget Office. Table 5.5 identifies the annual savings associated with this option.

Table 5.5: Budget Savings for Placing 24 More B-1Bs in the Air National Guard

Dollars in millions

	FY1997	FY1998	FY1999	FY2000	FY2001	Total
Budget Authority	0	0	0	$20	$50	**$70**
Outlays	0	0	0	20	50	**70**

Source: Congressional Budget Office.

In developing its estimate, the Congressional Budget Office assumed that one additional Air National Guard unit consisting of eight aircraft would be started in fiscal year 2000 and two additional units would be started in 2001. Savings shown for 2001 would recur annually beyond the years shown. Although there would be some costs associated with starting up new Air National Guard units, these costs could be kept to a minimum if the units are located at the same bases as active duty bomber units, as DOD suggested in its 1993 report to the Congress on transferring bombers to the reserve component. This has occurred at Barksdale Air Force Base in Louisiana where the Air Force has located a B-52H Air Force Reserve squadron alongside active B-52H units.

Option 4: Consolidate Basing of Active B-1B Bombers

The Air Force plans to move a detachment of six B-1Bs currently located at Ellsworth Air Force Base in South Dakota to Mountain Home Air Force Base in Idaho so that the detachment will be collocated with the 366th Wing, one of the Air Force's three composite wings. Keeping these six aircraft at Ellsworth would result in no measurable loss of capability and would enable DOD to save about $40 million. Leaving these six B-1Bs at Ellsworth also would eliminate potential difficulties in operating from Mountain Home that could occur over the next few years if the Air Force moves the aircraft as planned before construction of permanent facilities has begun.

Impact on War-Fighting Capability Would Be Minimal

Force projection composite wings are a significant change from the Air Force's traditional peacetime basing and wartime employment of aircraft. Traditionally, the Air Force has based one type of aircraft in a wing to achieve economies of specialization. In wartime, the Air Force assembles the needed mix of aircraft as a composite force package en route to a target. By permanently collocating different types of aircraft under one commander, the Air Force intends that force projection composite wings can deploy rapidly and fight autonomously, if necessary. According to the Air Force, moving the B-1Bs to Mountain Home Air Force Base will improve the operational readiness of the 366th Wing by providing more opportunities for B-1B crews to train with other wing assets, including F-15s and F-16s.

However, the Air Force has not demonstrated that composite wings provide significant benefits over traditional basing schemes. In 1993, we reported that the Air Force did not conduct sufficient analysis before deciding to build force projection composite wings in the United States

and that evidence does not exist that these wings will achieve significant advantages when compared with traditional peacetime basing concepts.[3] The Air Force's experience in establishing a wartime composite wing at Incirlik Air Base, Turkey, during the Gulf War demonstrated that the advantages attributed to force projection composite wings can be achieved without permanent collocation of aircraft. In addition, the three force projection composite wings the Air Force has established still need to train and deploy with specialized aircraft gained from different bases and commanders. Finally, opportunities for composite training by force projection wings could be limited by competing priorities and range restrictions. The Air Force acknowledges that the Mountain Home Air Force Base training range is incapable of supporting large-scale composite force training. Larger ranges are available in Utah and Nevada that can accommodate these exercises; however, using these ranges requires additional flying time and fuel.

The Air Force plans to move the B-1Bs to Mountain Home during fiscal years 1996 and 1997, before funds to construct permanent facilities are approved. The unit will be housed in temporary facilities until permanent facilities are completed several years later. During the intervening years prior to the completion of permanent facilities, the B-1B squadron at Mountain Home will be dependent on maintenance and munitions support from Ellsworth Air Force Base. Turnaround times for replacement or repairs of spare parts could increase due to the need to transport reparables between the two locations. In addition, the unit at Mountain Home Air Force Base will have very limited combat munitions loading capability until sometime after the year 2000 when munitions storage facilities are completed. If tasked with a wartime mission during this period, B-1Bs based at Mountain Home would either deploy to an in-theater forward operating location without munitions or fly to Ellsworth to be loaded with munitions before deploying to theater.

Military Construction Costs Could Be Avoided

The Air Force estimates that temporary and permanent facilities at Mountain Home will cost about $40 million to construct. The Air Force has programmed about $6 million in operations and maintenance funds to provide temporary facilities in fiscal year 1996 and plans to obligate these funds shortly. In addition, the Air Force funded $34 million in the fiscal year 1997 budget for military construction of permanent facilities for maintenance, operations, and housing. It does not expect construction of

[3]Air Force Organization: More Assessment Needed Before Implementing Force Projection Composite Wings (GAO/NSIAD-93-44, May 5, 1993).

these facilities to be complete until sometime after the year 2000. Table 5.6 identifies the annual savings for this option.

Table 5.6: Budget Savings for Reversing the Air Force's Decision to Move Six B-1Bs to Mountain Home Air Force Base

Dollars in millions

	FY1997	FY1998	FY1999	FY2000	FY2001	Total
Budget authority	$6	$34	0	0	0	**$40**
Outlays	5	7	13	9	5	**39**

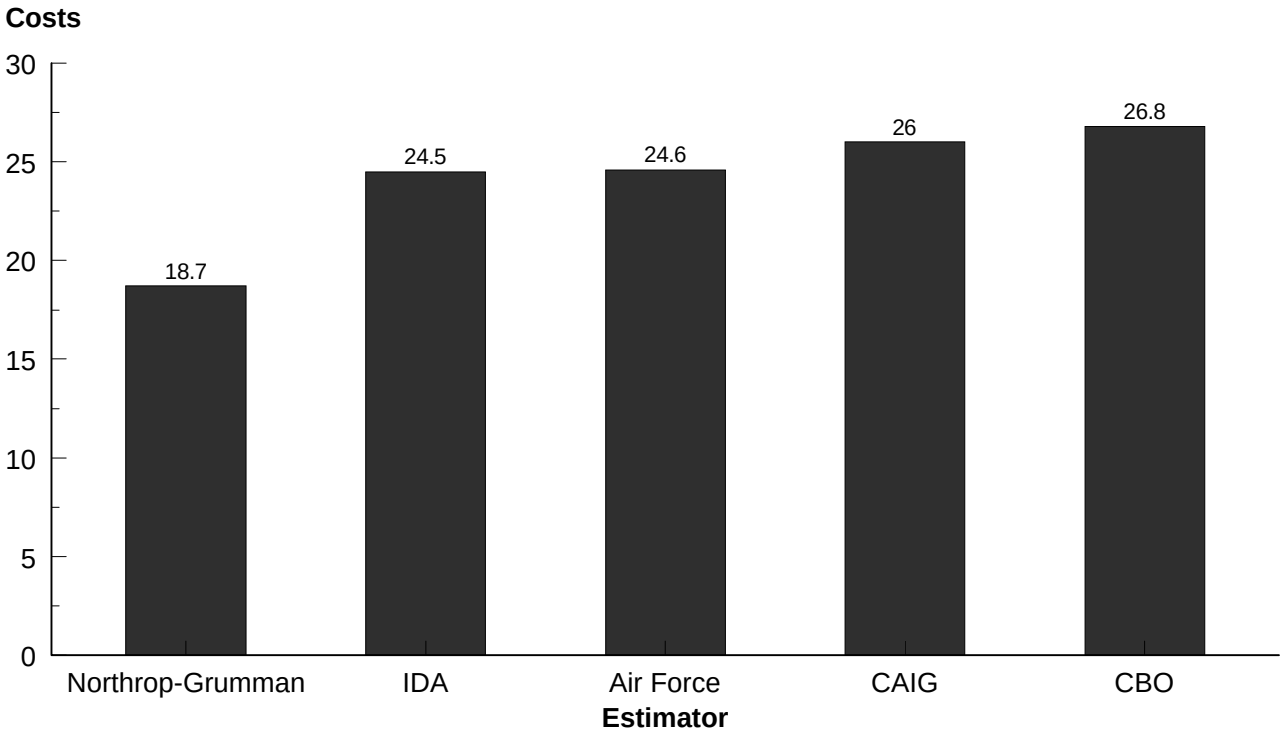
Source: Congressional Budget Office.

Additional B-2s Would Exacerbate DOD's Efforts to Develop and Implement a Long-Term Recapitalization Plan

Although funding for additional B-2s is not included in DOD's plan, DOD and the Congress have considered the need for additional B-2s beyond DOD's planned force of 21 B-2s in recent years. Proponents of buying additional B-2 bombers perceive that DOD needs more than the 187 bombers it plans to keep in the force because BUR stated that the United States may need 100 bombers for a major regional conflict and DOD may need to swing bombers from one theater to another if a second major regional conflict arose. However, on the basis of the analysis conducted during the 1995 DOD Heavy Bomber Force Study and affordability concerns, DOD determined in May 1995 that it should not procure additional B-2s. In early 1996, the President directed that the issue of more B-2s be reexamined. DOD will examine the potential contribution of B-2s further as part of its Deep Attack Weapons Mix Study, scheduled for completion in early 1997.

While our options for retiring or reducing the B-1B force would achieve significant savings, these savings would be eliminated if DOD procured additional B-2s. Substantial future costs could be avoided if the current B-2 force were capped at 21 as DOD currently plans. Moreover, additional B-2 procurements would make it more difficult for DOD to develop and implement a long-term recapitalization plan. In October 1995, the Chairman of the Joint Chiefs of Staff stated that he, along with the CINCs and Joint Chiefs, continues to strongly recommend against congressional action to add additional funding for more B-2s because the military has much higher priorities on which to spend limited procurement dollars. As shown in figure 5.1, life-cycle cost estimates for 20 additional B-2s developed by government agencies, IDA, and Northrop Grumman range from $18.7 billion to $26.8 billion.

Figure 5.1: Twenty-Five Year Life Cycle Cost Estimates for 20 Additional B-2s (In billions of fiscal year 1996 dollars)



Source: Institute for Defense Analysis (IDA) and Congressional Budget Office (CBO).

Our analysis of DOD's airpower capabilities suggests that DOD may be able to eliminate some of its planned capabilities, rather than carry through with all of the planned upgrades or expand beyond its existing plans by procuring additional systems such as more B-2s. For example, our report on interdiction concluded that DOD has ample capability today to destroy interdiction targets associated with two major regional conflicts and questioned the need for some planned improvements to DOD's interdiction capability given the amount of redundancy that exists today.[4]

[4]Combat Air Power: Reassessing Plans to Modernize Interdiction Capabilities Could Save Billions (GAO/NSIAD-96-72, May 13, 1996).

Some B-2 advocates also argue that procuring 20 more B-2s will save money because B-2s will be able to penetrate defenses and use low-cost, short-range attack weapons rather than expensive standoff weapons. However, in 1995, the Congressional Budget Office found that additional B-2s would reduce the cost of weapons expended by the bomber force by less than $2 billion during the first 2 weeks of a conflict when the Air Force envisions bombers would make their greatest contribution. This is a small fraction of the $26.8-billion life cycle cost that the Congressional Budget Office projects that an additional 20 B-2s would cost.

Within the past few years, several studies sponsored by industry, independent think tanks, and federally funded research and development centers have analyzed the need for more B-2s. Many of the studies that advocate procuring more B-2s assume that the B-2 will be a highly stealthy aircraft that will be able to find mobile targets and react quickly to changes in air defenses. However, as discussed in chapter 3, the B-2 has not yet demonstrated some of its essential mission capabilities, including the extent to which it will be able to evade detection by enemy radar. Moreover, unless upgraded beyond the block 30 configuration, B-2s would have to rely on other sensors to tell them where to look and would have trouble adjusting to rapid changes in threat.

Many of these studies also assume that conflicts would happen without warning and, therefore, tactical aircraft will not be available in large numbers. In contrast, DOD's Heavy Bomber Force Study, which concluded that procuring additional B-2s would not be cost-effective compared with the planned bomber forces, assumed that significant numbers of tactical aircraft would be available at the outset of a conflict, thereby reducing the potential contribution of B-2s. In conducting the Heavy Bomber Force Study, IDA reviewed a number of studies that advocate procuring more B-2s and concluded that the differences in the studies are due primarily to differences in assumptions, particularly those regarding warning time and the availability of tactical aircraft. The assumptions used by IDA are generally consistent with those used in DOD's BUR, the Defense Planning Guidance, and the Joint Staff's Nimble Dancer wargame.

In addition, DOD has concluded that additional B-2s are not needed to meet future nuclear war-fighting requirements, particularly in view of the nuclear weapons carrying capability limits included in START II. DOD's Nuclear Posture Review, completed in 1994, concluded that 66 B-52Hs and 20 B-2 bombers would provide sufficient capability for the nuclear leg of the strategic triad, assuming implementation of START I and II agreements

by 2003. The START II, once implemented, will limit the U.S. nuclear warhead carrying capability to 3,500 warheads, of which about 1,320 are planned for the bomber force. Even with DOD's planned force of 21 B-2s and 71 B-52Hs, the Air Force will be required to modify some B-52Hs so that they can carry fewer warheads to stay within the 1,320 limit allocated to the bomber force. More specifically, some B-52H bombers may be modified so that they can carry only 12 nuclear weapons under the wings instead of the maximum of 20 (12 under the wings and 8 inside the bomb bay). If START II is implemented, procuring 20 additional B-2s would require further changes in the B-52H force, which could be achieved either by reducing the size of the force or modifying more B-52Hs so that they can carry fewer weapons.

Conclusions

Considering the extensive and improving ground-attack capabilities of U.S. forces, the numerous other options that DOD has to attack most targets that the B-1B is likely to be assigned in future conflicts, and DOD's awareness that it may need to reduce the number of systems currently planned to ensure a stable, modernized force for the future, we believe that retiring the B-1B force is an option that merits consideration in the context of DOD's ongoing assessment of its future airpower needs. Retiring the B-1B force would leave DOD with a bomber force of 71 B-52s and 21 B-2s that seems small by Cold War standards. However, DOD's decision about what forces to keep in the post-Cold War era should be based on keeping the most cost-effective combination of weapon systems needed for a particular mission rather than on a separate examination of requirements for each type of platform in the services' inventory. When compared with the B-52H and B-2 bombers (which will continue to have a nuclear role in the future) and tactical aircraft that contribute ground-attack capability and air-to-air capability, the B-1B appears to be a logical candidate for retirement. Its role will be limited to adding to DOD's already formidable ground attack capabilities. For these reasons, it seems questionable that upgrading the B-1B's capabilities at a cost of about $2.8 billion and spending close to $1 billion per year to maintain the B-1B in the force will have a significant payoff. If DOD were to retire the B-1B force, it would not be necessary to procure additional B-2s to offset the loss of the B-1B's capabilities. Doing so would only exacerbate DOD's difficulties in achieving a long-term balance between near-term readiness and recapitalization.

If DOD and the Congress determine that the B-1B should not be retired, other options exist for reducing the costs of the bomber force that would preserve much or all of DOD's current bomber force capabilities. Retiring

the 27 B-1Bs currently classified as reconstitution reserve aircraft, placing more B-1Bs in the Air National Guard, or canceling the planned move of six B-1Bs to Mountain Home Air Force Base would result in savings while enabling DOD to preserve the CINCs capability to draw on a wide range of assets in planning wartime operations. In particular, placing more B-1Bs in the Air National Guard would save significant operations and support costs but would have little impact on DOD's overall bomber capabilities. Moreover, at a time when DOD is seeking to reduce its infrastructure costs, reversing the Air Force's decision to expand the number of B-1B bases would assist DOD to reduce infrastructure costs by avoiding the need for $40 million in military construction.

Recommendations

DOD's ongoing Deep Attack Weapons Mix Study is designed to determine the most cost-effective mix of systems needed for the deep attack mission. Given the challenges of long-term recapitalization of the force, we recommend that the Secretary of Defense consider options to retire or reduce the B-1B force as part of this study. Regarding the other two B-1B options, GAO recommends that the Secretary of the Air Force assess the potential to place more bombers in the reserve component and reexamine the decision to relocate six B-1B bombers to Mountain Home Air Force Base.

Agency Comments and Our Evaluation

In written comments on a draft of this report, DOD partially concurred with one recommendation and did not concur with the other one. DOD partially concurred with our recommendation to include options to retire or reduce the B-1B force in the Deep Attack Weapons Mix Study but disagreed with some of our analysis supporting the recommendation. DOD also stated that it plans to consider a number of force structure options as part of its analysis, including retiring the B-1Bs. DOD stated that we used the Nimble Dancer wargame to support a number of conclusions about bomber effectiveness but that the wargame was never intended to provide specific information about the effectiveness of selected weapons systems across a broad range of scenarios. We agree that the Nimble Dancer wargame was not designed to provide a cost-effectiveness comparison of weapon systems and we did not use it in that manner. We used Air Force modeling of the air campaign for two major regional conflicts, which was provided to the Joint Staff as input to the Nimble Dancer wargame, to show that targets assigned to the B-lB were not unique to the B-1B.

Results from the modeling were only one factor we considered in reaching our conclusions. We point out in the report that DOD has numerous and overlapping capabilities to strike ground targets and has not adequately supported its stated requirements for bombers. Given that DOD has stated that it cannot afford all of its planned modernization efforts and that the B-1B will require billions of modernization dollars, we believe that options to retire or reduce the B-1B force should be included in the Deep Attack Weapons Mix Study.

DOD also stated the draft report implied that the next generation of precision-guided munitions will be such a large force multiplier that they provide justification for retiring the B-1B now and that there is insufficient evidence to support this assertion. DOD acknowledges, however, that precision munitions are a fundamental enhancement to combat effectiveness. We noted that completion of bomber modifications and fielding of many new precision weapons for use by all attack aircraft should greatly improve bomber and fighter effectiveness potentially reducing the number of bombers and fighters needed to fight two major regional conflicts. The February 1996 Presidential redirection of the Deep Attack Weapons Mix Study also highlights the potential of future precision munitions. The redirection states that part two of the study will focus on the potential that the growing inventory and increasing capabilities of weapons could allow some consolidation of the ships, aircraft, and missiles that will deliver these weapons. It also states that the potential reduction in sorties required for deep attack missions could produce opportunities for appropriate force structure and platform tradeoffs. DOD has recognized that it cannot afford all of the modernization programs currently planned and must make difficult decisions on which programs to terminate or reduce. The Deep Attack Weapons Mix Study should help DOD with these decisions. Inclusion of B-1B options will provide DOD with the opportunity to assess the cost effectiveness of the B-1B prior to committing billions of dollars to upgrade the aircraft.

Although DOD written comments state that B-1B options are already included in the Deep Attack Weapons Mix Study, DOD officials stated in an exit conference that the list of options has not been finalized. They also told us that time constraints may limit the number of options that will be considered in the study and therefore some will probably be eliminated. Therefore, we still recommend that the B-1B options be included the study.

DOD did not agree with the recommendation that the Secretary of the Air Force assess the potential to place more bombers in the reserve component and reexamine the decision to relocate six B-1Bs to Mountain Home Air Force Base. DOD said that it evaluates the active/reserve mix annually during the budgetary process and believes it has the right bomber mix in place. DOD noted that the majority of the bomber force will most likely be required to strike targets on the first days of a conflict and that the call-up and mobilization requirements for reserves may stress reserve units' capacity to respond within time constraints.

RAND reported in 1993 that the Air Force reserve components train to similar readiness requirements as their active counterparts. Additionally, in responding to the congressional inquiries concerning the initial transfers of bombers to the reserves, the Air Force stated that such transfers would not adversely impact war-fighting capability. DOD already relies heavily on the reserve components to provide time-critical airlift and refueling aircraft. The reserve component operates over 50 percent of some types of these aircraft. Given the potential cost savings that could accrue, we continue to believe that DOD should reassess the potential to place more bombers in the reserve component.

With respect to relocating B-1Bs to Mountain Home Air Force Base, DOD stated that the move would eliminate lost training opportunities, additional flying hours, and temporary duty expenses incurred with the bombers stationed at Ellsworth Air Force Base. We still believe that the Air Force should reexamine the decision to move B-1Bs to Mountain Home Air Force Base. We previously reported that DOD has not demonstrated that the benefits associated with the composite wing concept outweigh the additional cost to maintain very small numbers of dissimilar aircraft at the same location compared with the traditional basing concept. Also, for several years after the move, the B-1B unit will be housed in temporary facilities until construction of permanent facilities are completed; remain dependent on maintenance support from Ellsworth Air Force Base; incur additional temporary duty and freight costs to accommodate maintenance; and remain dependent on other locations for wartime bomb loading support in the event deployments are necessary.

Description of Bomber Munitions

Heavy bombers can carry a variety of ground-attack munitions, including unguided gravity bombs, glide bombs, and cruise missiles. Gravity bombs can be either unguided or guided. Unguided bombs are unpowered and simply fall to the ground. Their direction and path are subject to the effects of air resistance and wind. Unguided bombs have ranges of 5 to 10 kilometers and are not very accurate, especially when dropped from high altitudes. Most gravity bombs in the inventory today are unguided but some are guided by movable fins that steer them to their targets and improve accuracy. Glide bombs have small wings that give them greater range than gravity bombs—40 to 75 kilometers when launched from high altitudes. Some glide bombs are unpowered and some are propelled by small rockets. Use of glide bombs versus gravity bombs increases aircraft survivability because the longer range of glide bombs allows the aircraft to remain farther away from enemy air defenses. Cruise missiles are designed to fly at least several hundred kilometers, which allows aircraft to avoid enemy air defense systems. Cruise missiles are essentially unmanned aircraft powered by a jet engine.

All three types of munitions can carry either a unitary warhead or cluster bombs. Unitary warheads have a single explosive charge, and cluster bombs dispense several submunitions or bomblets designed for specific targets. Unitary warheads are used for attacking fixed, hard targets such as bridges, aircraft shelters, and buildings. Cluster bombs are used for attacking dispersed targets such as troops, marshalling yards, broadcast antennas, vehicles, and tanks. Submunitions scatter to increase the weapons' area of impact. Some types of submunitions contain terminal seekers to guide them to an individual target such as a tank or truck.

Gravity Bombs

Gravity bombs include the MK-82, MK-84, and MK-117; the Joint Direct Attack Munition (JDAM); the Global Positioning System-Aided Munition; the Cluster Bomb Unit (CBU)-87, CBU-89, and CBU-97; and the Wind-Corrected Munitions Dispenser (WCMD).

Unitary Warhead Munitions

The MK-82, MK-84, and MK-117 are unguided unitary warhead bombs weighing 500, 2000, and 750 pounds, respectively. To increase the effectiveness of the MK-84, DOD is developing JDAM, which is a MK-84 modified with a kit that includes steerable fins, a global positioning system receiver, and an inertial navigation system to increase the range and accuracy of the weapon. Before release, the weapon will receive information from the aircraft on the target's location and, once released,

will receive signals from satellites needed to guide it to the target. Several ground-attack aircraft use these munitions. To give the B-2 interim precision capability, the Air Force is developing the Global Positioning System-Aided Munition. This weapon incorporates a tailgate and global positioning system guidance on a MK-84, and will be replaced when the munition is fielded.

Cluster Munitions

Cluster munitions include the CBU-87, CBU-89, and CBU-97, and the WCMD. The CBU-87 is a 1,000-pound, combined effects munition for attacking soft target areas with detonating bomblets. The CBU-89 is a 1,000-pound cluster munition containing antitank and antipersonnel mines. The CBU-97 is also a 1,000-pound, sensor-fuzed weapon containing sensor-fused submunitions for attacking armor. Each submunition contains four armor-penetrating projectiles with infrared sensors to detect armored targets. Once a target is detected, a rocket motor fires the projectile into the target. If no target is detected after a period of time, the projectiles automatically fires, causing damage to material and personnel. Several U.S. aircraft employ these munitions. To make all three of these cluster munitions more effective on the B-1B, DOD is developing the WCMD. Similar to JDAM, WCMD will add steering fins and an inertial navigation system to the munitions to guide them to the proper release points.

Glide Bombs

Glide bombs include the Joint Stand-off Weapon and the Have Nap.

Joint Stand-Off Weapon

The Joint Stand-off Weapon is an unpowered glide bomb in development that provides a short-to-medium range standoff capability. It is a complete airframe that uses a global positioning system aided inertial navigation system and will dispense the combined effects munition and the sensor fuzed weapon. The range of the weapon allows the B-1B bomber to attack targets at ranges outside of the enemy's air defenses. The weapon will be used by several other U.S. aircraft.

Air-to-Ground Guided Missile-142 (Have Nap)

The air-to-ground guided missile-142, also known as the Have Nap, provides the Air Force with a precision man-in-the-loop capability for the B-52H to attack high-value, fixed targets from standoff ranges. The B-52H is the only U.S. aircraft that employs the missile. The munitions data link provides for single aircraft operation or the munition's guidance may be turned over to a second aircraft allowing the first aircraft to leave the area.

It can be configured with a 750-pound warhead that breaks into fragments or a 770-pound warhead that penetrates hard surfaces.

Cruise Missiles

Cruise missiles include the Conventional Air-Launched Cruise Missile, Harpoon, and the Joint Air-to-Surface Standoff Missile.

Conventional Air Launched Cruise Missile

The Conventional Air Launched Cruise Missile is the only long-range cruise missile currently available and provides the B-52H with a capability to attack fixed soft targets while the aircraft remains outside of threat enemy air defenses. The missile uses blast fragmentation warhead and has a range of greater than 350 nautical miles. Guidance information on the missile is classified.

Harpoon

The Harpoon missile provides the B-52H and several naval aircraft with the capability to attack surface ships at ranges greater than 100 kilometers. The missile uses a radar seeker to guide itself to the target.

Joint Air to Surface Standoff Missile

DOD is in the concept development phase for Joint Air-to-Surface Standoff Missile, which will replace the canceled Tri-Service Standoff Attack Missile. DOD plans for several U.S. aircraft to use the weapon, including all bombers. It will be a long-range cruise missile with autonomous precision guidance used to attack fixed and movable targets. It will carry a 1,000-pound penetrating warhead.

Comments From the Department of Defense

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ACQUISITION AND TECHNOLOGY

04 SEP 1996

Mr. Richard Davis
Director, National Security Analysis
National Security and International
Affairs Division
U.S. General Accounting Office
Washington, DC 20548

Dear Mr. Davis:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report, "AIR FORCE BOMBERS: Options to Retire or Restructure Some of the Force Would Reduce Planned Spending," dated 26 July 1996 (GAO Code 701053), OSD Case 1196.

The Department appreciates the opportunity to comment on the draft and acknowledges that the GAO accepted some of our proposed changes discussed at the exit meeting. The DoD partially concurs with three of the draft report recommendations and nonconcurs with one. The Department believes the report contains some misinterpretations and contradictions.

The GAO used the Nimble Dancer wargame to support a number of their conclusions about bomber effectiveness. However, this wargame was never intended to provide specific information about the effectiveness of selected weapons systems across a broad range of scenarios. In reality, this wargame effort was only designed to determine sufficiency of the programmed force structure to fight and win two nearly simultaneous Major Regions Conflicts (MRCs) subject to a number of limitations.

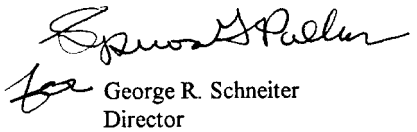
Nimble Dancer showed that the planned force structure is sufficient, but also raised a number of issues to guide force development and strategy in the future. In particular, the exercise underlined the need for programmed improvements to the force and raised concerns about, but did not address areas such as limited warning time, strategic targeting, and nuclear/biological/chemical effects, where bomber options would provide the most important contributions.

The report also implies that next-generation precision guided munitions (PGMs), which are expected to enter the force after 1999, will be such a large force multiplier that they provide justification for retiring the B-1Bs now. There is insufficient evidence to support this assertion. The Department believes that PGMs are a fundamental enhancement to combat effectiveness of our planned forces. On the other hand, any

tradeoffs between PGMs and other systems should result from a deliberate planning process, using inputs from ongoing efforts such as the Deep Attack Weapons Mix Study. Further, the Department believes that the report understates the loss of capability associated with retiring the B-1B fleet, and overstates what the planned B-2 and B-52 fleets could achieve in the absence of the B-1Bs.

Detailed comments on the GAO recommendations are provided in the enclosure.

Sincerely,



George R. Schneiter
Director
Strategic and Tactical Systems

Enclosure

GAO DRAFT REPORT - DATED JULY 26, 1996
AIR FORCE BOMBERS: OPTIONS TO RETIRE OR RESTRUCTURE SOME OF THE FORCE WOULD REDUCE PLANNED SPENDING,"

(GAO CODE 701053) OSD CASE 1196

DEPARTMENT OF DEFENSE COMMENTS
* * * * *

RECOMMENDATIONS

Now on pp. 12 and 75.

RECOMMENDATION 1: The GAO asserted that the DoD ongoing Deep Attack Weapons Mix Study is designed to determine the most cost-effective mix of systems needed for the deep attack mission. Given the challenges of long term recapitalization of the force, the GAO recommended that the Secretary of Defense consider options to retire or reduce the B-1B force as part of this study. (p. 15, p. 98/GAO Draft Report)

DOD RESPONSE: **Partially concur.** While the Department partially concurs with the recommendation, it does not agree with some of the analysis behind it. Further, the DoD has already included deep strike force structure options, including the B-1B, as part of the Deep Attack Weapons Mix Study (DAWMS). Part I, which followed the FY95 Heavy Bomber Study, will be completed later this year and will help us define the most cost-effective mix of deep attack weapons. The Department agrees that all DoD deep strike assets should be reassessed after the results of DAWMS, Part II, are available.

Now on pp. 12 and 75.

RECOMMENDATION 2: Regarding the other two B-1B options, the GAO also recommended that the Secretary of the Air Force assess the potential to place more bombers in the reserve component and re-examine the decision to relocate six B-1B bombers to Mountain Home Air Force Base. (p. 15, p. 98/GAO Draft Report)

DOD RESPONSE: **Nonconcur.** The Department evaluates bomber requirements annually as part of the programming, planning and budgeting system, and believes it has the correct active/reserve combination. Due to the nature of the bomber mission, a majority of the bomber forces will most likely be required to strike targets on the first days of a conflict. This would stress reserve units' capacity to respond within timely constraints, due to call-up and mobilization requirements. The Department will continue to assess the active/reserve mix to ensure it is providing the most cost-effective force.

Enclosure

Moving the B-1Bs to Mountain Home supports the Air Force Composite Wing concept. The decision to structure composite wings is based on our rapid-response war-fighting philosophy in support of the operational Commanders-in-Chief (CINCs). The six B-1Bs have been assigned to Mountain Home AFB for several years. During this time, however, they have been temporarily based at Ellsworth AFB, incurring a significant cost in lost training opportunities, additional flying hours, and temporary duty expenses. The Department believes that returning the B-1Bs to Mountain Home AFB will allow the wing to train and operate the way it will fight.

RECOMMENDATION 3: The GAO asserted that the bombers that remain in the force will need to be able to deploy and sustain operations at overseas locations to meet Commanders-in-Chief requirements. Therefore, the GAO further recommended that the Secretary of Defense require the Secretary of the Air Force to provide an assessment of the risk resulting from shortfalls in meeting requirements for mobility readiness spares packages (MRSP) and provide personnel needed to support conventional operations, including the impact of shortfalls on the Air Force's ability to meet Commanders-in-Chief requirements for bombers. (pp. 15-16, p. 66/GAO Draft Report)

Now on pp. 12 and 52.

DOD RESPONSE: **Partially concur.** The Department does not agree with the GAO comment that 14-day Readiness Spares Packages (RSP) for bombers constitute an MRSP shortfall. After careful review and analysis, the DoD made a conscious decision to field 14-day readiness spares packages for the B-1B and B-2 bombers vice 30-day RSPs. It was determined to be economically feasible and logistically supportable, and a smart war-fighting decision to incorporate the DoD strategic logistics initiative (i.e. rapid resupply, reinforcement, and reengagement capability) in B-1B and B-2 RSP computations. The new logistics emphasis on rapid transportation versus large and expensive inventories is consistent with the 14-day bomber RSPs. The Department believes that building 14-day B-1 and B-2 RSPs is an appropriate and supportable war-fighting decision.

The DoD does agree with the GAO that there is a personnel shortfall and is currently evaluating several options to bring this issue to closure.

RECOMMENDATION 4: The GAO also recommended that the Secretary of Defense require the Secretary of the Air Force to prepare plans and time frames to eliminate these shortfalls or mitigate the risks associated with them. (p. 16, p. 66/GAO Draft Report)

Now on pp. 12 and 52.

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DOD RESPONSE: **Partially concur.** The Department does not believe 14-day RSPs constitute an MRSP shortfall. As for manpower shortfalls, the Air Force is committed to resolving them and is currently evaluating several options to bring this issue to closure.

3

Major Contributors to This Report

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Related GAO Products

Embedded Computers: B-1B Computers Must Be Upgraded to Support Conventional Requirements (GAO/AIMD-96-28, Feb. 27, 1996).

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Strategic Bombers: Issues Related to the B-1B Aircraft Program (GAO/T-NSIAD-91-11, Mar. 6, 1991).

Strategic Bombers: B-2 Program Status and Current Issues (GAO/NSIAD-90-120, Feb. 22, 1990).

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