

August 1990

# STRATEGIC WEAPONS

## Long-Term Costs Are Not Reported to the Congress

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

National Security and  
International Affairs Division

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August 10, 1990

The Honorable Sam Nunn  
Chairman, Committee on Armed Services  
United States Senate

The Honorable Daniel K. Inouye  
Chairman, Subcommittee on Defense  
Committee on Appropriations  
United States Senate

The Honorable Les Aspin  
Chairman, Committee on Armed Services  
House of Representatives

The Honorable John P. Murtha  
Chairman, Subcommittee on Defense  
Committee on Appropriations  
House of Representatives



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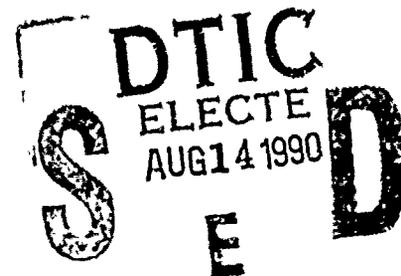
This report discusses the long-term costs of 12 strategic weapon systems and the extent to which the Congress is routinely provided with estimates of such costs. It illustrates the importance of complete estimates of the cost of operating and supporting major defense systems.

We are sending copies of this report to the Chairman, Senate Committee on Governmental Affairs; the Chairman, Legislation and National Security Subcommittee, House Committee on Government Operations; the Secretaries of Defense, the Air Force, and the Navy; and the Director, Office of Management and Budget.

This report was prepared under the direction of Nancy R. Kingsbury, Director, Air Force Issues, who may be reached at (202) 275-4268 if you or your staff have any questions concerning this report. Other major contributors to this report are listed in appendix II.

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# Executive Summary

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## Purpose

During the 1980s, concerns over the threat posed by the Soviet Union led the United States to acquire modernized strategic nuclear weapon systems as its defense budget increased. Recent events indicate that perceptions of a lessened Soviet threat will lead to greater efforts in the 1990s to control the federal deficit by reducing defense spending.)

The Congress is considering the first defense budget of the 1990s in light of these events and is reviewing the affordability of major weapon systems. This report uses 12 strategic weapon systems to illustrate the importance and difficulty of obtaining the long-term cost estimates that the Congress needs to assess weapon system affordability. *Keywords: Military budgets; cost estimates; Strategic Weapons; Defense; Military Personnel. (CP)*

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## Background

In October 1981 the President announced a program to modernize U.S. strategic airborne systems, land-based missiles, and submarine-launched missiles. The modernization program now encompasses 12 Air Force and Navy systems, including B-1B and B-2 bombers, Air Launched and Advanced Cruise Missiles, Trident II submarines and missiles, and Peacekeeper and Small Intercontinental ballistic missiles.

A system's total cost to the government consists of the cost to acquire, operate, and support the system over its entire life. Acquisition costs include development, production, and directly related military construction. Operation and support costs include personnel, fuel, spare parts replenishment, direct depot maintenance, and contractor support.

The Department of Defense (DOD) submits major weapon system acquisition cost estimates to the Congress in annually updated Selected Acquisition Reports. Reports first prepared after January 1985 must include operation and support cost estimates.

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## Results in Brief

The cost of acquiring 11 strategic weapon systems and operating 10 of them between fiscal years 1982 and 2020 could exceed \$476 billion in then-year dollars. (Unless noted otherwise, all years cited are fiscal years and all figures are in then-year dollars, which reflect the effects of inflation over time.) Small Intercontinental Ballistic Missile total costs and Air Launched Cruise Missile operation and support costs were unavailable. GAO's cost projections are based on DOD's plans as of 1989. Changes to these plans—such as DOD's April 1990 decision to reduce the number of B-2s from 133 to 75—will affect costs.

Acquiring, operating, and supporting the seven airborne systems as of DOD's 1989 plans could cost about \$315 billion from 1982 to 2020. Trident II submarines and missiles could cost \$122 billion to acquire and operate. The Peacekeeper missile, if made mobile, could cost about \$39 billion. About 27 percent, or about \$129 billion, of the strategic systems' total cost was appropriated for 1982 through 1990.

About \$275 billion will be needed to operate and support 10 of the systems through 2020. GAO found that DOD does not routinely provide the Congress with complete operation and support cost estimates for most of these systems. GAO supplemented the few routinely provided estimates by requesting data from the services. Congressional visibility over the operation and support costs will decrease further once the systems are deployed. Until DOD fulfills congressional directives aimed at establishing a uniform system to routinely provide the Congress with more complete operation and support cost estimates, congressional decisionmakers will have to request estimates from the services as needed.

GAO believes that the projections in its report understate the cost of the strategic systems as of 1989. Some DOD acquisition cost estimates have been understated in the past, and the operations and support cost projections assume a very low future inflation rate.

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## GAO's Analysis

GAO combined acquisition cost data, primarily from Selected Acquisition Reports, with operation and support cost projections that were based on data from Selected Acquisition Reports or from Air Force and Navy sources. GAO did not verify these data due to the amount of time that would have been required.

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## Projected Costs

The projected annual funding levels required to acquire, operate, and support the strategic systems will peak in the early 1990s at about \$18 billion, due to acquisition cost levels. (These costs are depicted in fig. 2.1 on pp. 14 and 15.) As the acquisition programs are completed and annual acquisition costs fall, operation and support costs will increase. By 2003 annual operation and support costs will be about \$9 billion. GAO used DOD's 1.8 percent annual inflation rate to project that by 2020 annual operation and support costs will be about \$11 billion.

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### Limited Congressional Visibility Over Operation and Support Costs

Although Selected Acquisition Reports first prepared after January 1985 must include operation and support cost estimates, reports for seven of the systems were first prepared before that date and did not include such estimates. The reports for the other systems typically contained limited operation and support estimates that did not include all the data needed to fully assess total cost. For example, the reports often did not identify the operation and support costs of the total number of units to be deployed, the system's anticipated life, or the then-year dollar value of the cost.

Once a system is deployed, its operation and support costs become less visible to the Congress. DOD stops submitting a Selected Acquisition Report after a system is fielded. Moreover, DOD budget and Five Year Defense Plan documents provided to the Congress do not identify such costs by system.

The Congress's concern over long-term operation and support costs continues. The Senate Committee on Appropriation's report on the fiscal year 1998 DOD appropriations bill requested, in part, that (1) each service be able to report accurate and verifiable operation and support costs for major systems within 4 years and (2) operation and support data for at least 3 major systems per service be included in budget submissions beginning with the 1990 budget. DOD tried to comply with this request but did not do so in the 1990 and 1991 budgets.

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### Understated Cost Projections

GAO believes that the projections in its report understate the cost of these systems because acquisition cost estimates have been understated in the past and operational and support projections assume very low future inflation rates. Earlier this year GAO reported that DOD's B-2 acquisition cost estimate had grown over 20 percent in less than 4 years. In 1989 GAO reported that the B-1B program had incurred \$31 billion in costs, including about \$3.7 billion in costs excluded from the Selected Acquisition Report.

GAO's operation and support cost projections are based largely on a 1.8 percent inflation rate that DOD was using for future planning when GAO conducted its work. By historic standards this rate is low, and some analysts predict future rates of 4.3 percent or more. After GAO completed its work, DOD informed GAO that DOD had begun using inflation rates of 3.1 to 3.4 percent for planning beyond 1994. GAO has not revised its projections but notes that the costs shown represent the lower end of the cost range.

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**Recommendations**

GAO is not making recommendations in this report because the Congress has already directed DOD to provide better cost estimates for operating and supporting individual defense systems.

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**Agency Comments**

In its comments on a draft of this report, DOD basically agreed with GAO's findings, conclusions, and overall numbers in the cost projections. DOD's comments are included in appendix I and evaluated in chapter 2.

DOD stated that a more useful analysis would have shown each program's complete life-cycle cost in constant-year dollars. GAO believes that then-year dollars are appropriate units of measurement to illustrate both the rise and fall of costs on a year-by-year basis and the long-term impact of operation and support costs. Then-year dollar figures enumerate the annual cost of each program in the type of dollars that would be requested from the Congress for that year.

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**Abbreviations**

ACM	Advanced Cruise Missile
ALCM	Air Launched Cruise Missile
DOD	Department of Defense
GAO	General Accounting Office
ICBM	intercontinental ballistic missile
O&S	operation and support
SAR	Selected Acquisition Report
SLBM	submarine-launched ballistic missile
SRAM	Short Range Attack Missile

# Introduction

For the past three decades, the United States has had a strategic nuclear Triad of airborne systems, land-based intercontinental ballistic missiles (ICBMs), and submarine-launched ballistic missiles (SLBMs). In October 1981 concern over the threat posed by the Soviet Union led the President to announce an extensive program to modernize these forces. The strategic modernization program includes the B-1B and B-2 bombers, B-52 bomber modifications, the KC-135R tanker aircraft, the Air Launched Cruise Missile (ALCM), the Advanced Cruise Missile (ACM), the Short Range Attack Missile (SRAM) II, the Peacekeeper ICBM in silos and in Rail Garrison, the Small ICBM, and the Trident II SLBM and submarine.

During much of the 1980s, the strategic modernization program coincided with large increases in U.S. defense spending. However, current trends suggest that defense spending may be reduced during the 1990s because of perceptions of a diminished Soviet threat.

## System Costs

A weapon system's total cost to the government consists of the cost to acquire, operate, and support the system over its life cycle.

## Acquisition Costs

A system's acquisition costs include the cost of development; production, training, support equipment, and initial spares; military construction directly identified with the system being acquired; and some operation and maintenance activities, such as installing modifications to complete system acquisition. The Department of Defense (DOD) funds acquisition costs from several budget appropriations, including those for research, development, test, and evaluation; procurement; military construction; and operation and maintenance.

DOD provides acquisition cost estimates of major systems to the Congress in Selected Acquisition Reports (SARs).<sup>1</sup> It prepares SARs for major defense acquisition programs.<sup>2</sup> Each SAR summarizes acquisition cost by year and appropriation.

<sup>1</sup>Annual SARs are for the quarter ending December 31. DOD prepares quarterly SARs if program costs increase by 6 percent or more or if milestones change by 6 months or more from those in the previous SAR.

<sup>2</sup>DOD defines a major defense acquisition program as a program (1) that has been so designated by the Secretary of Defense or (2) whose cost in 1980 dollars will exceed \$200 million in research, development, test, and evaluation funds, or exceed \$1 billion in procurement funds.

<sup>3</sup>We have issued reports on the SARs, including Weapon Acquisition: Improving DOD Weapon System Acquisition Reporting (GAO/NSIAD-90-20, Nov. 14, 1989).

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## Operation and Support Costs

According to DOD, 55 to 65 percent of a system's constant-year dollar life-cycle costs are for its operation. Operation and support (O&S) costs are those associated with a system's operation and maintenance, including directly and indirectly attributable costs. The Secretary of Defense's Cost Analysis Improvement Group has identified the following O&S cost elements:

- pay and allowances for officers, enlisted personnel, and civilians assigned to operational or deployable units;
- O&S consumables, including energy and materials needed for operation and maintenance, and ammunition used in training;
- direct depot maintenance costs for maintaining or modifying systems at DOD and contractor facilities or by depot teams;
- sustaining investment, such as replenishment spares, software support, and replacing support equipment;
- interim contractor support and other contract-level support;
- other direct costs, such as updating publications, recurring engineering or technical services, and leasing and maintaining support equipment or materials; and
- indirect O&S costs, such as base operating support, medical personnel, and personnel acquisition and training.

DOD funds O&S costs from various appropriations, including procurement, military personnel, and operation and maintenance.

The Air Force and the Navy prepare an O&S cost estimate for the Defense Acquisition Board's consideration before a system enters full-scale development or production. DOD must include O&S estimates in SARS that were first submitted after January 1985 for programs that were in or had completed full-scale development.

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## Objectives, Scope, and Methodology

To assist the Congress in assessing the affordability of major weapon systems in light of recent global events, this report uses the strategic systems to illustrate the importance of and difficulty in obtaining long-term cost estimates.

We selected the 12 weapon systems based on statements by the President and the Secretary of Defense from 1982 through 1989. We chose 1982 as our initial year because the strategic modernization program was announced at the beginning of fiscal year 1982. We selected 2020 as

our concluding year after we were told that the oldest strategic systems—the modified B-52s and KC-135s—could be operational at least until that year.

We did not prepare independent cost estimates because of the amount of time that would have been required. Instead, we compiled and projected DOD, Air Force, and Navy estimates of the cost to acquire, operate, and support these systems. These estimates are generally based on DOD plans and schedules as of 1989. Changes to these plans—such as the Secretary of Defense's April 1990 decision to reduce the number of B-2s to be acquired from 133 to 76—will affect these systems' cost.

Most of our acquisition cost data was obtained from the most recent SARs available at the time of our work—the fiscal year 1989 annual and quarterly SARs.<sup>1</sup> Complete acquisition costs for the Small ICBM were not available because DOD had not determined the number or basing mode of Small ICBMs.

The O&S cost projections for airborne systems are based primarily on estimates in SARs or requested from the Air Force Cost Center.<sup>2</sup> These estimates were generally limited to the cost of operating a typical aircraft unit in several specific years or on an average annual cost basis. We requested the data needed to adjust these estimates in long-term projections of O&S costs. Air Force officials were unable to provide ALCM and Small ICBM O&S cost estimates. The Chief of Naval Operations' Strategic Submarine Division and the Navy's Strategic Systems Programs estimated Trident II O&S costs at our request.

We did not validate the cost estimates that we obtained. We supplemented them by reviewing documents and meeting with officials from the Office of the Secretary of Defense, the Departments of the Air Force and the Navy, the Air Force Systems Command's Ballistic Systems Division, and the Navy's Strategic Systems Programs. Unless otherwise noted, costs are expressed in then-year dollars, which reflect the effect of inflation over time. We used DOD inflation guidance to inflate estimates as needed. On the basis of DOD guidance at the time of our work,

<sup>1</sup>These SARs accompanied the proposed 1990 defense budget. We used the fiscal year 1990 Peacekeeper SAR because the fiscal year 1989 SAR did not reflect major program changes announced in early 1989.

<sup>2</sup>The Air Force Cost Center, a part of the Office of the Air Force Deputy Comptroller for Cost and Economics, estimates future aircraft O&S costs and collects historic O&S data.

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our estimates assume a 1.8 percent inflation rate beyond 1994. References to years are for fiscal years unless otherwise noted.

For those systems being modified, we included the costs of acquiring modifications and for operating and supporting the modified systems. We did not include the cost of acquiring, operating, and supporting the systems before modification.

We conducted our work from January to December 1989 in accordance with generally accepted government auditing standards. DOD provided written comments on a draft of this report. DOD's comments appear in appendix 1 and are evaluated in chapter 2.

# Costs of the Strategic Modernization Program's Weapon Systems

The cost of acquiring, operating, and supporting the strategic weapon systems, as of 1989, could exceed \$476 billion from 1982 to 2020, assuming low future inflation. Although the strategic systems' long-term O&S costs collectively surpass their acquisition costs, DOD does not routinely provide the Congress with complete O&S cost estimates for these systems.

## Program Costs

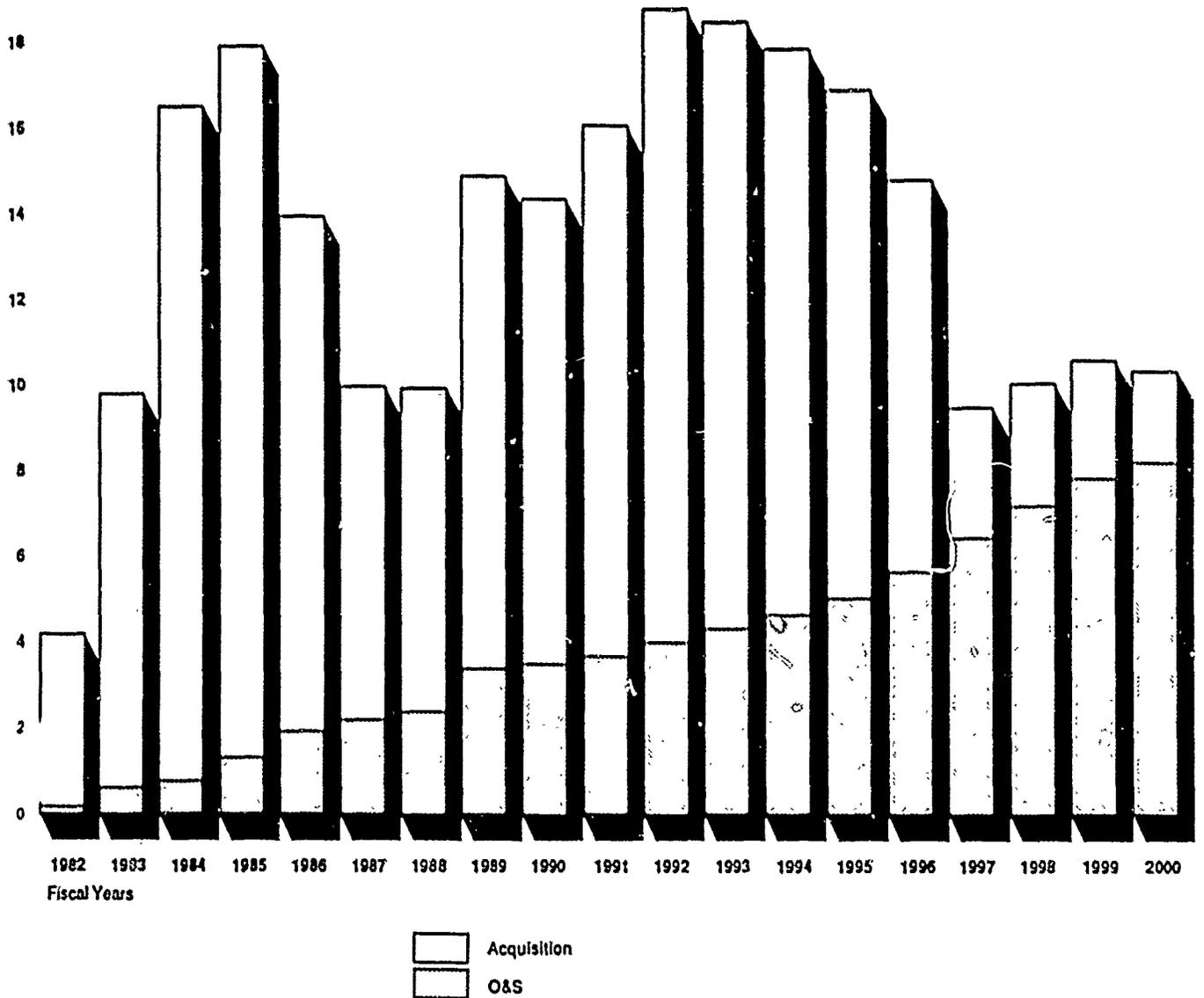
Our review of DOD, Air Force, and Navy cost estimates indicated that the cost of acquiring 11 strategic systems and operating 10 of them between 1982 and 2020 could exceed \$476 billion. About 27 percent—about \$129 billion—of this amount was appropriated or planned for 1982 through 1990. The \$476 billion total does not include Small ICBM costs or ALCM O&S costs. Small ICBM acquisition would cost about \$7.3 billion from 1984 to 1994, and 300 Small ICBMs could cost about \$24 billion in 1988 dollars to acquire and operate for 20 years.

Acquiring, operating, and supporting airborne systems accounted for two-thirds of the \$476 billion total, although the April 1990 reduction in the B-2 program could lower these costs by more than \$30 billion. The Navy's 21 Trident II submarines, equipped with D-5 SLBMs, account for about 25 percent of the \$476 billion total.

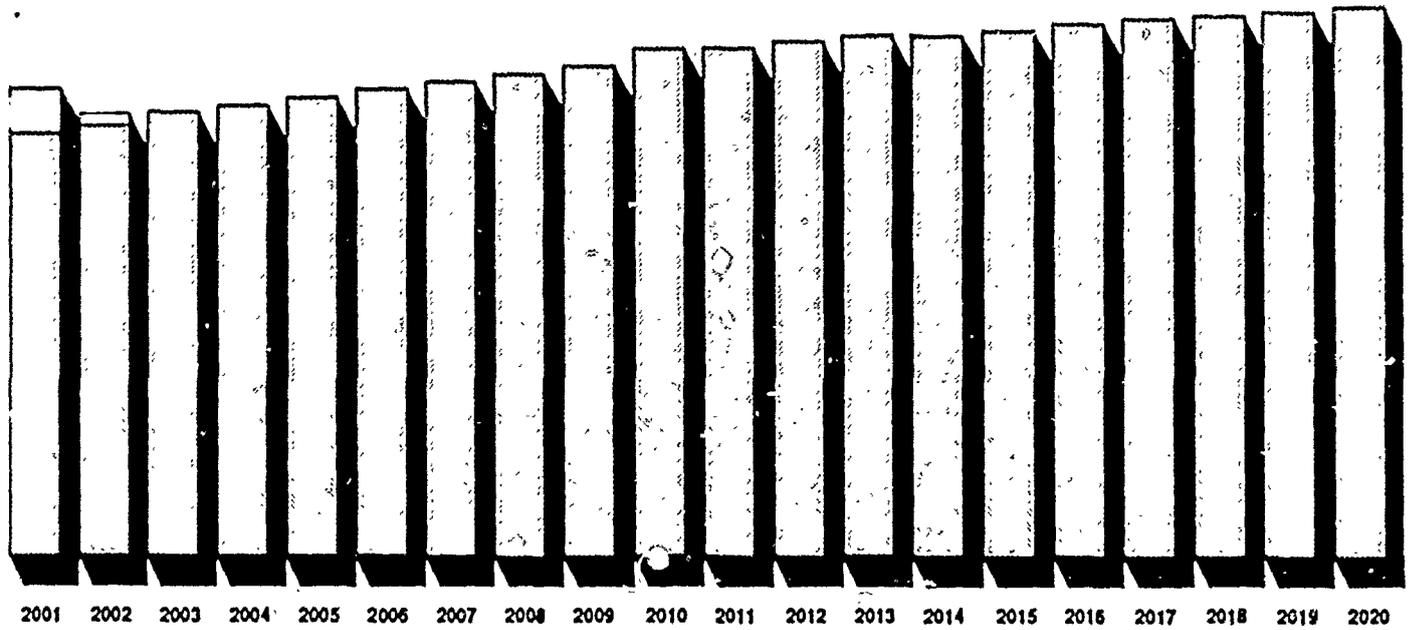
Figure 2.1 (see pp. 14 and 15) shows how the acquisition and O&S costs of the strategic systems would be distributed by year. Figure 2.2 (see pp. 16 and 17) depicts how the total annual cost would be allocated among the three legs of the Triad. Figure 2.3 (see p. 18) depicts the annual distribution of the cost of acquiring these systems, which exceeds \$200 billion. Figure 2.4 (see pp. 20 and 21) shows O&S costs, which could total over \$275 billion, or about 58 percent of the total cost. Cost increases after 2003 are due primarily to inflation.



Figure 2.1: Projected Total Costs of Strategic Systems by Type of Cost  
 20 Then-Year Dollars in Billions



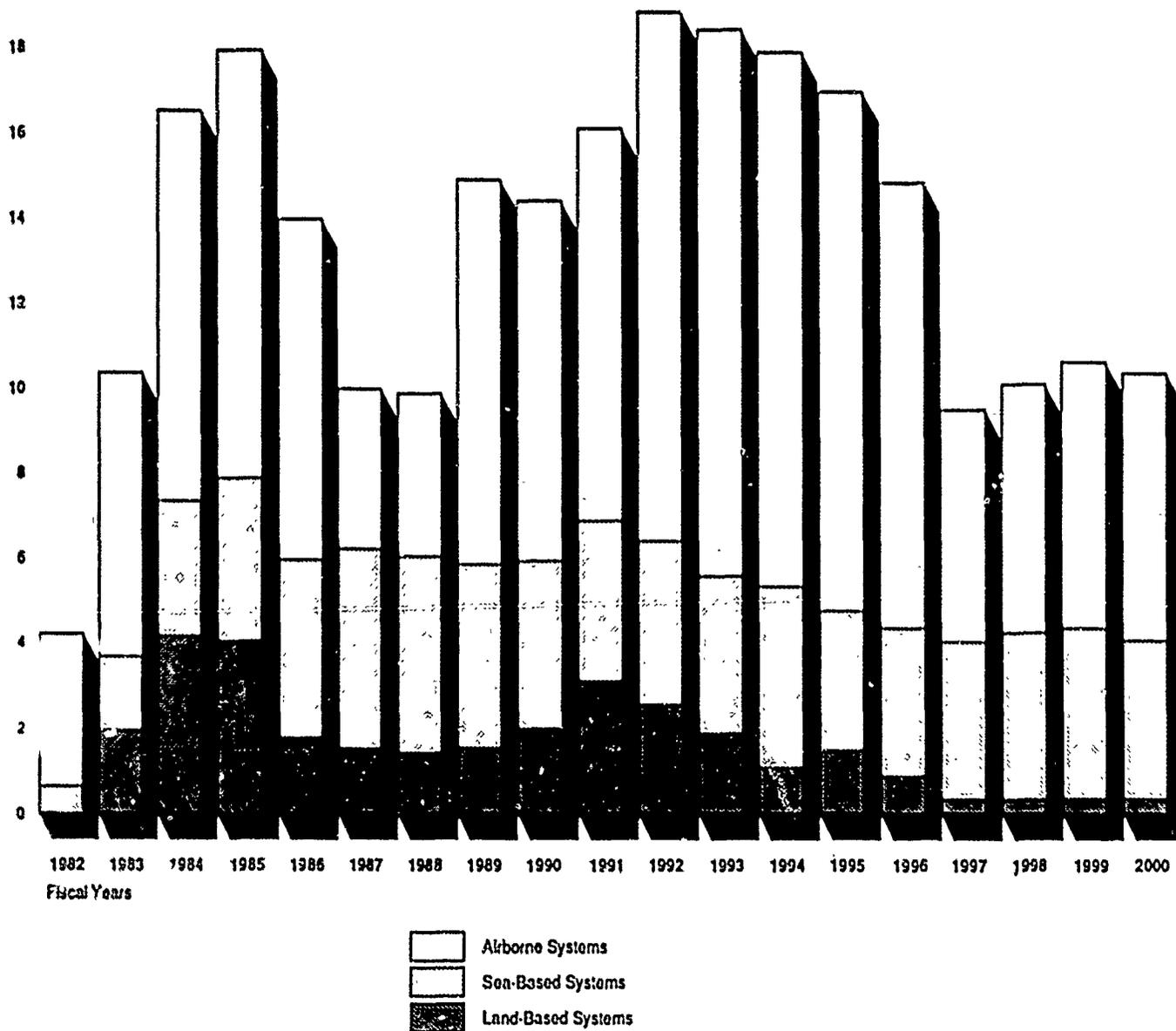
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Program's Weapon Systems



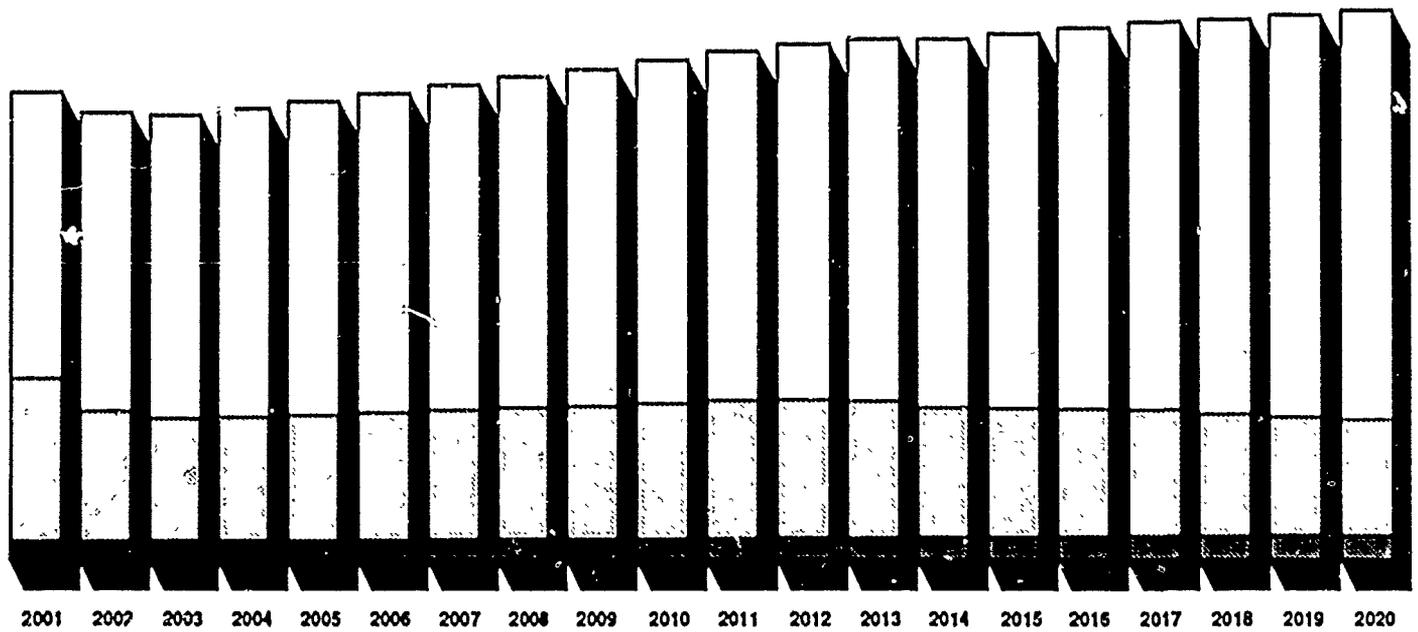
Note: B-2 acquisition costs before 1989 (totaling \$17.3 billion), effects of B-2 program changes announced in April 1990, ALCM O&S costs, and Small ICBM costs are not included.

Figure 2.2: Projected Total Costs of Strategic Systems by Type of System

20 Then-Year Dollars in Billions



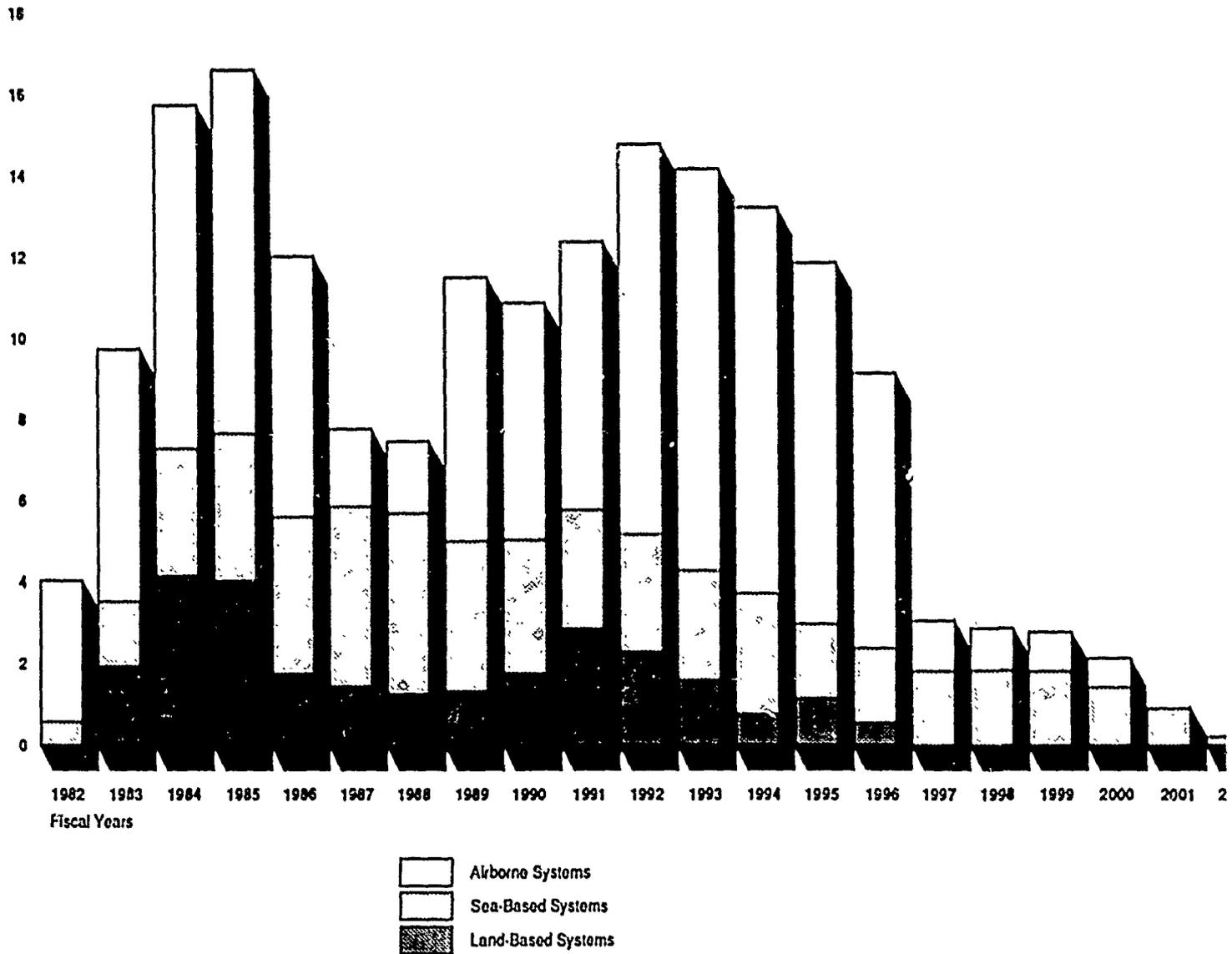
Chapter 2  
Costs of the Strategic Modernization  
Program's Weapon Systems



Note: B-2 acquisition costs before 1989 (totaling \$17.3 billion), effects of B-2 program changes announced in April 1990, ALCM O&S costs, and Small ICBM costs are not included.

Figure 2.3: Projected Acquisition Costs of Strategic Systems

26 Then-Year Dollars in Billions



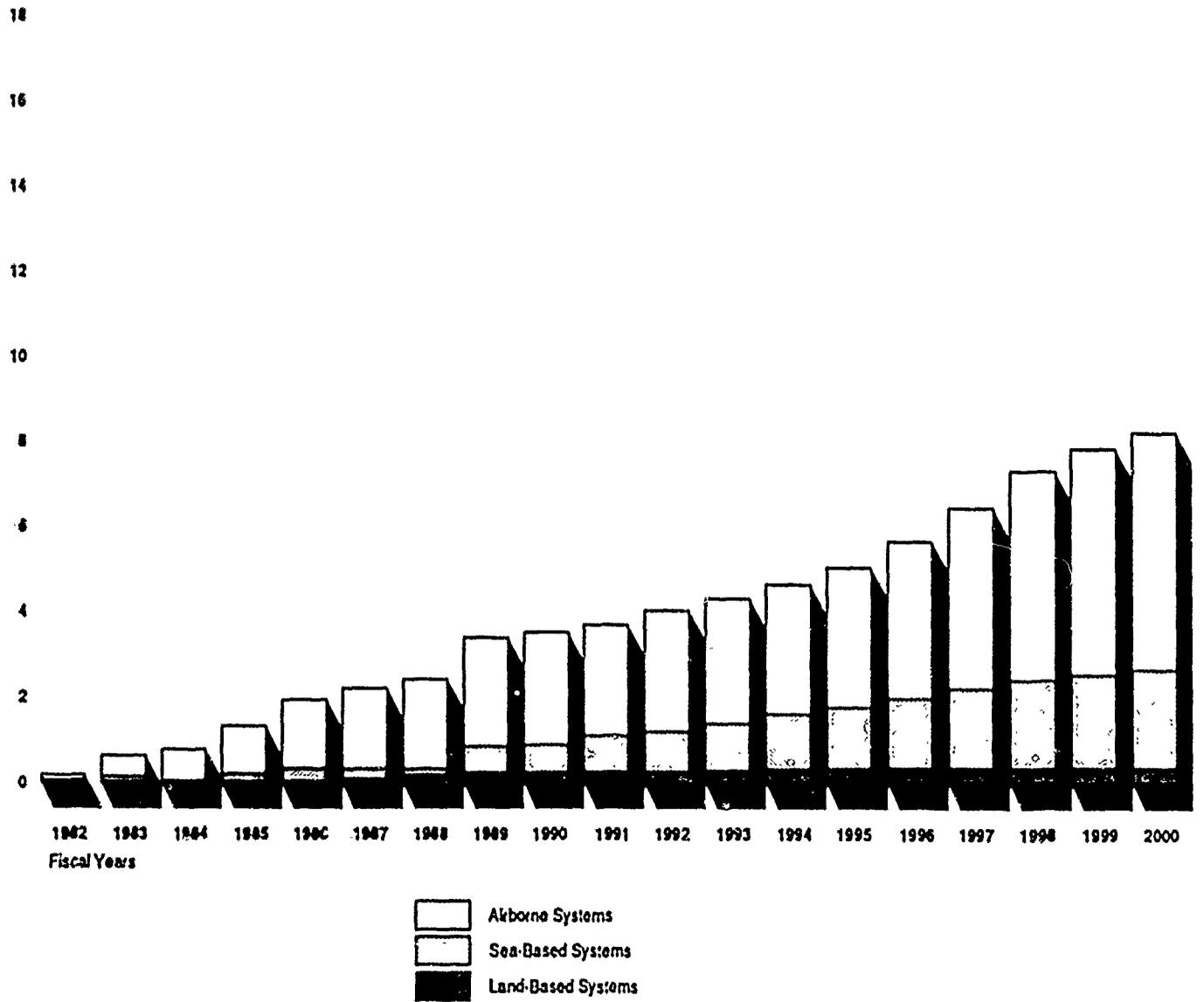
Note: B-2 acquisition costs before 1989 (totaling \$17.3 billion), effects of B-2 program changes announced in April 1990, and Small ICBM costs are not included.

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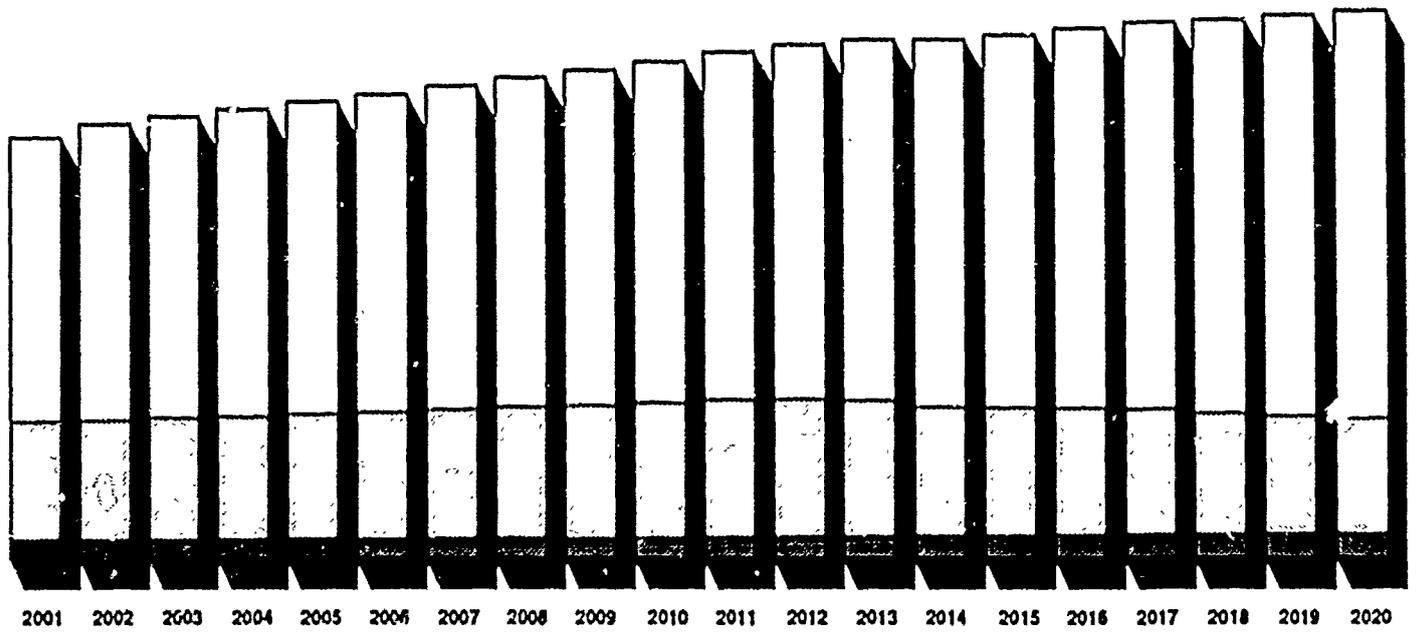
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Figure 2.4: Projected O&S Costs of Strategic Systems

20 Then-Year Dollars in Billions



Chapter 2  
Costs of the Strategic Modernization  
Program's Weapon Systems



Note: ALCM and Small ICBM costs are not included

## Limited Congressional Visibility Over O&S Costs

We found that DOD does not routinely provide the Congress with complete long-term O&S cost estimates for most of the strategic systems.

The Congress has indicated concern over long-term O&S costs by directing DOD to include a complete analysis of life-cycle costs in each new SAR submitted initially after January 1985. However, the SARs for the B-1B, modified B-52, KC-135R, Trident II submarine and missile, and Peacekeeper ICBM were first submitted before January 1985 and do not include life-cycle or O&S cost estimates.<sup>1</sup>

SARs for more recent systems—such as the B-2, SRAM II, ACM, and Rail Garrison—usually include limited O&S estimates that do not contain all of the information needed to fully assess life-cycle O&S costs. O&S estimates are usually stated in terms of average annual O&S costs per wing or squadron in base-year dollars.<sup>2</sup> The SARs often do not identify the number of wings or squadrons to be deployed, the anticipated life of the system or the span of years covered by the average annual cost estimate, the degree of system maturity assumed in computing the average annual cost estimate, the cost of operating and supporting the system before it is fully operational and mature, and guidance for converting base-year dollar O&S estimates into current- or future-year dollars.

An individual system's O&S costs become less visible to the Congress after the system is fielded. DOD does not update a SAR once the system has been deployed. DOD budget documents and the Five Year Defense Plan routinely provided to the Congress do not identify the total O&S costs of specific systems.<sup>3</sup>

The Senate Committee on Appropriations has asked DOD to provide system-specific O&S cost estimates in budget submissions. The Committee's report on the 1988 DOD appropriations bill requested, in part, that (1) each service be able to report accurate and verifiable O&S costs for major systems within 4 years and (2) O&S data for at least 3 major systems per service be included in the 1990 and subsequent budgets. DOD attempted to comply with this direction but did not do so in the 1990 and 1991 budgets.

<sup>1</sup>The Small ICBM SAR also does not include O&S data, apparently because its operational configuration has yet to be determined.

<sup>2</sup>For example, the B-2 SAR's O&S estimate is in 1981 dollars.

<sup>3</sup>For example, the Five Year Defense Plan does not break out depot-level maintenance costs by system. The Air Force operation and maintenance budget justification stated that several areas of support costs cannot be tracked by weapon system.

The Air Force and Navy sources that we used to supplement the few routinely provided O&S cost estimates do not fully compensate for the lack of readily usable and available life-cycle cost estimates. For example, the Air Force Cost Center's databases and models can estimate the future variable O&S costs of typical units of deployed aircraft, such as the B-52, B-1B, and KC-135R. However, its O&S cost models do not estimate costs for strategic missiles or unfielded aircraft. Other Air Force sources were unable to provide us with complete missile O&S data. Although the Navy updated its February 1987 D-5 O&S estimate and estimated Trident II submarine O&S costs, these estimates were prepared at our request and were made available only after numerous discussions with Navy officials over several weeks.

### Understated Cost Projections

We believe that the actual cost of these systems will exceed this report's projections for the following reasons.

#### Low Inflation Rate

The O&S cost projections prepared for this report use a projected 1.8 percent inflation rate for 1994 and beyond that DOD had been using at the time of our work. Historically, this rate is very low. During the last 25 years the Air Force's operation and maintenance and aircraft procurement budget accounts have experienced annual inflation rates that exceeded 1.8 percent. During the 1980s inflation in the operation and maintenance and aircraft account fluctuated from 2.7 to 5.4 percent.

The 1.8 percent rate is also low compared with other projections of future inflation rates, such as the Congressional Budget Office's 4.3 inflation rate for 1994. Annual 4.3 percent inflation rates through 2020 would increase projected B-1B O&S costs from about \$27 billion to over \$35 billion and KC-135R O&S costs from about \$60 billion to about \$80 billion. In its comments, DOD noted that it has begun using 3.1 to 3.4 percent inflation rates for planning beyond 1994.

#### Potentially Low Acquisition Cost Estimates

The acquisition cost estimates may understate the actual cost of developing and deploying these systems in the quantities that were planned in 1989. Earlier this year we found that the B-2 acquisition cost estimate

had grown over 20 percent in less than 4 years.<sup>1</sup> In 1989 we reported that the B-1B program had incurred about \$31 billion in costs—about \$3.7 billion more than shown in the SAR—and that the Air Force planned to spend an additional \$669 million in enhancements. According to the Air Force, the B-1B SAR's cost schedules did not reflect the use of over \$570 million from expired appropriations. (Expired appropriations include surplus authority, merged surplus authority, and "M" account funds.)

### Other Factors

Other factors may also tend to understate the cost projections. For example, Air Force Cost Center officials told us that their variable O&S cost estimates for the B-52, B-1B, and KC-135R do not include software support, interim contractor support, or most indirect O&S costs. The SAR O&S estimates that we reviewed are stated in terms of average annual costs and, to the extent that they assume mature levels of operation, may understate O&S costs before system maturity is achieved. SAR acquisition funding schedules do not include nuclear costs<sup>2</sup> or post-acquisition enhancement costs.

### Conclusions

At the beginning of the past decade, concern over the threat posed by the Soviet Union resulted in significant increases to the U.S. defense budget and in the strategic modernization program. However, recent events in the Soviet Union and Eastern Europe suggest that perceptions of a diminished Soviet threat will lead to greater efforts in this decade to control the federal deficit through reduced defense spending.

The Congress is considering the first defense budget of the 1990s in light of these events and is assessing the affordability of major defense systems. However, congressional concerns regarding the affordability of strategic systems can be fully resolved only with complete and accurate estimates of each system's life-cycle O&S costs. Such estimates will not be readily available until DOD fulfills congressional directives aimed at establishing a uniform system for routinely providing the Congress with

<sup>1</sup>Strategic Bombers: B-2 Program Status and Current Issues (GAO/NSIAD-90-120, Feb. 22, 1990).

<sup>2</sup>Strategic Bombers: B-1B Cost and Performance Remain Uncertain (GAO/NSIAD-89-55, Feb. 3, 1989).

<sup>3</sup>According to DOD's instructions, SARs report nuclear armament and propulsion costs as separate, nonadditive items.

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more complete O&S cost estimates. Until then, congressional decisionmakers will have to request such estimates from the services on a case-by-case basis.

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### Agency Comments and Our Evaluation

In its comments on a draft of this report, DOD basically agreed with the report's findings and conclusions. It also agreed with the overall numbers used in our projections of each system's long-term costs. However, it commented that our analysis would have been more useful if we had shown each program's complete life-cycle costs in constant-year dollars because (1) use of then-year dollars would tend to exaggerate O&S costs and (2) comparisons of programs using aggregated then-year dollars can be misleading because they obscure the effects of inflation in combination with the high and low points of each program's funding profile.

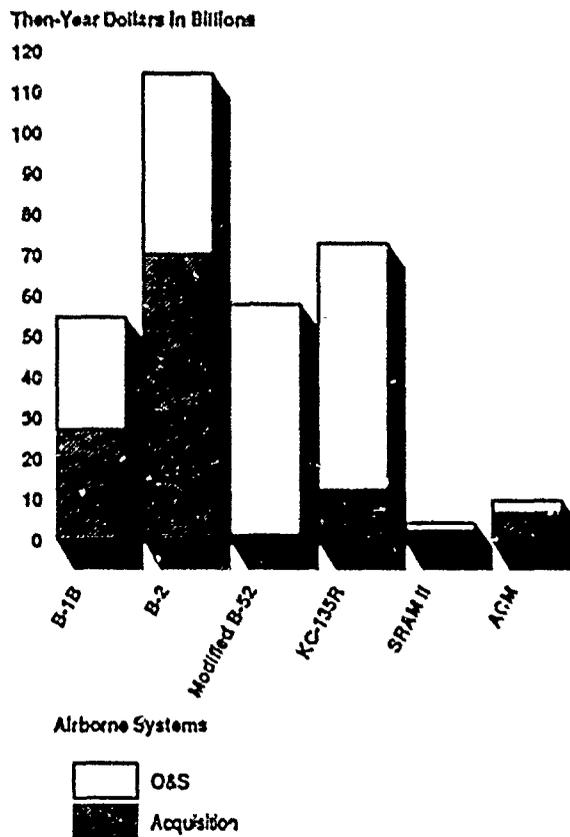
We believe that then-year dollars are appropriate units of measurement for our analysis because almost all of the cost projections are depicted graphically on a year-by-year basis to illustrate both the rise and fall of costs over time and the long-term impact of O&S costs. Then-year dollar figures are well-suited for this purpose because they enumerate each year's costs in the type of dollars that would be requested for that year. Our use of DOD's 1.8 percent inflation rate for 1994 and beyond should mitigate the impact of inflation whenever we aggregate then-year dollar estimates.

DOD also commented that in the past it was not required to routinely report complete O&S cost data for specific systems.

# Airborne Systems

Data assembled from S&AS and Air Force officials indicated that the B-1B, B-2, modified B-52, KC-135R, SRAM II, ALCM, and ACM may cost about \$315 billion to acquire, operate, and support from 1982 to 2020.<sup>1</sup> Of this amount, 61 percent is for O&S costs. Figure 3.1 shows the acquisition and O&S costs of six airborne systems.

**Figure 3.1: Costs of Six Airborne Systems**



Note: We were unable to obtain ALCM O&S costs

## B-1B Bomber

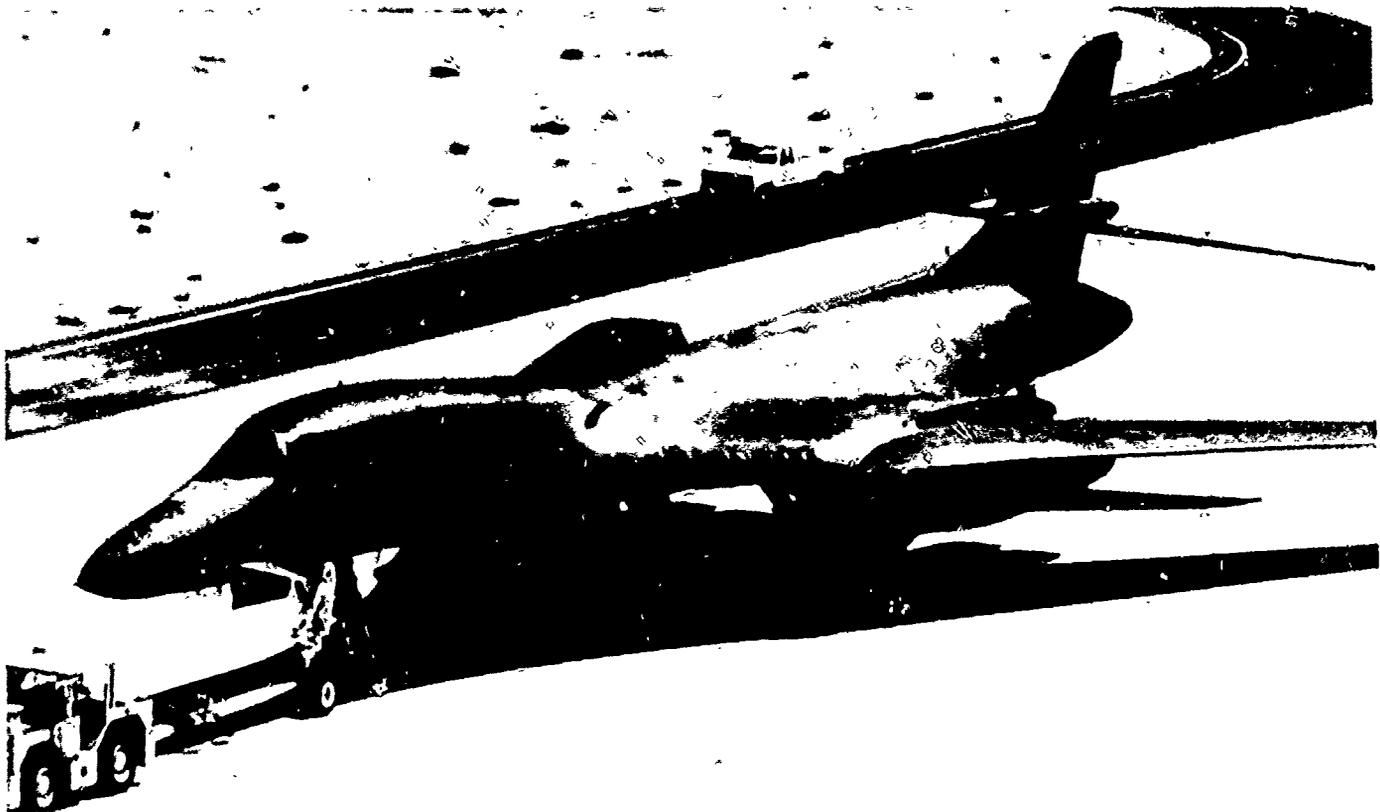
The cost of acquiring, supporting, and operating the baseline configuration B 1B from 1982 through 2020 could exceed \$54 billion, according to Air Force cost estimates.

<sup>1</sup>Changes in the B-2 program announced after we completed our work could reduce this amount by over \$30 billion.

## Background

The B-1B is a four-engine bomber with variable sweep wings. The Air Force plans to replace the B-52 as a penetrating bomber with the B-1B, which will eventually be used as a cruise missile carrier after the B-2 has been deployed. Figure 3.2 shows a B-1B.

Figure 3.2: The B-1B Bomber



Source: DOD

The President announced in 1981 that the B-1E would be deployed. It first flew in October 1984, achieved initial operational capability in September 1986, and completed production in 1988. The B-1B has had numerous problems,<sup>2</sup> and DOD's Operational Testing and Evaluation Director does not consider it to be fully capable. The Air Force informed us that system maturity is planned for 1994.

<sup>2</sup>These problems are described in our February 1989 B-1B report and in *Strategic Bombers: Logistics Decisions Impede B-1B Readiness and Supportability* (GAO/NSIAD-89-129, May 19, 1989).

## Acquisition Costs

According to the funding summary in the 1989 SAR, acquiring the B-1B will cost about \$27.4 billion, including about \$27.2 billion for 1982 and beyond.<sup>3</sup> The estimate included 100 baseline B-1Bs<sup>4</sup> equipped to carry gravity bombs, ALCMs, and the original SRAM; and a 6-year extension of the acquisition program to correct defensive avionics system defects and obtain deferred support equipment.

In February 1989 we reported that the Air Force had incurred costs of about \$31 billion for 100 B-1Bs, including \$3.7 billion for non-baseline items excluded from the SAR. The Air Force plans to spend an additional \$669 million to enhance the B-1B with the SRAM II and two satellite systems. Another \$365.8 million for construction was excluded from the SAR's overall estimate.

## O&S Costs

The Air Force Cost Center provided us with estimates of O&S costs for a typical unit of 16 B-1Bs from 1989 through 1997. These estimates are shown in table 3.1.

Table 3.1: Estimated O&S Costs of a B-1B Unit

Then-year dollars in millions				
Fiscal year	Procurement	Operation and maintenance	Military compensation	Total
1989	\$58.4	\$41.5	\$41.5	\$141.4
1990	60.6	41.3	42.4	144.3
1991	23.1	42.7	43.5	109.3
1992	23.7	44.1	44.6	112.4
1993	23.9	45.4	45.6	114.9
1994	24.5	46.6	46.7	117.8
1995	25.0	47.8	47.8	120.6
1996	25.4	49.1	49.0	123.4
1997	25.8	50.3	50.1	126.2

Note: Totals may not add due to rounding

<sup>3</sup>According to the SAR, the \$27.4 billion sum equals about \$20.3 billion in 1981 dollars. The SAR also states that the cost is over \$20.8 billion in 1981 dollars. The Air Force informed us that the discrepancy was due to the use of expired appropriations. For more information, see our report, Strategic Bombers: B-1B Program's Use of Expired Appropriations (GAO/NSIAD-89-209, Sept. 5, 1989).

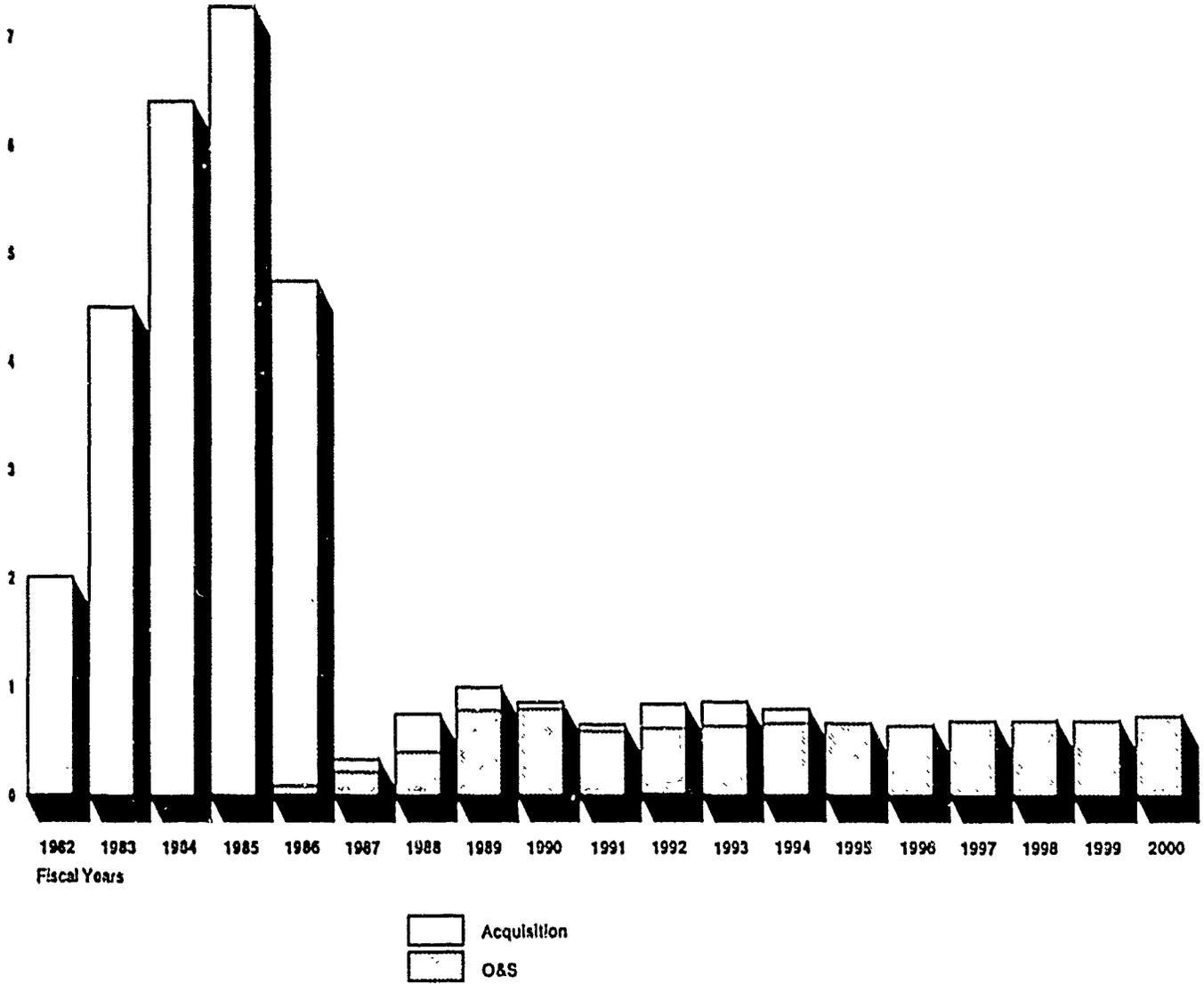
<sup>4</sup>Crashes have reduced the B-1B fleet to 97.

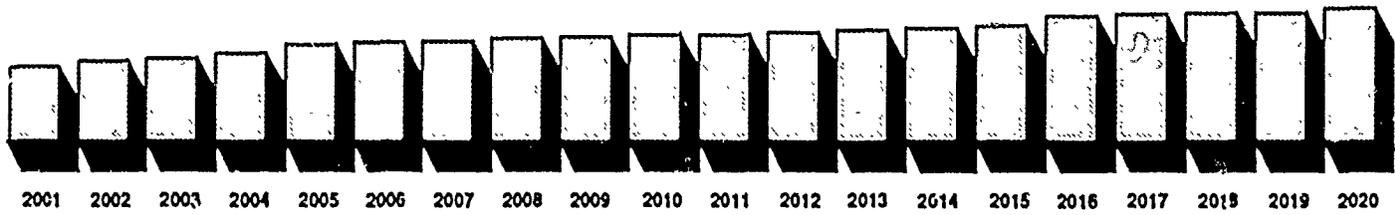
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We also obtained O&S data for 1986 through 1988 from the Air Force Cost Center. We used these data and guidance from Air Force and DOD officials to project O&S costs for the entire B-1B fleet from 1986 to 2020 at \$27.4 billion. Figure 3.3 combines the SA's acquisition cost estimate with the O&S cost projection.

Figure 3.3: Estimated Baseline B-1B Costs From 1982 to 2020

\$ Billion-Year Dollars in Billions





## B-2 Bomber

Acquiring 133 B-2 bombers and operating four wings of B-2s through 2020 could cost over \$11.4 billion.<sup>5</sup> DOD's April 1990 decision to acquire only 76 B-2s and operate two wings could reduce this amount by over \$30 billion.

## Background

The B-2, depicted in figure 3.4, first flew in 1989. According to DOD, the B-2 has been designed to penetrate Soviet air defenses at both high and low altitudes by using special shaping, radar absorbing materials, and other technologies to reduce its detectability. It will be able to carry up to 26 tons of payload, including 16 to 20 SRAM IIs.

Figure 3.4: The B-2 Bomber



Source: DOD

<sup>5</sup>At the time of our work, many aspects of the B-2 program were designated special access required. We restricted our work to data that was not designated special access required.

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## Acquisition Costs

In 1986 DOD estimated that the B-2 would cost \$58.2 billion to acquire. By mid-1989 the estimated cost of 133 B-2s had grown to \$70.2 billion due to an incomplete aircraft design at the start of manufacturing, underestimated material costs, and production schedule extensions. The 1989 estimate assumed that (1) the Congress would approve at least \$7.5 billion annually for four consecutive years, (2) \$6.2 billion would be saved through cost saving initiatives and multiyear procurement, and (3) the schedule would be met, despite less progress than planned in improving the manufacturing process.<sup>6</sup>

After we completed our work, DOD raised its estimate for 133 B-2s to \$75.4 billion before announcing in April 1990 that it would acquire no more than 75 B-2s for an estimated cost of \$61.1 billion. It did not release the annual allocation of this cost.

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## O&S Costs

The Air Force estimated the average annual O&S cost, in 1981 dollars, of a wing of 30 B-2s. According to DOD, the estimate included direct costs of supporting primary personnel and operations; indirect costs of base operating support personnel; and depot costs of overhauls, component part repairs, modification installation, and software support.

We inflated this estimate and multiplied the result to calculate the average annual cost of four B-2 wings. To approximate O&S costs during deployment, we prorated the estimate by the data in the then-current delivery schedule, although this approach would not capture any above average O&S costs that might result from a lack of system maturity.

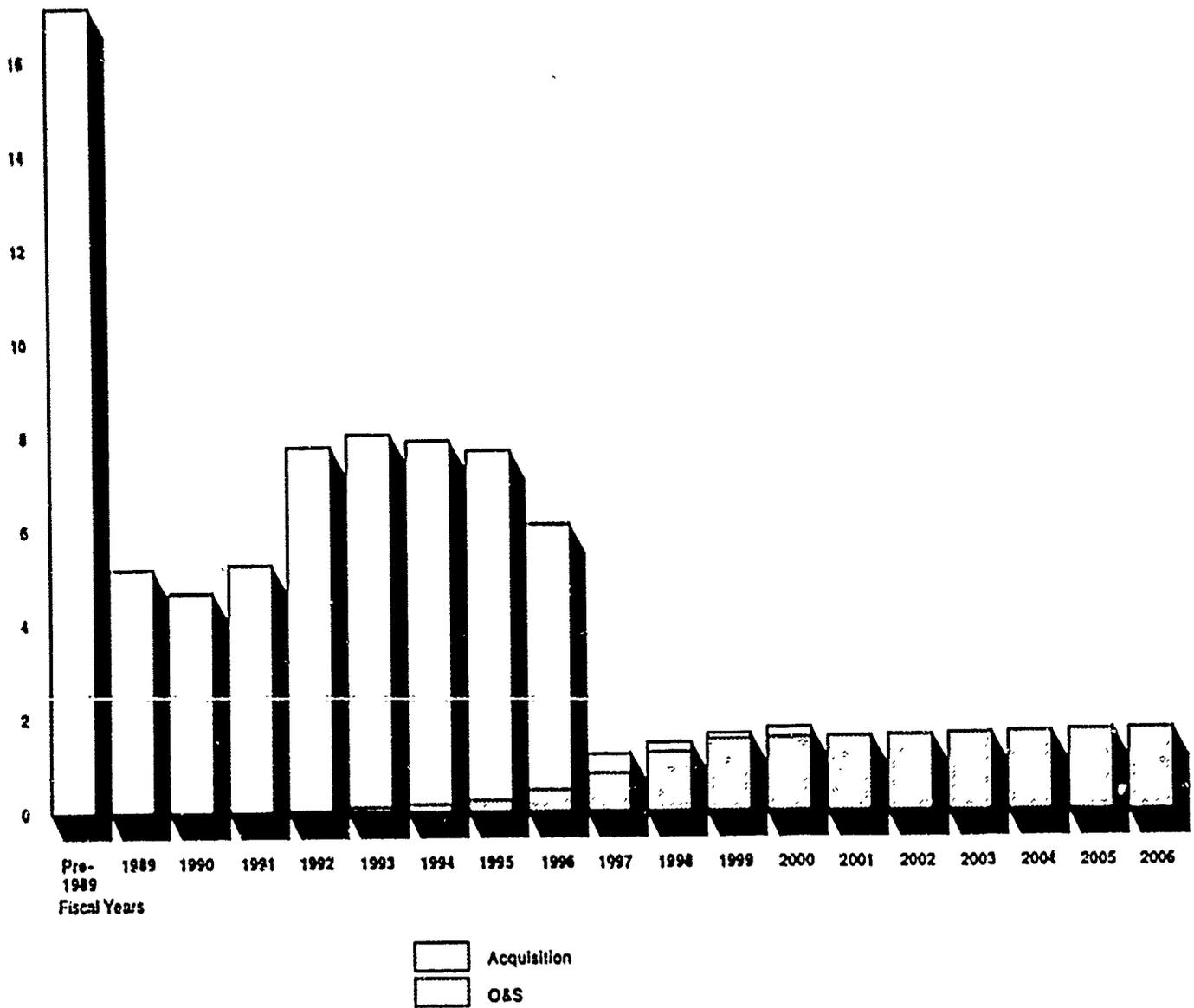
We projected the O&S cost of four B-2 wings through 2020 at \$44.1 billion. The annual allocation of DOD's 1989 acquisition cost estimate for 133 B-2s and our O&S projection for 4 B-2 wings are depicted in figure 3.5. In April 1990 DOD announced that it would operate two B-2 wings. Based on our O&S cost projection for four wings, two wings could cost about \$22 billion through 2020.

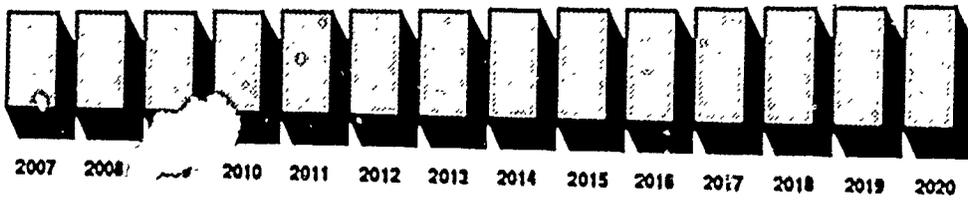
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<sup>6</sup>These issues are discussed in our February 1990 B-2 report.

Figure 3.5: Cost of Acquiring 133 B-2s and Operating 4 B-2 Wings Through 2020

18 Then-Year Dollars in Billions





## Modified B-52 Bomber

SAR and Air Force data indicated that acquiring, operating, and supporting modified B-52s from 1992 to 2020 could cost \$57.3 billion.

## Background

The Air Force acquired almost 300 B-52G and B-52H bombers from 1958 to 1962. These aircraft continue to make up the bulk of the U.S. strategic bomber force. Figure 3.6 shows a B-52 bomber that has been modified to carry ALCMs.

Figure 3.6: The Modified B-52 Bomber



Source: DOD

The B-52's strategic role is shifting from penetrating Soviet airspace to carrying long-range cruise missiles. To allow the bomber to carry ALCMs and to improve its avionics, the Air Force began the B-52 Cruise Missile Integration and Offensive Avionics System program in 1977. Air Force officials informed us that 264 B-52s had been fitted with the Offensive Avionics System by the end of 1987. Of these aircraft, 195 will be integrated with ALCMs by the end of 1990.

When we conducted our work, Air Force officials stated the B-52G and B-52H were not scheduled for retirement and that these aircraft could remain in service into the 2020s. The Air Force plans to reduce its B-52G force.

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**Acquisition Costs**

The final SAR for the B-52 modification program identified acquisition costs of about \$2.3 billion, including about \$1.2 billion for 1982 and beyond.

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**O&S Costs**

The Air Force Cost Center provided us with estimated annual O&S costs for a typical unit of 14 B-52Gs and a typical unit of 19 B-52Hs for 1990 through 1997. It also provided historical O&S cost data.<sup>7</sup> With assistance from Air Force and DOD staff, we adjusted and inflated these estimates to project about \$56.5 billion in O&S costs for modified B-52s through 2020.

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**KC-135R Tanker**

DOD and Air Force data indicated that the KC-135R will cost about \$72.6 billion to acquire, operate, and support from 1982 to 2020.

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**Background**

The Air Force is acquiring KC-135R tankers by modifying existing KC-135 tankers with more fuel-efficient engines, strengthened landing gears, and other improvements. It initiated full-scale production in 1981 and began operating the first KC-135R squadron in June 1985. The Air Force informed us that 482 Air Force KC-135s will be converted by the end of 1998. From 1998 to 2002, 154 Air National Guard and Air Force Reserve KC-135Es will be converted. Figure 3.7 shows a KC-135R.

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<sup>7</sup>The historical data included modified and unmodified B-52s. We adjusted annual costs to reflect the modification program's pace.

Figure 3.7: The KC-135R Tanker



Source: DOD

### Acquisition Costs

The 1989 KC-135R SAR estimated that acquiring 637 KC-135Rs<sup>a</sup> will cost almost \$12.6 billion. The Air Force's KC-135R program monitor subsequently provided us with an adjusted annual summary that reflected the President's April 1989 revised budget and projected post-1981 acquisition costs at about \$12.3 billion.

<sup>a</sup>One KC-135 crashed during 1989 after the SAR was released.

**O&S Costs**

We obtained the Air Force Cost Center's estimates for operating and supporting a unit of 18 Air Force KC-135Rs from 1989 to 1997. These estimates are shown in table 3.2.

**Table 3.2: Estimated O&S Costs of a KC-135R Unit**

Then-year dollars in millions				
Fiscal year	Procurement	Operation and maintenance	Military compensation	Total
1989	\$4.8	\$8.8	\$12.2	\$25.8
1990	4.6	13.6	12.5	30.6
1991	5.2	14.1	12.8	32.1
1992	5.6	14.6	13.0	33.1
1993	5.3	15.0	13.3	33.6
1994	5.5	15.4	13.5	34.4
1995	5.6	15.9	13.8	35.2
1996	5.7	16.3	14.0	36.0
1997	5.8	16.7	14.4	36.8

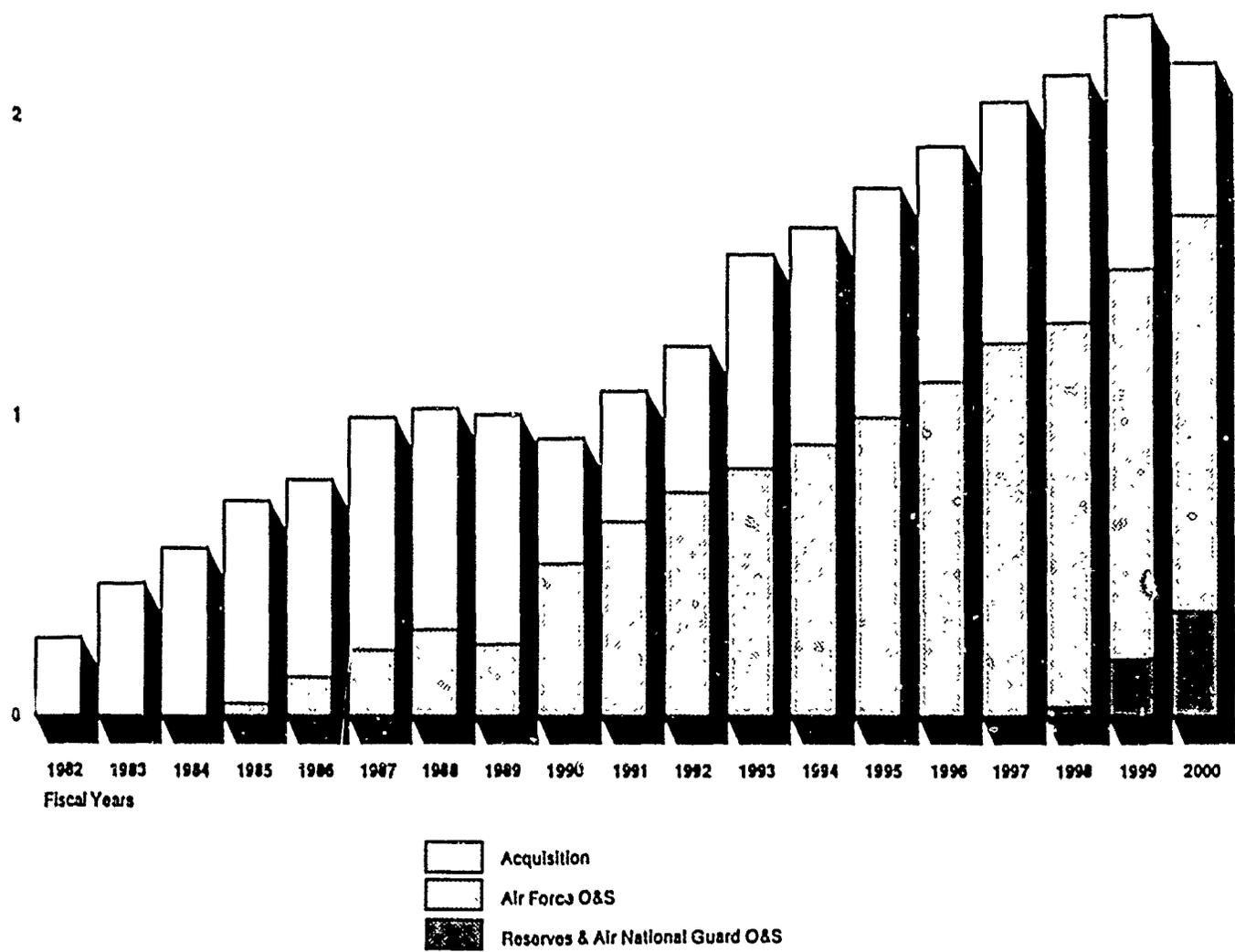
Note: Totals may not add due to rounding.

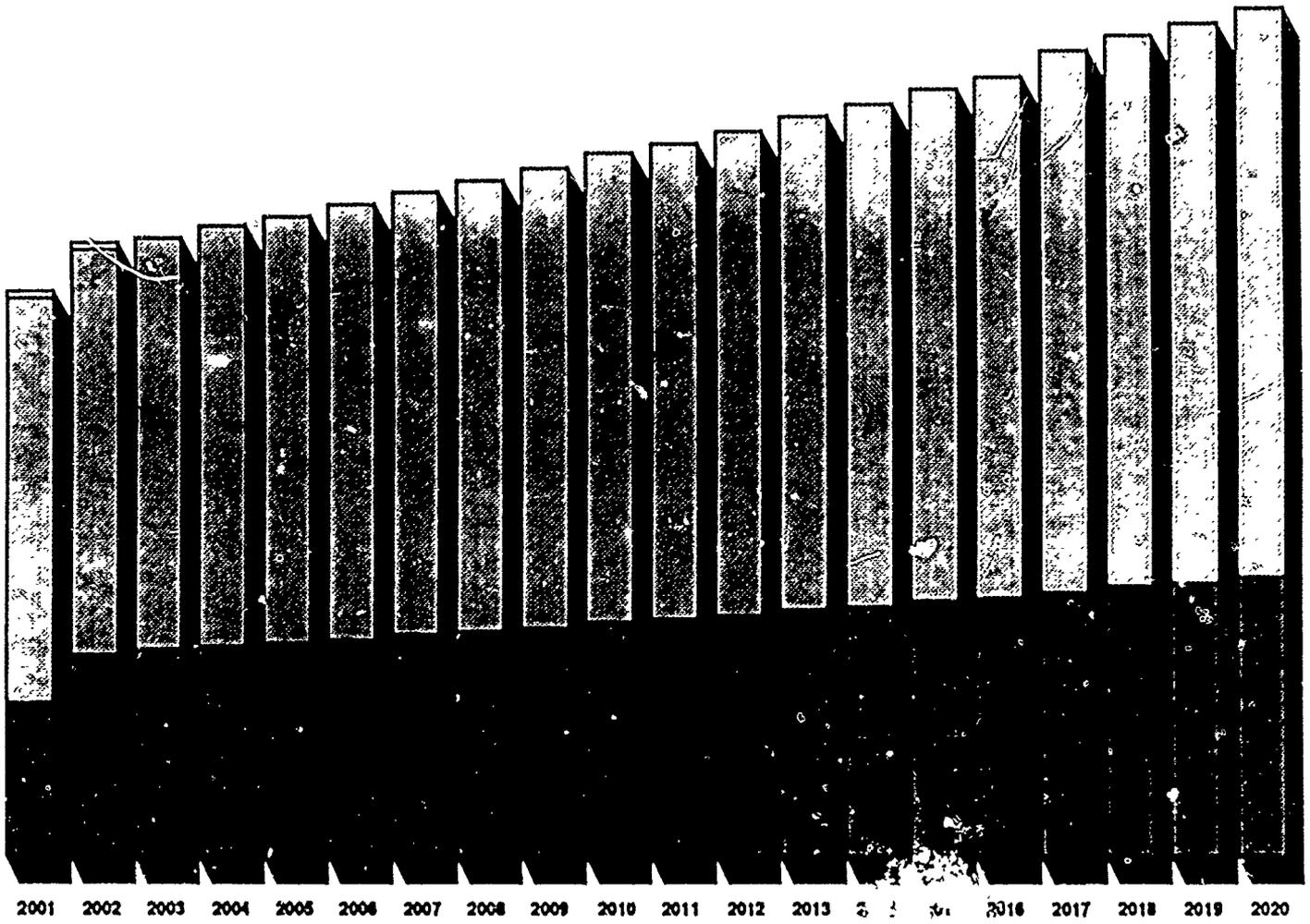
At our request, the Cost Center estimated the o&s costs of Air National Guard and Reserve KC-135R units.<sup>a</sup> We adjusted and prorated the Cost Center estimates with other Air Force data and inflated the results to project KC-135R o&s costs of \$60.4 billion from 1982 to 2020. Figure 3.8 combines this projection with the acquisition cost estimate.

<sup>a</sup>The Cost Center assumed that future Air National Guard and Reserve KC-135R operations will resemble current KC-135 operations.

Figure 3.8: Estimated KC-135R Costs From 1982 to 2020

3 Then-Year Dollars in Billions





## SRAM II

Air Force cost estimates indicate that SRAM II acquisition and O&S could cost about \$4.1 billion through 2020.

## Background

The supersonic, air-to-surface SRAM II, shown in figure 3.9, will replace the aging SRAM-A and be carried by the B-1B and B-2. According to DOD, the SRAM II will be able to penetrate advanced defenses to strike defended, hardened, and relocatable targets.

Figure 3.9: The SRAM II



Source: Air Force

Over 1,600 SRAM IIs will be built and 1,225 will be deployed in 10 squadrons. At the time of our work, the first launch was planned for September 1990. Initial and full operational capability are scheduled for April 1993 and October 1998, respectively. The 1990 SAR indicated that the first flight is now scheduled for April 1991 and first deliveries are planned for 1994. According to the Air Force, the SRAM II's service life is 25 years. Steady-state operations will begin in 2001.

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**Acquisition Costs**

According to the SAR, the SRAM II will cost over \$2.3 billion to acquire, including development associated with B-1B integration.

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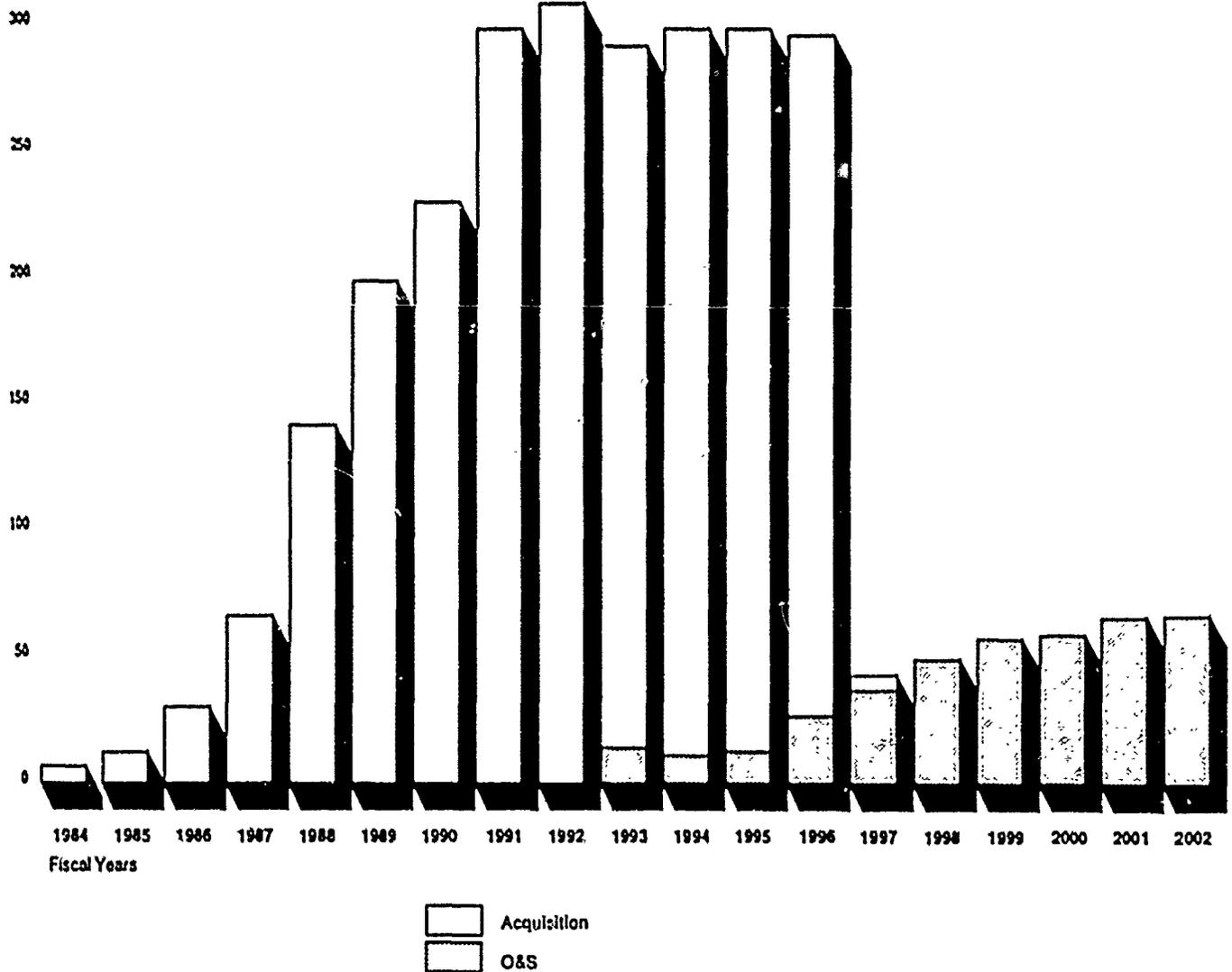
**O&S Costs**

The SRAM II SAR included an average annual steady-state O&S cost estimate for SRAM IIs on a unit of B-1Bs. It does not reflect the cost of SRAM IIs on B-2s. According to the SAR, the estimate includes personnel, including base-level personnel support; O&S consumables; direct depot maintenance, including staff and materials for component repair, nuclear test instrumentation kit repairs, surveillance testing, and depot supply; sustaining investment, including replenishment spares, support equipment maintenance, and software support; other direct costs, including follow-on test and evaluation flights and transportation; and indirect costs, such as personnel acquisition and training.

The SAR did not specify the number of B-1B or B-2 units that will carry the SRAM II. At our request, Air Force officials provided estimates of total SRAM II O&S costs from 1993 to 2007. We inflated these estimates from 1983 dollars to then-year dollars and inflated the 2007 estimate through 2020. Figure 3.10 combines the \$1.7 billion O&S cost projection with the acquisition estimate.

Figure 3.10: Estimated SRAM II Costs From 1984 to 2020

\$9 Then-Year Dollars in Millions

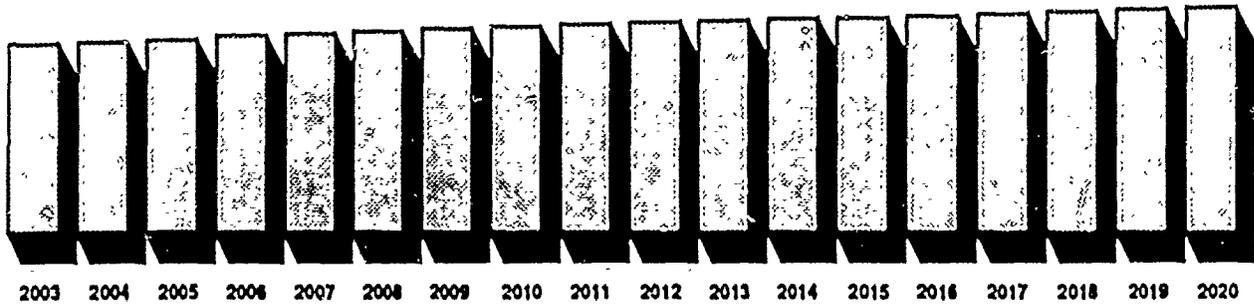


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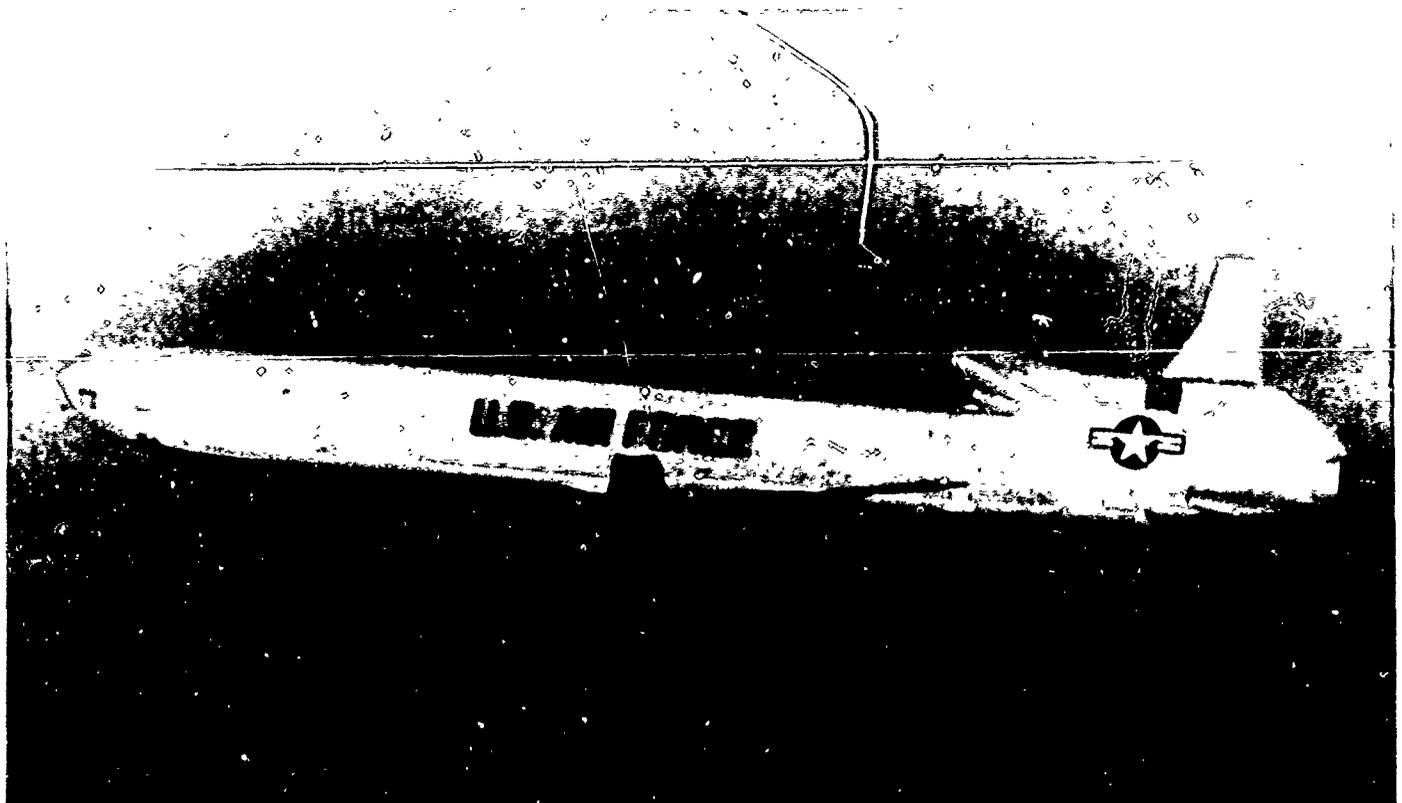
**ALCM**

The final ALCM SAR indicates that the ALCM cost almost \$2 billion to acquire during and after 1982. O&S costs were unavailable.

**Background**

DOD describes the ALCM—shown in figure 3.11—as a subsonic, nuclear air-to-surface missile with a range of about 1,350 nautical miles. Up to 20 ALCMs can be carried by a B-52. The B-1B SAR indicates that the B-1B will also be able to carry 20 ALCMs.

Figure 3.11: The ALCM



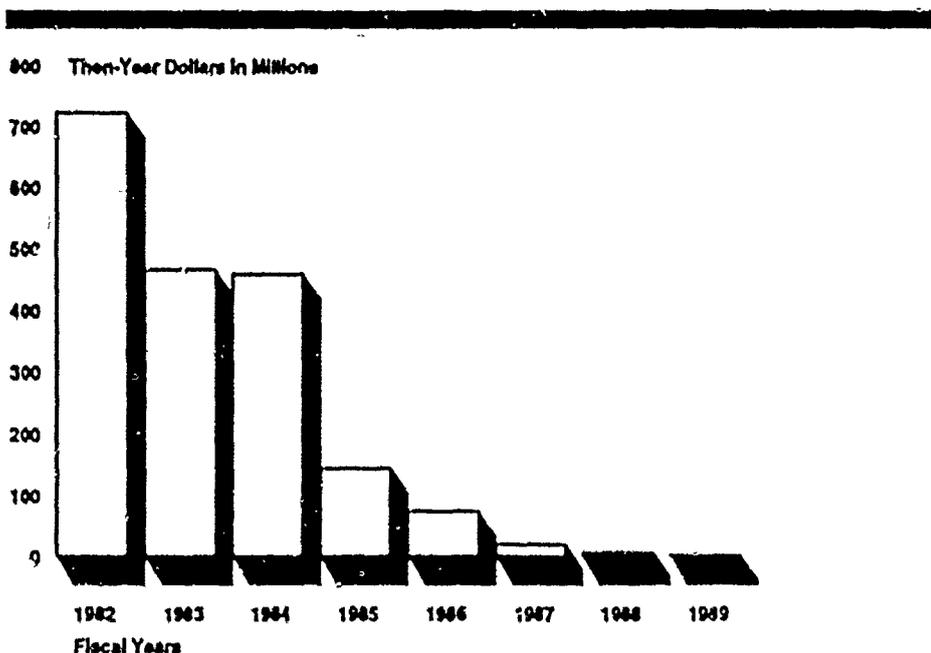
Source: DOD

DOD initiated the ALCM program in 1974. The first squadron of ALCM-equipped B-52s began operating in December 1982. Over 1,700 ALCMs were produced. Full operational capability is scheduled for 1990.

Acquisition Costs

The final ALCM SAR, completed in December 1985, estimated ALCM acquisition cost at about \$4.1 billion. About \$2 billion was appropriated for 1982 and beyond, as shown in figure 3.12.

Figure 3.12: ALCM Acquisition Costs From 1982 to 1989



O&S Costs

Air Force officials were unable to provide us with complete and current ALCM O&S cost estimates.

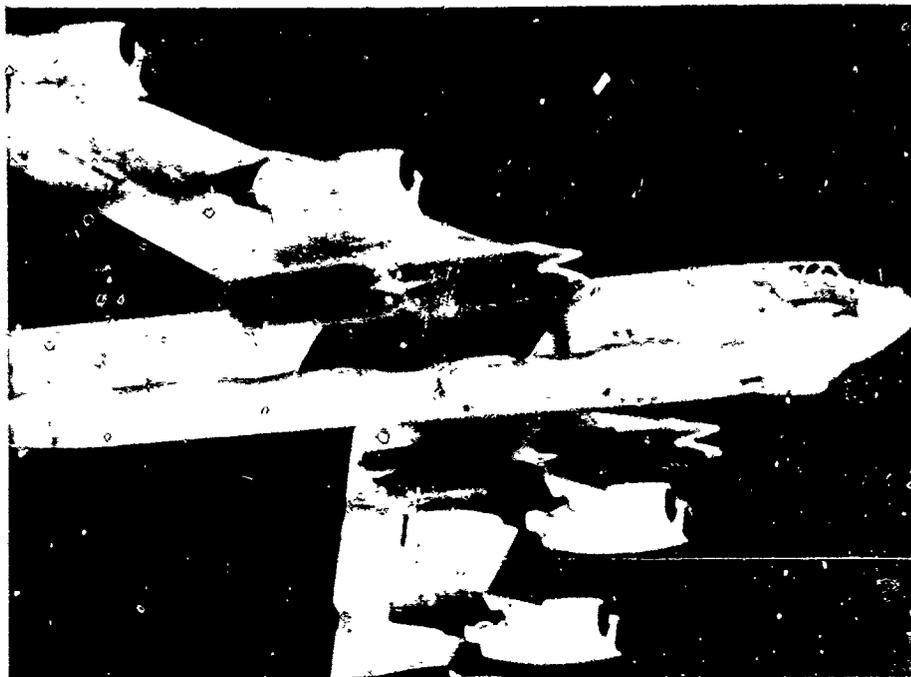
ACM

Data in the SAR indicates that acquiring, operating, and supporting the ACM through 2020 may cost about \$9.6 billion.

Background

According to the December 1989 SAR, the ACM will require operational integration with the B-52 and B-1B. Figure 3.13 shows a B-52 carrying ACMS.

Figure 3.13: ACMs on a B-52



Source DOD

The first ACM flight occurred in July 1985. In July 1986 DOD decided to begin initial low-rate production. Although serious flight test problems have hampered the ACM's progress,<sup>14</sup> the Air Force plans to achieve initial operational capability in March 1991 and to finish procuring over 1,400 ACMs in 1995.

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### Acquisition Costs

According to the SAR, the ACM will cost about \$6.7 billion to acquire. The estimate included aircraft integration costs but excludes \$979.9 million in nuclear costs.

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### O&S Costs

According to the SAR, during steady-state operations an ACM-equipped bomber wing will incur average annual ACM O&S costs of about \$14.3 million in 1983 dollars, including direct personnel costs; depot maintenance staff-hours, interim contractor support, and surveillance of the ACM;

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<sup>14</sup>As of December 1988, more than one-half of the test flights had crashed. In January 1989, DOD's Operational Test and Evaluation Director reported that the ACM had "...failed to demonstrate acceptable performance in several areas that will severely affect its operational effectiveness and suitability if not corrected."

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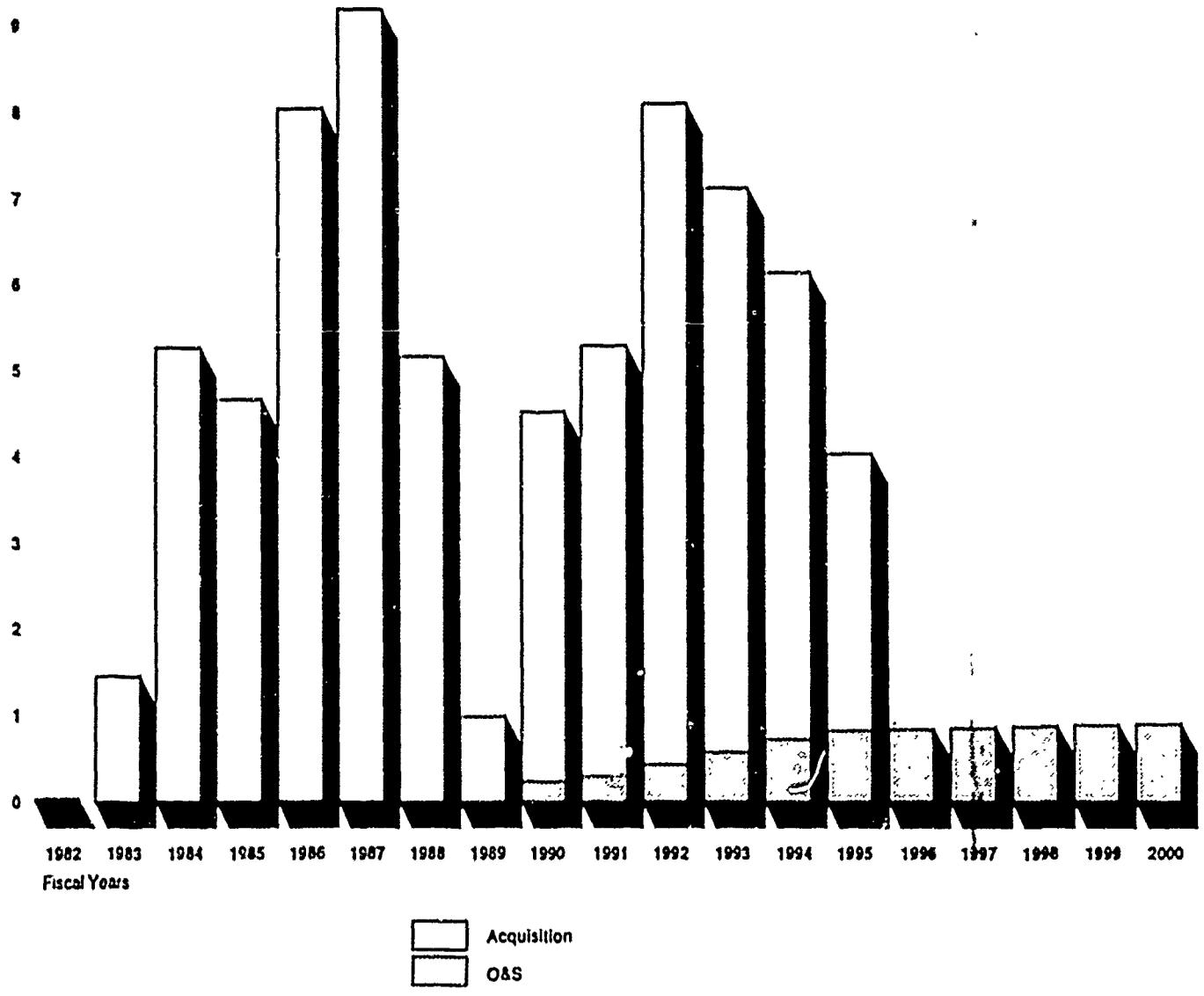
indirect personnel costs at operating facilities; and transportation, material management, and system management and contractor sustaining support. The estimate is equivalent to \$18.3 billion in 1990 dollars.

The SAR did not specify the number of wings to be equipped with the ACM. Air Force officials informed us that four bomber wings will carry ACMS.

Because the SAR does not specify full operational capability or system maturity dates, we assumed that full operational capability would occur at the end of acquisition. To approximate O&S cost during deployment, we prorated the average annual cost estimate by the SAR's production data. After inflating the results, we projected O&S costs from 1990 to 2020 at \$2.9 billion. Figure 3.14 depicts the acquisition cost estimate and O&S projection.

Figure 3.14: Estimated ACM Costs From 1982 to 2020

10 Ten-Year Dollars in Billions



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# Intercontinental Ballistic Missiles

The strategic modernization program includes the Peacekeeper, Rail Garrison, and Small ICBM programs. Current estimates indicate that the Peacekeeper and Rail Garrison programs will cost about \$39 billion from 1982 to 2020. Small ICBM costs are unknown, pending decisions on its configuration, force structure, and basing.

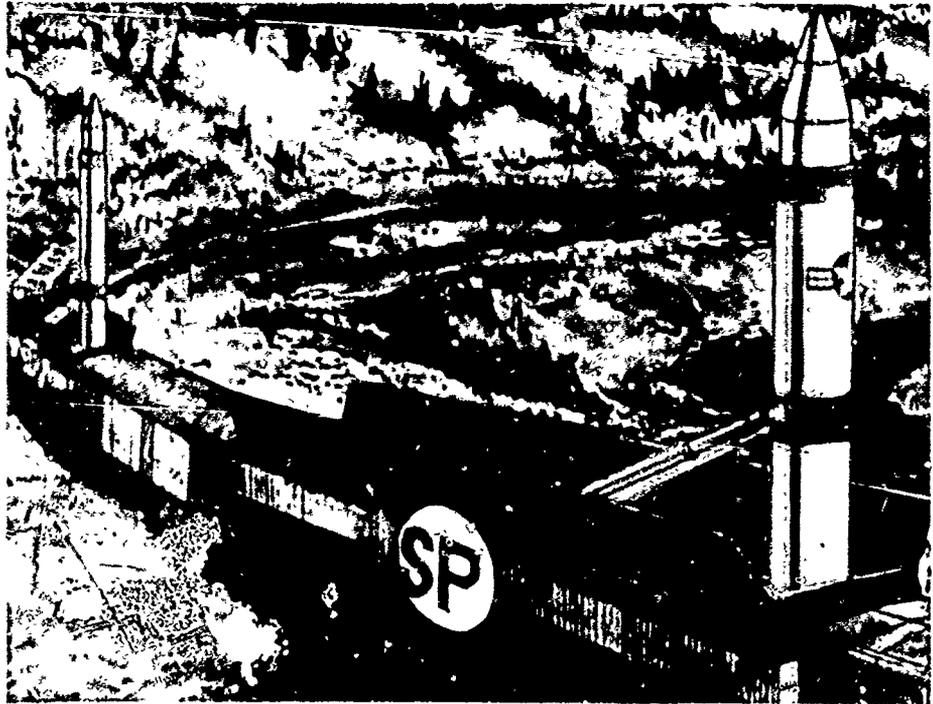
## Peacekeeper and Rail Garrison

The 1990 Peacekeeper and Rail Garrison S&S reflected program changes announced in April 1989. Data in these S&S and a past O&S estimate suggest that the revised Peacekeeper program could cost \$26.7 billion to acquire and \$12.3 billion for O&S through 2020.

## Background

Full-scale development of the 4-stage, 10-warhead Peacekeeper began in September 1979. It achieved initial operational capability in 1986 and full operational capability in 1988. The Air Force has 50 Peacekeepers now based in silos. DOD plans to move these missiles to the mobile Rail Garrison basing system, which is scheduled to achieve initial operational capability<sup>1</sup> in 1992 and full operational capability in 1994. Figure 4.1 depicts a Peacekeeper Rail Garrison train.

Figure 4.1 Peacekeeper ICBMs in Rail Garrison



Source: DOD

<sup>1</sup>This capability is defined as one train on alert with two missiles and one train for training.

Before 1985 the Air Force had planned to base 100 Peacekeepers in silos but in 1985 the Congress limited the number of silo-based Peacekeepers to 50. DoD then planned to retain 50 Peacekeepers in silos and deploy another 50 in Rail Garrison. However, in April 1989 the Secretary of Defense announced that the 50 silo-based Peacekeepers would be redeployed onto Rail Garrison. The Congress later limited the number of deployed Peacekeepers to 50.

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**Acquisition Costs**

The 1990 Peacekeeper SAR estimated that 173 Peacekeepers and the silo basing system will cost \$19.6 billion to acquire. The 1990 Rail Garrison SAR estimated that the mobile basing system will cost over \$7.1 billion to acquire.

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**O&S Costs**

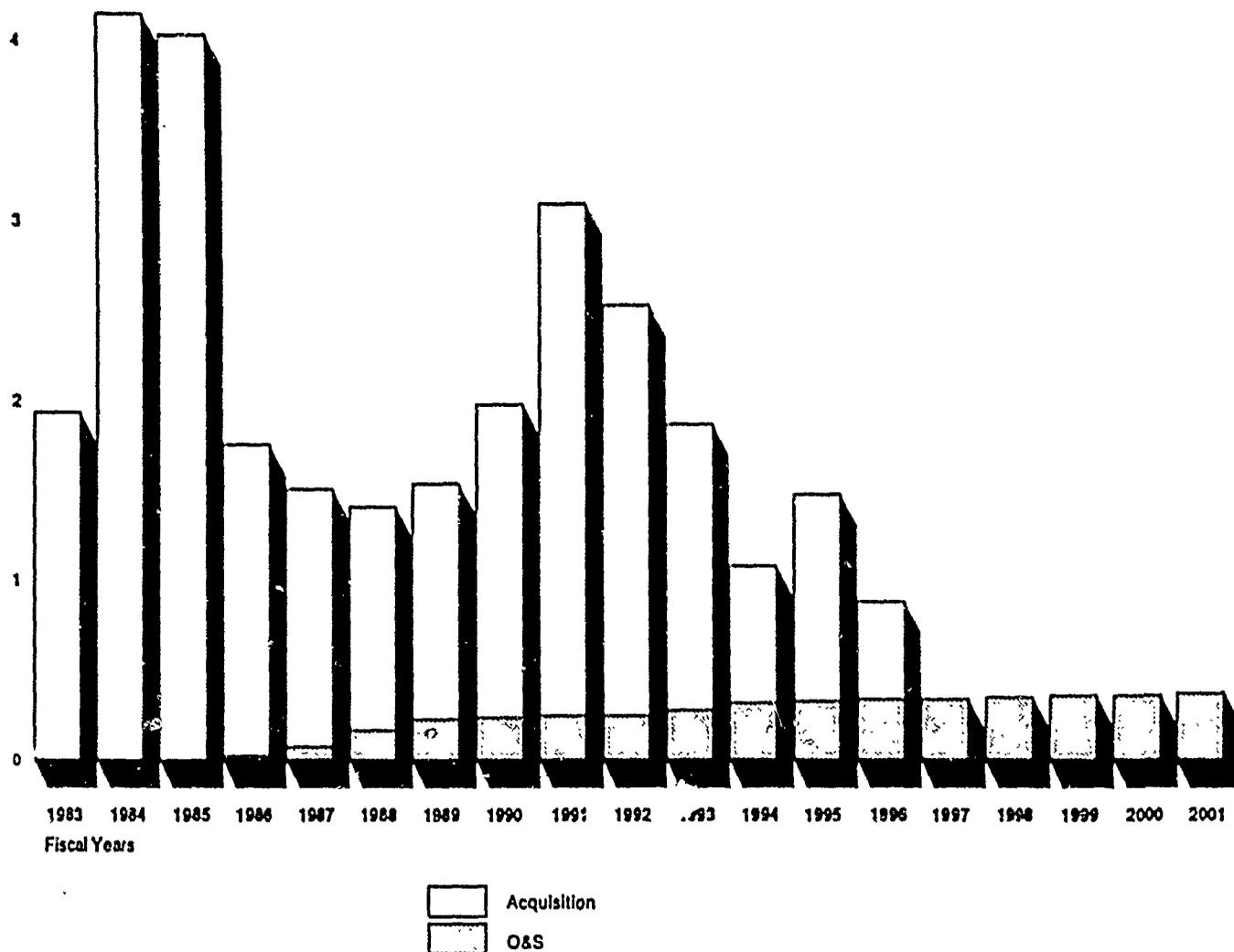
In 1987 the Peacekeeper program office estimated the average annual O&S cost of 50 silo-based Peacekeepers at about \$170.8 million in 1982 dollars. The 1990 Rail Garrison SAR projected the average annual steady-state O&S cost of 50 Peacekeepers in Rail Garrison at \$214.1 million in 1982 dollars. We inflated and combined the estimates and found that the O&S cost of deploying 50 Peacekeepers through 2020 could be about \$12.3 billion. Figure 4.2 depicts the acquisition and O&S cost estimates.

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<sup>2</sup>The Rail Garrison SAR O&S estimate was based on 50 operational missiles. It assumed 25 operational and 2 training trains at 2 Minuteman and 5 non-Minuteman bases and 66 operational test and evaluation flights. It included personnel and depot maintenance costs.

Figure 4.2: Peacekeeper Costs From 1983 to 2023

\$ Then-Year Dollars in Billions



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Intercontinental Ballistic Missiles

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## Small ICBM

At the time of our review, the Air Force could not provide us with estimates of the Small ICBM program's acquisition and O&S costs because of uncertainties concerning missile quantities, basing characteristics, and other factors.

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## Background

The Small ICBM, shown in figure 4.3, is a three-stage, solid propellant ICBM. The President approved Small ICBM development in April 1983 to place Soviet hard targets at risk while allowing more flexible and survivable basing than silo-based ICBMs. Full-scale development began in December 1986.

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Figure 4.3: The Small ICBM



Source: DOD

In its 1989 budget request, DOD recommended that the Small ICBM program be terminated because of cost. The 1989 SAR reflected DOD's intention to terminate the program by September 1989. In April 1989 DOD opted to continue the program and provide funds for 1989 through 1994. Initial operational capability is planned for 1997 but full operational capability has yet to be scheduled.

**Program Cost**

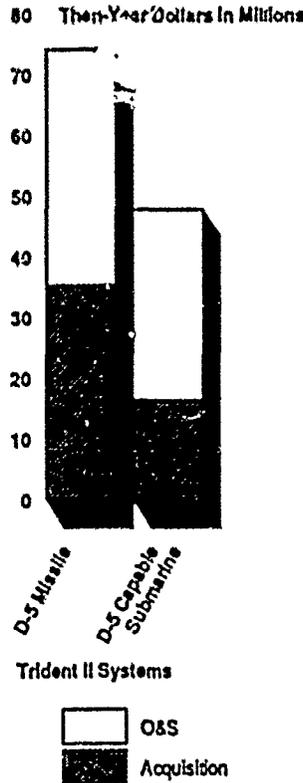
At the time of our review, DOD had not estimated total Small ICBM program costs because it had not determined the total number of Small ICBMs and warheads to be produced or the missile's basing mode. Accordingly, the SARs did not include acquisition costs beyond 1994. Acquisition costs from 1984 to 1994 were estimated at about \$7.3 billion.

The Small ICBM program office has estimated the total cost of various Small ICBM force structures and basing configurations. In December 1988 it estimated that 300 Small ICBMs, with one or two warheads each, that are based on hard mobile launchers at Minuteman sites and in random movement would cost \$17.8 billion in 1988 dollars to acquire and \$6.1 billion in 1988 dollars for O&S over 20 years. It also estimated that 250 Small ICBMs, with two warheads each, that are based in silos would cost about \$12 billion in 1988 dollars to acquire and \$5.3 billion in 1988 dollars for O&S over 20 years.

# Trident II Missile and Submarine

The Navy estimated that the total life-cycle cost of acquiring, operating, and supporting 899 Trident II D-5 SLBMs and 21 Trident II submarines will be \$141 billion between 1978 and 2032. Of this amount, the Navy estimated that \$121.8 billion will be needed between 1982 and 2020. O&S costs account for \$70.1 billion from 1982 to 2020, or almost 58 percent. Acquisition and O&S costs for the Trident II systems are shown in figure 5.1.

Figure 5.1: Trident II SLBM and Submarine Costs From 1982 to 2020



The Trident II program consists of developing and deploying the Trident II D-5 SLBM, building one Trident II submarine per year, backfitting eight Trident I submarines with the D-5, and building and modifying facilities at two Trident bases.<sup>1</sup>

<sup>1</sup>For more information, see Navy Strategic Forces, *Trident II Proceeding Toward Deployment* (GAO/NSIAD-89-40, Nov. 21, 1988).

## Background

### Trident II D-5 Weapon System

The D-5 strategic weapon system consists of the D-5 SLBM and related navigation, launcher, fire control, guidance, and test instrumentation subsystems. It is a follow-on to the Trident I C-4 weapon system and includes the larger three-stage, eight-warhead D-5 SLBM and improved systems for stellar guidance, shipboard inertial navigation accuracy, fire control, and launch.

The Navy expects that the D-5's size, accuracy, and payload will allow it to attack the entire range of Soviet targets. Full-scale development began in October 1983. Initial operational capability is scheduled for March 1990. The SAR indicated that 899 D-5s will be acquired. Figure 5.2 shows a D-5 SLBM being launched.

Figure 5.2: The Trident II D-5 SLBM

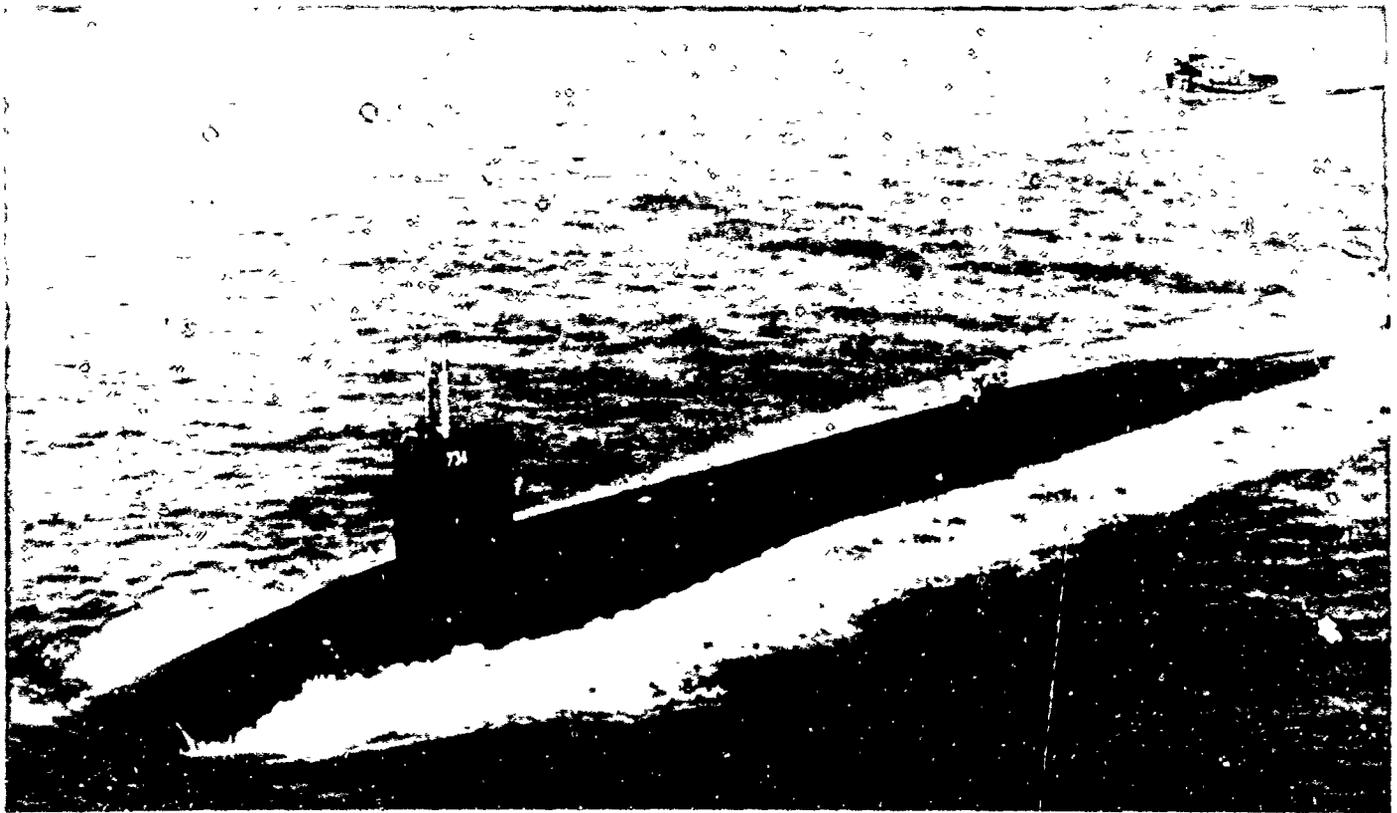


Source: DOD

## Trident II Submarine

According to the Navy, Trident II submarines will operate at higher speeds than previous nuclear-powered ballistic missile submarines. Each will carry 24 D-5 SLBMs. According to the 1989 SAR, the Navy plans to acquire 13 Trident II submarines at a shipbuilding rate of one per year through 1994. The U.S.S. Tennessee, shown in figure 5.3, is the first Trident II submarine.

Figure 5.3: The Trident II Submarine



Source: DOD

The Navy has eight Trident I submarines equipped with the C-4 SLBM. Beginning in 1993, the Navy will backfit one Trident I submarine per year with the D-5 system. The 8 backfitted submarines and the 13 new Trident II submarines will result in a total Trident II fleet of 21 submarines.

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The Navy expects each Trident II submarine to have an operating life of 30 years with overhauls occurring around 12 and 17 years after delivery. It plans to have two base facilities for Trident II support. One facility, at Kings Bay, Georgia, will accommodate the first 10 Trident II submarines, beginning in fiscal 1990. Early in the 1990s, the Navy plans to begin deploying Trident II submarines from a second facility in Bangor, Washington, where the Trident I submarines are now based.

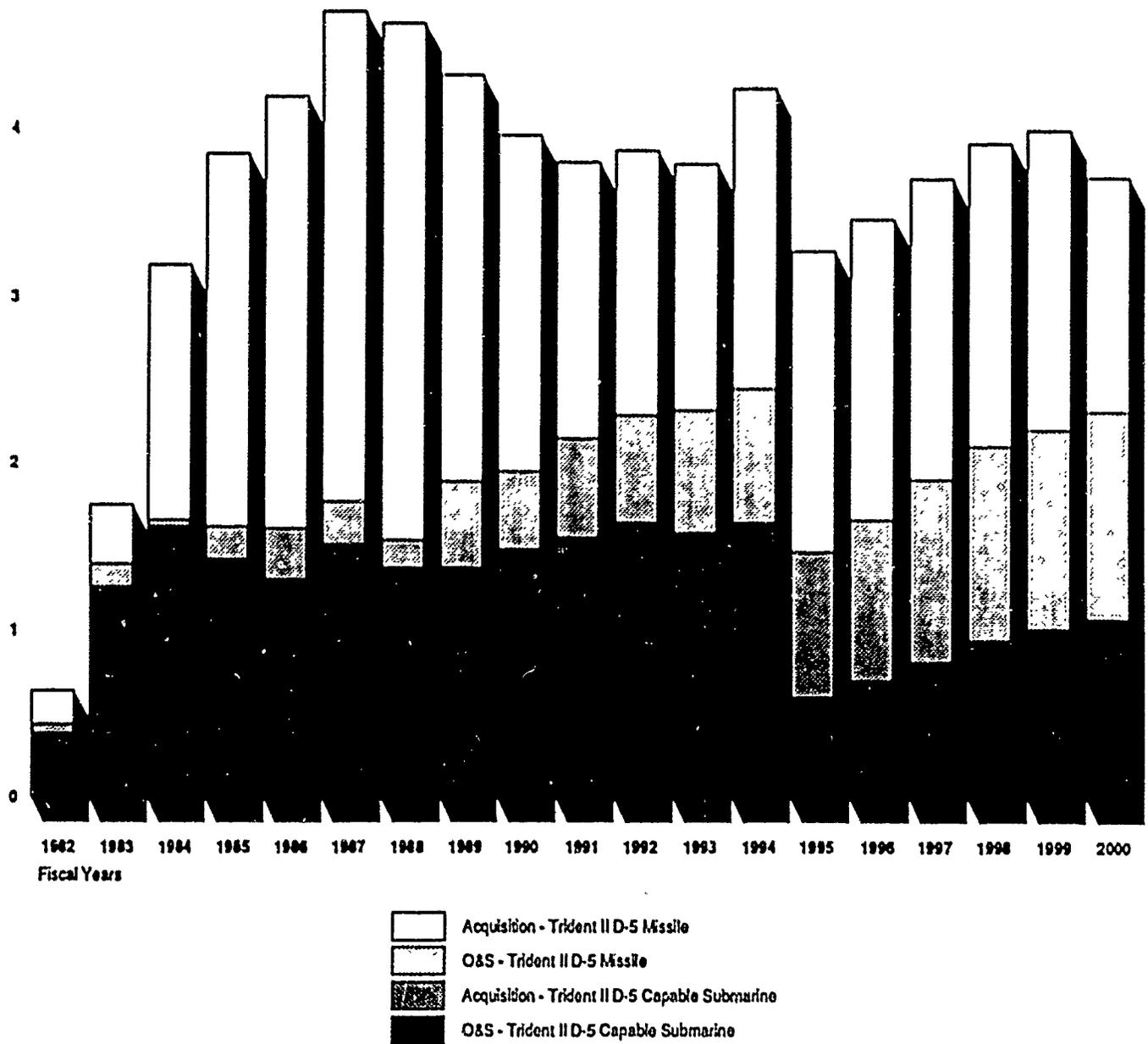
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### Program Costs

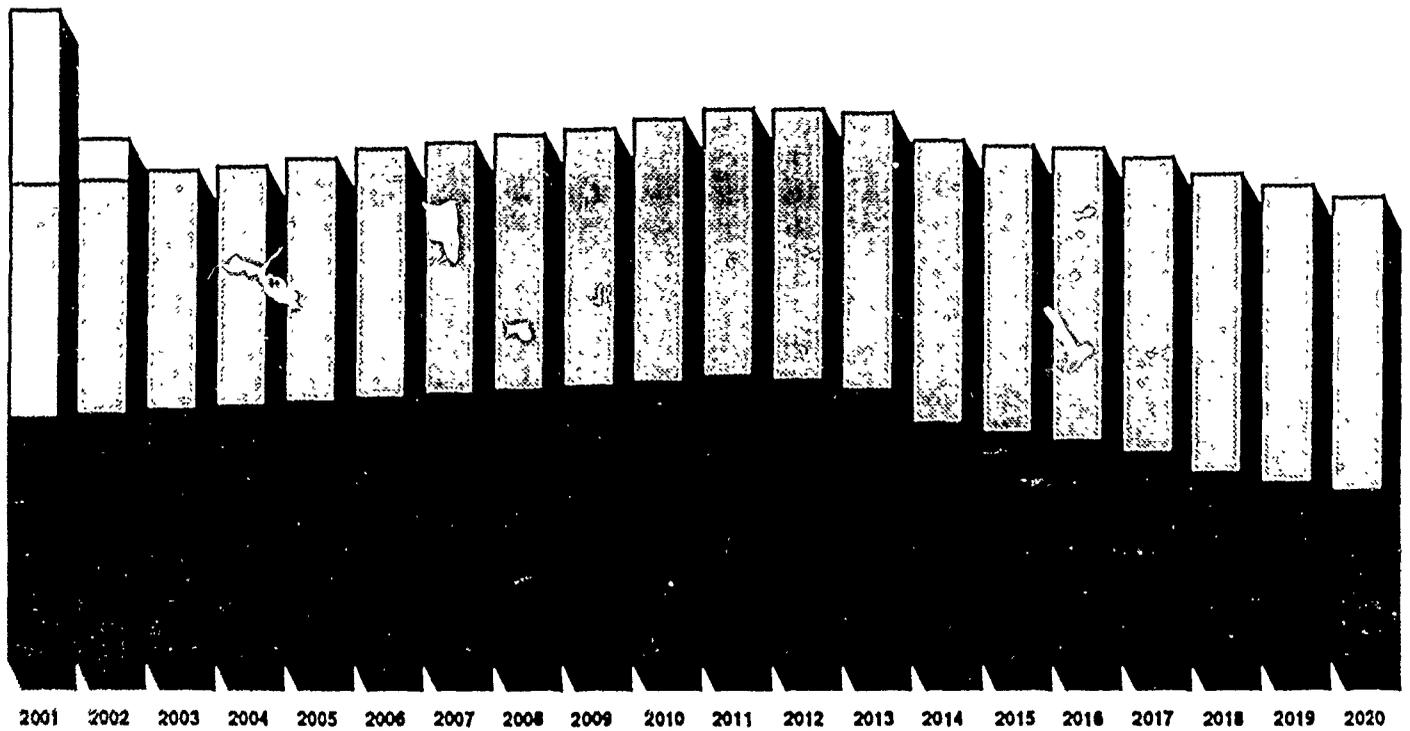
The Navy estimates that the Trident II program will cost about \$121.8 billion to acquire, operate, and support between 1982 and 2020. Figure 5.4 depicts the acquisition and o&s costs of the Trident II submarine and missile through 2020.

Figure 5.4: Estimated Trident II Costs From 1982 to 2020

\$ Then-Year Dollars in Billions



Chapter 5  
Trident II Missile and Submarine



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Acquisition Costs

According to the 1989 SARS, the acquisition cost of the D-5 weapon system and the Trident II submarine after 1981 will be \$35.3 and \$16.4 billion, respectively. These amounts include (1) research and development of the D-5 weapon system and Trident II submarine, (2) procurement of 899 missiles, (3) construction of 13 Trident II submarines, and (4) military construction to support Trident II operations. These costs do not include the cost of acquiring the Trident I submarines or the Department of Energy's nuclear costs.

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O&S Costs

We asked the Navy to estimate Trident II O&S costs, based on the programs described in the 1989 SARS. It estimated that the D-5 weapon system and 21 submarines would cost \$38.8 billion and \$31.3 billion, respectively, to operate and support between 1982 and 2020. These costs included Trident I backfits, overhauls, missile industrial facility equipment maintenance,<sup>1</sup> and general support.<sup>2</sup> According to the Navy, Trident II O&S costs will end with the retirement of the last submarine in 2032. At our request, the Navy did not include Trident I O&S costs.

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<sup>2</sup>According to the Navy, a missile industrial facility is a government-provided facility. The government furnishes contractors with equipment to assist in manufacturing missiles.

<sup>1</sup>According to the Navy, general support costs includes the base infrastructure costs, such as housing, chapels, and theaters.



# Comments From the Department of Defense



DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING

WASHINGTON, DC 20301-2010

21 MAY 1990

(BETNY)

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

Dear Mr. Conahan:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report entitled "STRATEGIC WEAPONS: Long-Term Costs Are Not Reported to the Congress," Dated March 16, 1990 (GAO Code J92478), OSD Case 8272.

The Department basically concurs with the report findings. However, the DoD does not completely concur with the methodology used to demonstrate the relative life-cycle costs of the individual modernization programs. A more useful analysis would show each program's complete life-cycle cost in constant-year dollars, clearly identifying: (1) the funding which has already been obligated through FY 1990; and (2) the cost remaining to complete each planned program and to support it to some fixed date. The latter information would provide the type of discretionary cost data that are generally needed. In addition, an important perspective is that procurement of all elements is completed by the year 2000. All costs associated with the decades in the next century are with operations and support. Conveying the costs in then-year dollars, rather than constant-year dollars, tends to exaggerate the operations and support component.

The GAO correctly stated that the DoD does not routinely provide the Congress with complete operations and support cost estimates. Routine reporting requirements in the past have not included this type of data attributable to specific systems.

Each finding is specifically addressed in the enclosure. The DoD appreciates the opportunity to comment on the draft report.

Sincerely,

Charles M. Herzfeld

Enclosure

GAO DRAFT REPORT - DATED MARCH 16, 1990  
(GAO CODE 392478) OSD CASE 8272

"STRATEGIC WEAPONS: LONG-TERM COSTS  
ARE NOT REPORTED TO THE CONGRESS"

\* \* \* \* \*

DEPARTMENT OF DEFENSE COMMENTS

FINDINGS

**FINDING A: Background: Strategic Nuclear Triad.** The GAO observed that, for the past three decades, the United States has had a strategic nuclear Triad of airborn systems, land-based intercontinental ballistic missiles, and submarine-launched ballistic missiles. According to the GAO, at the beginning of FY 1982, the President announced a program to modernize the triad. The GAO reported that the strategic modernization program includes 12 Air Force and Navy weapon systems and, once acquired, the systems could be operational for decades.

The GAO indicated that the program includes the following systems:

- the B-1B bomber;
- the B-2 bomber;
- the B-52 bomber modifications;
- the KC-135R tanker aircraft;
- the Air-Launched Cruise Missile;
- the Air-Launched Advanced Cruise Missile;
- the Air-Launched Short Range Attack Missile II;
- the Peacekeeper ICBM in Minuteman silos;
- the Train-based Peacekeeper Rail Garrison system;
- the Small Intercontinental Ballistic Missile;
- the Trident II D-5 Submarine-Launched ballistic missiles;
- and
- the D-5 capable Trident II (Ohio-class) submarine.

The GAO also observed that a system's total cost to the Government is the cost of acquiring, operating, and supporting the system over its entire life-cycle. The GAO noted that, according to DoD officials, in most cases, the bulk of a system's total cost would be incurred during the operational phase. The GAO pointed out that operation and support costs consist of the direct and indirect costs of operating and maintaining a system, including (1) personnel, (2) fuel and other consumables, (3) spare parts, (4) replenishment, (5) direct depot maintenance, and (6) interim contractor support.

Now on pp 2 8-9

Regarding acquisition costs, the GAO explained that the DoD provides acquisition cost estimates of major systems to the Congress in Selected Acquisition Reports. The GAO noted that the DoD was required to include operation and support cost estimates in those Selected Acquisition Reports first submitted after January 1986, for programs that were in, or had completed, full-scale development. (p. 2, pp. 10-12/GAO Draft Report)

DoD Response: Concur. The general proportions of a system's life-cycle cost are typically attributed to Research, Development, Test and Evaluation (10-15 percent), Procurement (25-35 percent), and Operations (55-65 percent) when defined in constant-year dollars. It should be noted, however, that when operations and support costs are expressed in then-year dollars, over a long period (such as 38 years), the operations percentage will appear even greater. Such is the case with the GAO analysis.

FINDING B: Acquisition And Operation And Support Costs Of The Strategic Modernization Program. The GAO found that DoD, Air Force, and Navy cost estimates indicate that the strategic modernization program airborne, sea-based, and PEACEKEEPER weapons systems will cost more than \$475 billion to acquire, operate, and support from FY 1982 to FY 2020. The GAO noted that acquisition, operation, and support costs for airborne systems accounted for two-thirds of the total. The GAO further noted that about 25 percent would be needed for the 21 Trident submarines with D-5 Submarine launched ballistic missiles. The GAO found that acquisition cost estimates for the 12 Strategic Modernization systems from FY 1982 to FY 2002 exceed \$200 billion--with airborne systems accounting for most of the costs. The GAO also found that projections and estimated costs indicate that between FY 1982 and FY 2020, operation and support costs could total over \$275 billion--or about 58 percent of all the costs during FY 1982 to FY 2020. (p. 3, pp. 16-19/GAO Draft Report)

Now on pp 23. 12

DoD Response: Partially concur. The cost figures expressed by the GAO, in the form of summary information, are compilations of then-year dollars over a 38 year period. Comparison of programs using these aggregated then-year dollars can be misleading. This is true because the effects of inflation, combined with the relative high and low points in a program's funding stream, are obscured for the decision maker. It would be more appropriate to use constant-year dollars for this type of analysis, particularly for the aggregate summary information.

FINDING C: Limited Visibility Over Operation And Support Costs. The GAO reported that the DoD does not routinely provide the Congress with complete operation and support cost estimates for most of the 12 strategic modernization systems. According to the GAO, the cost and budget documents routinely provided to the

Congress, generally, do not contain readily usable estimates of the cost to operate and support the strategic modernization program's weapon systems during their life-cycles. The GAO noted that the Congress has expressed concern over long-term operation and support costs and has asked the DoD to provide the cost estimates on a regular basis. The GAO explained that, in 1986, the Congress directed the DoD to include life-cycle costs in each new Selected Acquisition Report submitted after January 1986. The GAO found, however, that seven of the systems reviewed--including those for the B-1B, the modified B-52, the KC-135R, the Trident II submarine and missile, and the PEACEKEEPER Intercontinent 1 Ballistic Missile--were first submitted before January 1986 and, therefore, did not include life-cycle or operation and support cost estimates. The GAO also found that Selected Acquisition Reports for more recent systems--including those for the B-2, the Short Range Attack Missile II, the Advanced Cruise Missile, and the Rail Garrison--usually included only limited operation and support estimates, which did not contain all of the information needed to fully assess life-cycle operation and support costs.

The GAO also reported that an individual system's operation and support costs become less visible to the Congress after the system is fielded. In addition, the GAO reported that the DoD does not update a system's Selected Acquisition Report once the system has been deployed, and budget documents and the Five Year Defense Plan routinely provided to the Congress do not identify the total operation and support cost of specific systems.

The GAO reported that the Senate Appropriation Committee has asked the DoD to provide system-specific operation and support cost estimates in budget submissions. According to the GAO, the Committee report on the FY 1988 Defense Authorization Act directed that (1) each Service be able to report accurate and verifiable operation and support costs for major systems within four years and (2) operation and support data for at least three major systems per Service be included in budget submissions, beginning with the FY 1990 budget. The GAO found that the DoD attempted to comply, but was unable to do so during the FY 1990 budget cycle. The GAO concluded that congressional concerns regarding the affordability of strategic modernization systems can be fully resolved only with the development of complete and accurate estimates of each system's life-cycle operation and support costs. The GAO also concluded that such estimates will not be readily available until the DoD can fulfill congressional directives aimed at establishing a uniform system for routinely providing the Congress with more complete operation and support cost estimates. (p. 3, pp. 20-22/GAO Draft Report)

DoD Response: Concur. The GAO correctly stated that the DoD does not routinely provide the Congress with complete operation and support cost estimates for most of the 12 strategic modernization systems. It should be recognized, however, that routine reporting requirements in the past have not included this

Now on pp. 3-4, 22, 24.

type of operation and support data attributable to specific systems.

FINDING D: Cost Estimates of The Strategic Modernization Programs May Be Understated. The GAO reported that, for a variety of reasons, the actual costs of the strategic modernization program weapon systems will probably exceed the projected \$475.5 billion cost. According to the GAO, one of the reasons is that inflation rates are probably too low. The GAO explained that it used the 1.8 percent inflation rate the DoD projected for FY 1994 and beyond. The GAO pointed out, however, that the 1.8 percent is very low by historical standards. In support of that position, the GAO pointed out that Aircraft Procurement budget accounts have always exceeded 1.8 percent and actual inflation in the Air Force operation and maintenance account fluctuated from 2.7 to 5.4 percent during the 1980s. The GAO also pointed out that the FY 1994 inflation rate used by the Congressional Budget Office for 1994, was 4.3 percent.

The GAO also observed that acquisition cost estimates may understate the actual cost of developing and deploying the systems. The GAO referenced its February 1989 report on the B-1B (OSD Case 7747), which found that the Air Force had incurred about \$31 billion in costs--about \$3.6 billion more than depicted in the Selected Acquisition Report--and that the Air Force planned to spend an additional \$669 million in B-1B enhancements. The GAO also pointed out that the FY 1989 Selected Acquisition Report cost schedules did not reflect the use of over \$750 million from expired appropriations. The GAO observed that reviews of the more costly B-2 program have shown that DoD acquisition cost estimates assumed that (1) the Congress will approve multi-year procurement and at least \$7.5 billion in funding for four successive years, (2) cost saving initiatives will succeed, and (3) the schedule will be met, although the program has made less progress than planned in key manufacturing areas. The GAO observed that, due to these optimistic assumptions, the B-2 acquisition will probably cost more than the \$70.2 billion DoD estimate incorporated in the report. The GAO further reported that other factors, such as software support, interim contractor support, or most indirect operation and support costs, are not included in cost estimates for the B-52, the B-1B, and the KC-135R, which would also understate cost projections. The GAO also noted that the estimates do not include the cost of nuclear warheads or post-acquisition enhancements. The GAO concluded that, because of the cited reasons, the cost estimates for the strategic modernization programs are probably understated. (p. 3, pp. 22-24/GAO Draft Report)

Now on pp. 4, 23-24.

DoD Response: Concur. It should be recognized that inflation rates used by the DoD for planning out-year program cost are established in conjunction with the Office of Management and Budget. Since December 1989, the DoD has been using rates

between 3.1 percent and 3.4 percent for planning beyond FY 1994. This is another example of why constant year dollars should be used.

FINDING E: Impact Of Recent World Events. The GAO reported that, at the beginning of the past decade, concern over the threat posed by the Soviet Union resulted in significant increases to the U.S. defense budget and in the strategic modernization program. The GAO observed, however, that recent events in the Soviet Union and Eastern Europe suggest that perceptions of a diminished Soviet threat will lead to greater efforts in this decade to control the Federal budget deficit through reduced defense spending. The GAO noted that the Congress will consider the first defense budgets of the 1990s in light of the events in Europe and will assess the affordability of major defense systems. The GAO concluded that those recent events increase the importance of the ability of Congress to assess the affordability of the strategic modernization weapon systems. (p. 2, pp. 24-25/GAO Draft Report)

Now on pp 2, 24

DoD Response: Concur.

FINDING F: Projected Costs Of Airborne Systems. The GAO reported that projected costs for the B-1, the B-2, the modified B-52, KC-135R, the Air Launched Cruise Missile, the Advanced Cruise Missile, and the Short Range Attack Missile II will cost approximately \$115 billion. The GAO compiled its cost projection as follows:

- B-1B Bomber--The cost to acquire, support, and operate the baseline-configuration B-1B from FY 1982 through FY 2020, would be over \$54 billion (\$27.4 billion for acquisition and \$27.4 billion for operation and support costs).
- B-2 Bomber--The B-2 bomber may cost more than \$114 billion to acquire, operate and support through FY 2020 (\$70.2 billion for acquisition and \$44.1 billion for operation and support cost).
- Modified B-52 Bomber--The FY 1982-FY 2020 cost of acquiring, operating, and supporting the modified B-52s could equal \$57.8 billion (\$1.2 billion for acquisition and \$56.5 billion for operation and support).
- KC-135R Tanker--The available cost data indicate that, from FY 1982 to FY 2020, the KC-135R tanker could cost about \$72.6 billion to acquire, operate, and support (\$12.3 billion for acquisition and \$60.4 billion for operation and support).
- Short Range Attack Missile II--The cost estimates indicated that Short Range Attack Missile II acquisition, operation

and support could cost about \$4.1 billion through FY 2020 (\$2.4 billion for acquisition and \$1.7 billion for operation and support).

- Air Launched Cruise Missile--The final Air Launched Cruise Missile Selected Acquisition Report indicated that for missiles acquired after 1981, the missile would cost almost \$2 billion. (The GAO noted that operational support costs were unavailable.)
- Advanced Cruise Missile--Based on data in the most recent Selected Acquisition Report, acquiring, supporting, and operating the missile through FY 2020 could cost about \$9.6 billion (\$6.7 billion for acquisition and \$2.9 billion for operation and support). (pp. 3-4, pp. 26-50/GAO Draft Report)

Now on pp. 3, 26-51.

DoD Response: Partially concur. Although the Department concurs with the overall numbers used, the DoD does not completely concur with the methodology used to demonstrate the relative life cycle costs of the individual modernization programs. See the DoD response to Finding B.

FINDING G: Projected Cost of Intercontinental Ballistic Missiles. The GAO reported that the strategic modernization program intercontinental ballistic missile system includes the PEACEKEEPER in Minuteman Silos, the PEACEKEEPER Rail Garrison, and the Small Intercontinental Ballistic Missile. According to the GAO, current estimates suggested that the PEACEKEEPER and Rail Garrison programs could cost about \$38.8 billion--including \$12.1 billion for operation and support--if the Air Force keeps 50 PEACEKEEPERS in operation through FY 2020. The GAO noted that the Small Intercontinental Ballistic Missile costs were unknown, pending decisions concerning configuration, force structure, and basing. The GAO explained the cost projections as follows:

- PEACEKEEPER--The revised PEACEKEEPER program could cost \$26.7 billion to acquire and \$21.1 billion to operate and support the system through FY 2020.
- Small Intercontinental Ballistic Missile. The Air Force could not provide complete estimates of the Small Intercontinental Ballistic Missile Program's acquisition and operation and support costs, because of uncertainties concerning missile quantities, basing characteristics and other factors. (pp. 3-4, pp. 51-56/GAO Draft Report)

Now on pp. 3, 52-57.

DoD Response: Partially concur. Although the Department concurs with the overall numbers used, the DoD does not completely concur with the methodology used to demonstrate the relative life cycle costs of the individual modernization programs. See the DoD response to Finding B.

FINDING H: Projected Cost Of Trident II Missile And Submarines.  
The GAO reported that the Navy estimated the total life-cycle cost of acquiring, operating, and supporting the Trident II Submarine Launched Ballistic Missile and 21 Trident II submarines will be \$141 billion between FY 1978 and FY 2032. According to the GAO, of this amount, the Navy estimated that \$121.8 billion would be needed between FY 1982 and FY 2020. The GAO determined that operation and support costs account for \$70.1 billion, or almost 58 percent of the FY 1982-FY 2020 total. The GAO provided the following explanation of the cost projections:

- Trident II Missile--According to the Selected Acquisition Report and Navy estimates, the missile will cost about \$74.1 billion to acquire, operate and support between FY 1982 and FY 2020 (\$35.4 billion for acquisition and \$38.8 billion for operation and support).
- Trident II Submarine--The estimated cost of the submarine program from FY 1982-FY 2020 could be \$47.7 billion (\$16.4 billion for acquisition and \$31.3 billion for operation and support). (pp. J-4, pp. 57-62/GAO Draft Report)

Now on pp 3, 58-64

DoD Response: Partially concur. Although the Department concurs with the overall numbers used, the DoD does not completely concur with the methodology used to demonstrate the relative life cycle costs of the individual modernization programs. See the DoD response to Finding B.

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#### RECOMMENDATIONS

- o NONE

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