TACTICAL COMBAT FORCES OF THE UNITED STATES AIR FORCE: ISSUES AND ALTERNATIVES

Staff Working Paper

(Preliminary Analysis)

May 1984

The Congress of the United States
Congressional Budget Office

Report Documentation Page

Form Approved
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE **MAY 1984**	2. REPORT TYPE	3. DATES COVERED **00-00-1984 to 00-00-1984**
4. TITLE AND SUBTITLE **Tactical Combat Forces of The Unites States Air Force: Issues and Alternatives**		5a. CONTRACT NUMBER 5b. GRANT NUMBER 5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)		5d. PROJECT NUMBER 5e. TASK NUMBER 5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Congressional Budget Office,Ford House Office Building, 4th Floor,Second and D Streets, SW,Washington,DC,20515-6925**		8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S) 11. SPONSOR/MONITOR'S REPORT NUMBER(S)
12. DISTRIBUTION/AVAILABILITY STATEMENT **Approved for public release; distribution unlimited**		
13. SUPPLEMENTARY NOTES		
14. ABSTRACT		
15. SUBJECT TERMS		

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**Same as Report (SAR)**	**92**	

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std Z39-18

NOTES

Aircraft included in this analysis are only those associated with the Air Force tactical forces. Aircraft that support the strategic interceptor forces of the United States were deleted.

All out-year dollars in this report assume the Administration's inflation assumptions.

All years are fiscal years unless otherwise indicated.

PREFACE

In the past few years, the Congress has restrained spending on tactical aircraft in the Air Force. These funding decisions, and similar ones that could be debated in the future, will have important effects on the Air Force's ability to expand the size of its tactical air forces while also modernizing those forces with new aircraft and retiring older planes. This analysis by the Congressional Budget Office (CBO) presents the effects of the Administration's current tactical aircraft plans on costs and modernization. It also presents alternatives to the Administration's plans. The results in this study, which was requested by the Defense Subcommittee of the Senate Committee on Appropriations, are preliminary and will be expanded in a subsequent publication. In keeping with CBO's mandate to provide objective analysis, the study contains no recommendations.

The study was prepared by Lane Pierrot of CBO's National Security Division, under the general supervision of Robert F. Hale. John J. Hamre (formerly of CBO) provided assistance and supervision during the analysis. William P. Myers and Patrick L. Haar, both of CBO's Budget Analysis Division, contributed extensive cost analyses. The author wishes to thank T. Keith Glennan III and Jonathan W. Woodbury, of CBO's National Security Division, and Bert H. Cooper, of the Congressional Research Service, for their assistance. (The assistance of external participants implies no responsibility for the final product, which rests solely with CBO.) Patricia H. Johnston edited the manuscript, assisted by Nancy H. Brooks, and G. William Darr prepared it for publication.

May 1984

CHAPTER I. SUMMARY AND INTRODUCTION

SUMMARY

The tactical air forces are composed of aircraft, supporting equipment, and personnel. In war they would counter the enemy's tactical air forces and deliver bombs and missiles against ground targets.

Direct costs to operate, support, and procure selected aircraft for the Air Force tactical forces amounted to $12 billion in fiscal year 1984, or about 14 percent of the overall Air Force budget. Indirect costs associated with these aircraft, though difficult to estimate, would add substantially to the total. These funds support 36 tactical air "wings," made up of six kinds of fighters and short-range bombers. 1/ (A typical wing consists of 72 operational aircraft plus backups.) The funds also are used to procure two types of aircraft, F-15s and F-16s, and assorted missiles and equipment.

The Air Force intends to expand the current force structure to 40 wings by fiscal year 1989 and plans to increase annual procurement of the F-15s and F-16s from a total of 180 aircraft in 1984 to 312 aircraft per year by fiscal year 1988. 2/ The Congressional Budget Office (CBO) has analyzed these plans for consistency within the Administration's projected growth in the defense budget and has also considered the impact on those plans of less optimistic growth levels. This is a preliminary report of that analysis.

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1. Typically aircraft that have the mission of bombing surface targets are called "attack" aircraft rather than bombers as has been used to simplify discussion in the text. The reason for this designation is that the aircraft also carry air-to-surface missiles and precision-guided munitions in addition to bombs.

2. In April 1984, the Air Force released a plan that would reduce F-15 procurement below the levels submitted in the February 1984 budget while retaining the level of F-16s. In May 1984, the Department of Defense released a budget revision that would reduce F-16 quantities in the out years, cut F-15 procurement in fiscal year 1985 (with no information on out-year F-15 procurement), and defer the 40-wing goal to fiscal year 1990. Appendix A discusses the effects of these changes.

The Air Force has three key goals for tactical air forces that planned new procurements are expected to help meet:

- Expansion of the force from its current level of 36 wings to 40;
- Retirement of older aircraft after 20 years of service; and
- Modernization of the fleet with newer, more capable aircraft.

The CBO finds that these three goals can be met if the Congress approves new procurements at levels proposed in the February 1984 budget. (An addendum in Appendix A discusses the effects of subsequent revisions to the February 1984 request.) These procurements would, however, require real growth in the tactical air force budget averaging over 6 percent annually over the next five years with substantially higher growth in the near term. Lower levels of growth--such as the 5 percent real annual increases in budget authority approved by the Congress last year for the defense budget as a whole--would pose a problem if the tactical air forces' share of that spending remains constant at today's levels. In this case, the Air Force would find it difficult to pay the increased operating and support costs for the 40-wing force while also buying the aircraft necessary to meet the force requirements.

CBO examined several alternatives consistent with a 5 percent real growth budget. The analysis suggests that, if the goal of expansion to 40 wings is to be met, both the other goals will be sacrificed to a substantial degree. On the other hand, if the Administration decided to keep today's 36 wings, goals for retirement and modernization could largely be met with only 5 percent annual real growth in funds for tactical air forces. The Congress may wish to make these difficult choices now because, as an Air Force study contended last year, having plans that are roughly consistent with available funding leads to stable, more efficient purchases of aircraft. 3/

This analysis focused on funding problems over the next five years, but introduction of the new Advanced Tactical Fighter (ATF) in the 1990s could lead to even more severe problems in the next decade. Analysis suggests that the Air Force will have to continue large purchases of tactical aircraft into the 1990s, especially if it is not able to buy the large numbers of aircraft that it plans to purchase in the late 1980s. Yet the ATF is being designed to meet a wide variety of requirements; this could make it

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3. Affordable Acquisition Approach, a study prepared at the request of Air Force Systems Command, released in January 1983.

substantially more costly than the current generation of aircraft. If so, it may be extremely difficult to maintain a force of adequate size and age. Since many key decisions that will influence the cost of the ATF will be made in the next few years, the Congress may wish to ensure that the cost is an important design feature of the new fighter.

TYPES OF AIRCRAFT

Six types of aircraft, totaling approximately 4,000 planes in 1984, make up the aircraft inventory from which tactical combat forces are drawn (see Table 1). Three of these aircraft--the F-111, A-10, and A-7--are no longer in production and are not the focus of this report. The F-111 is capable of carrying large payloads relatively long ranges for the deep interdiction mission of bombing high-value targets far behind enemy lines. The other two planes have shorter ranges and are intended for close air support, providing air strikes at the request of ground forces, and battlefield bombing.

The other three aircraft--the F-15, F-16, and F-4--are the key systems considered in detail in this paper. The F-15 is the premier air superiority aircraft, intended to control the airspace above the ground forces by attacking enemy fighters and bombers. The F-16 is a "swing-role" aircraft, performing both air-to-air and air-to-ground missions. Its range is much shorter than the F-111's, however, and so it is unable to perform the deep interdiction mission in its air-to-ground role. The F-16 is a lower-cost fighter than the F-15 and was developed in the mid-1970s when the Air Force determined that the F-15 was too expensive to procure in quantity. The F-4 is an older, swing-role fighter procured in quantity in the 1960s and early 1970s.

In 1981 the Air Force announced plans to procure a long-range, ground-attack aircraft to supplement the aging and small fleet of F-111s in the deep interdiction mission. 4/ At that point, McDonnell Douglas Corporation had announced development of an F-15 "strike eagle" aircraft (eventually designated the F-15E), a modified F-15 with improved range and an air-to-ground attack capability. Shortly afterward General Dynamics Corporation put forward an enhanced version of the F-16, known as the F-16XL, and eventually a two-seat version of the XL named the F-16E. At the Congress' direction, the Air Force conducted a competition between the

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4. Hearing testimony before the Senate Armed Services Committee, Tactical Warfare Subcommittee, Department of Defense Authorization for Appropriations for Fiscal Year 1982, Part 3, pg. 1273.

TABLE 1. TACTICAL AIR FORCE FIGHTER/ATTACK AIRCRAFT

Aircraft	First Entered Force in Bulk b/	Approximate Quantity in Inventory in 1984 c/	Primary Mission(s) a/				Procurement Unit Cost d/
			Air-to-Surface			Air-to-Air	
			Close Air Support	Battlefield Interdiction	Deep Interdiction	Air Superiority	
A-7	Late 1960s	380	X	X			--
A-10	Late 1970s	690	X				--
F-4	Mid-1960s	1,180	X	X		X	--
F-111	Late 1960s	280			X		--
F-15	Mid-1970s	650				X	41
F-16	Early 1980s	740	X	X		X	23
F-15E	Late 1980s	0		X	X	X	--
F-16F	Early 1990s	0	X	X		X	--
Advanced Tactical Fighter	Mid-1990s	0				X	--

SOURCE:

a. Air Force data.
b. Jane's All the World's Aircraft (various years).
c. CBO estimate from Air Force data.
d. Procurement Programs (P-1) Annex to Department of Defense Budget for fiscal year 1985.

two aircraft. Early this year the Air Force announced that the F-15E won the competition, primarily because of its longer range. The Air Force also announced that it will continue to evaluate the possibility of procuring an enhanced F-16 which may incorporate some of the advances gained in development of the F-16XL/E which may be designated the F-16F.

These six aircraft--and their derivatives--will form the Air Force tactical aircraft inventory through the mid-1990s. By 1995 the Air Force expects to begin deliveries of a totally new aircraft--currently called the Advanced Tactical Fighter. Because this plane is in advance concept design stages, no detailed plans permit discussion of its capabilities or costs. The Air Force, however, would like it to have enhanced avionics, a supersonic cruise capability, stealth characteristics, a short take-off and landing capability, high reliability and maintainability, and longer flight ranges. Because these capabilities all exceed those found in the current premier fighter, the F-15, it is realistic to assume that it would be a very expensive aircraft.

PLAN OF THE STUDY

Chapter II discusses the Administration's plans for these tactical air forces. The plans should allow the Air Force to meet its planned force increases. But the Administration's plans would require that the tactical air force budget grow in real terms at substantially more than 5 percent a year from fiscal years 1985 to 1989. Thus Chapter III considers alternatives to the Administration's plans in light of less optimistic projections of available budget resources. Finally, Chapter IV notes some long-term issues that the Congress will want to consider as it reviews Air Force plans for the Advanced Tactical Fighter.

CHAPTER II. ADMINISTRATION PLANS FOR TACTICAL AIR FORCES

During this decade, the Air Force plans to buy new F-15s and F-16s and retire older F-4s while also altering its requirements. Together these factors will determine whether the Air Force will have enough aircraft available to meet its projected requirements.

AVAILABLE AIRCRAFT

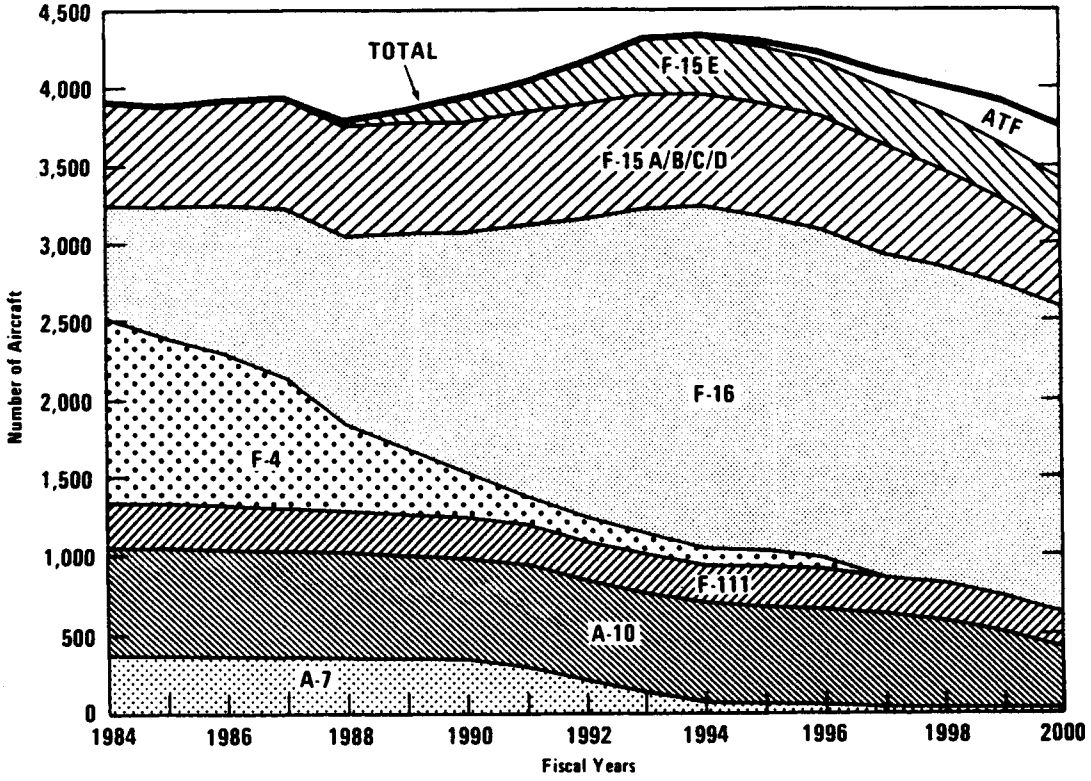
Inventory of Aircraft

Over the next five years, the Air Force proposes to have about 4,000 tactical aircraft in its inventory (see Figure 1). The figure shows the impact on the Air Force inventory of the retirement of aging aircraft and their replacement by new F-15s and F-16s. The large fleet of F-4s, bought primarily during the Vietnam War years, would be retired in quantity during the 1980s. These numerous retirements would hold inventory levels fairly constant--even decreasing the level slightly in fiscal years 1987 and 1988--although deliveries of newly procured F-15s and F-16s would steadily increase during this period. By the end of the 1980s and in the early 1990s, inventory levels would begin to rise because F-4 retirements would be largely complete. Retirement of F-4s and their replacement also mean that, by 1991, more than half of the inventory would be composed of F-15s and F-16s.

Three key assumptions underlie these findings. First, the projection assumes that the Administration carries out its plan--expressed in the February 1984 budget--to buy 1,386 F-15s and F-16s in fiscal years 1985-1989. (Table 2 shows details of the plan; the addendum in Appendix A discusses changes to the February 1984 plan.) Second, most aircraft are assumed to be retired at 20 years of age--which the Air Force has indicated is desirable. 1/ Third, because this paper focuses on tactical aircraft issues, this projection and the remainder of data in the paper exclude aircraft destined for strategic air defense--that is, defense of the United States against attacks by Soviet strategic bombers. Thus, procurements of F-15 and F-16

1. As the Air Force plans, the F-111 aircraft are retained in the force structure through this century, retiring them at 30 years of age.

Figure 1.
Cumulative Tactical Aircraft Inventory



SOURCE: CBO estimates from Air Force data.

TABLE 2. ADMINISTRATION PLAN FOR F-15 AND F-16 PROCUREMENT, AS OF FEBRUARY 1984 a/
(By fiscal year, in number of planes)

Plane	1985	1986	1987	1988	1989	Total 1985-1989
F-15	48	56	24	24	24	176
F-15E	0	4	48	72	72	196
F-16	150	216	216	216	216	1,014
Total	198	276	288	312	312	1,386

SOURCE: Budget of the United States Government for Fiscal Year 1985 (February 1984).

a. February 1984 plans call for a force goal of 40 wings by 1989.

aircraft intended to maintain and modernize the 15 squadrons of strategic air defense interceptors were deleted from the inventories used in this report. Only those F-15s and F-16s that are to be used tactically have been included.

Figure 1 also shows a modest decline in numbers of aircraft in the late 1990s. This long-term decline results from the assumption that the Air Force carries out its currently announced plans to complete procurement of F-15s and F-16s by 1992. Because of the probable high cost of the new Advanced Tactical Fighters (ATFs), CBO has assumed--in the absence of any firm Administration plans--that only small quantities of the ATF will be bought in the 1990s, similar to early purchases of F-15s, that is starting with 30 planes in the 1994 budget and increasing to 96 by the mid-1990s.

Projections of future inventories depend not only on planned procurement and retirement but also detailed assumptions, for example numbers of peacetime losses of aircraft because of crashes or ground damage. Appendix B describes the method used to make these projections.

Age of the Inventory

Along with numbers, age is an important attribute of the fleet. The Air Force has a goal of keeping the average age of its fleet at 10 years--which implies retirement of tactical aircraft after 20 years of service. If aircraft were equally distributed across the age spectrum, the Air Force estimates that it would have to procure about six aircraft per wing per year to maintain an average age of 10 years. 2/

Annual procurement needs are likely to be higher than 6 per wing in the next few years, however, because of the age composition of the Air Force inventory as of 1984 (see Figure 2). 3/ Almost half that inventory is currently ten years of age or older. This part of the inventory was primarily procured in the 1960s during the Vietnam War. These aircraft would have to be replaced entirely by the mid 1990s, and in large quantity by the late 1980s, if the Air Force were to hold firmly to its goal of retirement after twenty years of service.

Figure 2 also shows a pattern in Air Force tactical combat aircraft procurement over the last 20 years. 4/ As can be seen here, after the fairly large procurement quantities during the Vietnam years, there was a de-

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2. The Air Force uses the following formula to derive these numbers:

$$\frac{(\#\text{Wings}) \times (120 \text{ aircraft})}{(2) \times (\text{Average Age})}$$

120 aircraft is based on:

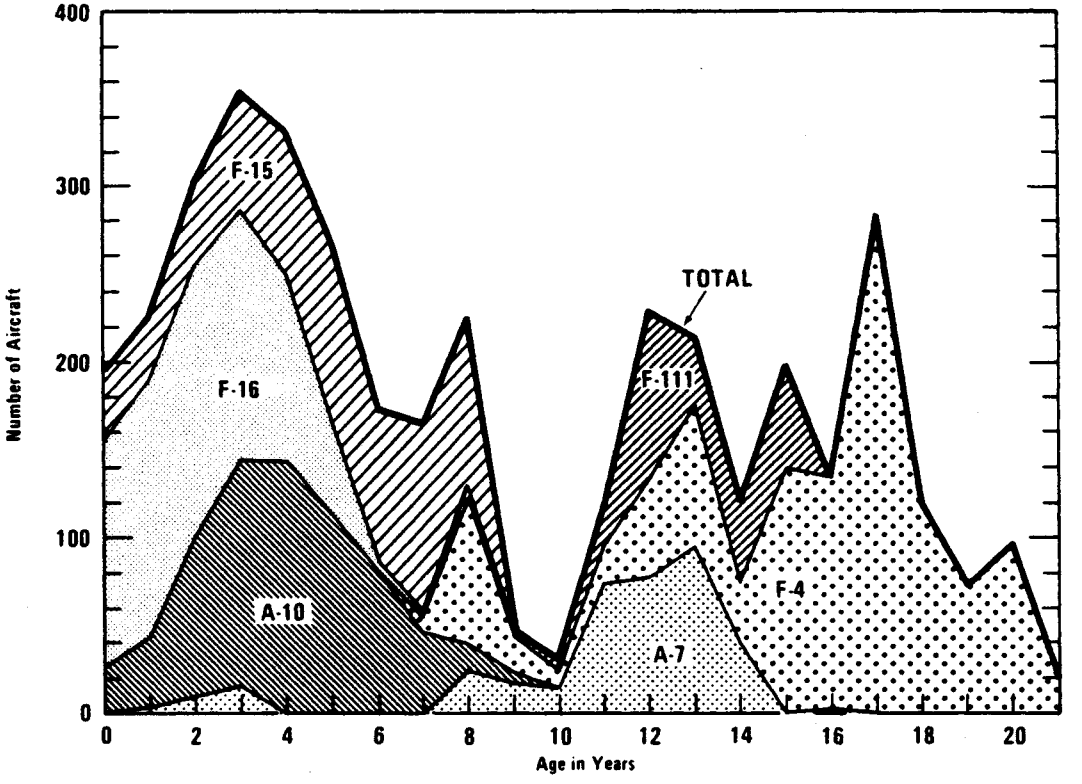
Combat	72
Back-up	28
Total	100
20 years of losses at 1 percent per year	20
	120

3. Some specific assumptions influence results on this figure. F-4s over 20 at the end of 1984 (about 10 aircraft) were excluded. Also the F-4 aircraft currently in five air defense interceptor squadrons were deleted. As those aircraft are generally older F-4s, their deletion reduces the F-4 aircraft that are 17 through 20 years old.

4. The figure cannot provide an exact guide to historical deliveries as the aircraft quantities may have been reduced by attrition (peacetime losses).

Figure 2.

Cumulative Tactical Aircraft Inventory, by Age as of 1984



SOURCE: CBO estimates from Air Force data.

crease in procurement reflected in the relatively small numbers of aircraft that are nine, ten, and eleven years old. This decrease reflected both reduced defense spending and a transition from F-4 to F-15 procurement and from A-7 to A-10 procurement. As the F-15 turned out to be a relatively expensive aircraft, it was not until F-16 deliveries began that the next large wedge of aircraft appeared in the inventory. At the same time that the F-16s were reaching quantity procurement, the A-10s were at a mature production rate. Thus the fiscal years 1978, 1979, 1980 were bumper ones for Air Force tactical aircraft procurement; this can be seen in the peak quantities of aircraft that are two, three, and four years old. For purposes of comparison, the Administration's procurement program would stabilize aircraft procurement by 1988 at levels approaching those of the late 1970s.

REQUIREMENTS FOR AIRCRAFT

The Air Force plans to increase its current force requirements from 36 wing "equivalents" to 40 wing "equivalents" by 1989. A notional tactical air wing contains 72 combat aircraft in three squadrons of 24 aircraft each. Because the actual number of combat aircraft can vary among operational squadrons, the Air Force uses a wing equivalent to describe force size. This is derived by dividing the total number of combat aircraft by 72. A wing in this paper will refer to a wing equivalent.

In a joint planning process, the Air Force and the other services set their goals for forces by assessing the capability of the U.S. forces versus the threat the United States and her allies would face in a major war. All of the services have goals that are much higher than current force levels. The highest goals are associated with minimum risk; these are the forces that the services feel they would need in order to have clear certainty of winning a major war. By accepting more risk, the services reduce requirements to levels more consistent with fiscal constraints. The plan for 40 wings is presumably consistent with the fiscal constraints that the Air Force has been told to meet.

Expanding to 40 wings would require about 4,000 aircraft by 1989, or roughly 100 aircraft per wing. Each wing has 72 combat or primary authorized aircraft (PAA). But, according to the Air Force, an additional 28 aircraft per wing are needed as backups. Of the 28 additional aircraft, 18 are trainers (TF) that are needed to help pilots practice. The remaining ten aircraft are a combination of "pipeline" and support aircraft for research and development (back-up aircraft authorizations--BAA). Pipeline aircraft are the additional aircraft needed to keep combat levels constant while aircraft undergo modification and repair. Support aircraft for research and development are those aircraft that are used to test new systems--both aircraft systems and weapons.

There is some controversy over whether all 28 of these additional aircraft are needed. The General Accounting Office (GAO) has argued that it would be possible to reduce pipeline requirements if better maintenance practices were put into place; GAO also contends that higher use of trainers could reduce training requirements. 5/ Moreover, there is some question as to whether the Air Force would need as many training aircraft for reserve wings, which form about a third of the force, as for active wings. Reserve wings are manned by part-time personnel who train mostly on weekends; these wings are generally have experienced pilots who may not need as much refresher training as the inexperienced pilots entering active duty.

For the purposes of this analysis, however, official Air Force figures were used, and these call for 100 aircraft per wing including 72 combat and 28 additional aircraft. It should be kept in mind that different assumptions about these back-up aircraft would reduce the requirements.

REQUIREMENTS VERSUS AVAILABLE AIRCRAFT

CBO's projections suggest that, if Administration procurement plans are carried out, the Air Force would have sufficient aircraft to expand to 40 wings (see Figure 3). There would be a slight shortfall in 1988, 1989, and 1990. But, if older F-4 aircraft were retired just one year later than their planned retirement after 20 years of service, requirements would be met exactly.

In the late 1990s, however, inventory levels would begin to slip below requirements. This is related to procurement of the Advanced Tactical Fighter, which is discussed in Chapter IV.

AFFORDABILITY OF AIR FORCE PLANS

The planned procurements that would allow the Air Force to meet its requirements may not, however, be affordable in the next five years. Unfortunately, it is difficult to answer the question about affordability for two

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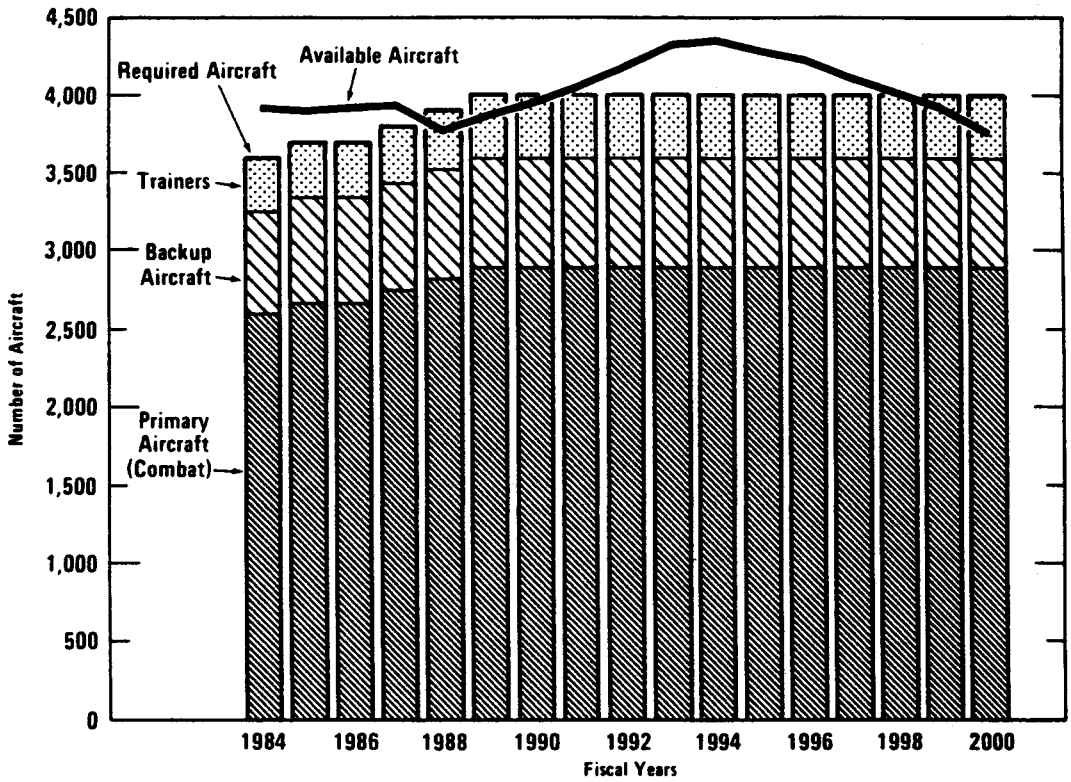
5. See Statement of Werner Grosshans, General Accounting Office, Planning Director, National Security and International Affairs Division, before the Subcommittee on Legislation and National Security, House Committee on Government Operations (June 2, 1983); and Report to the Congress by the Comptroller General of the United States, The Congress Should Require Better Justifications of Aircraft for Noncombat Missions (July 22, 1980).

Figure 3.
Tactical Aircraft Requirements Versus Available Aircraft



SOURCE: Required Aircraft—CBO estimates from Administration Plan, Annual Report to Congress (1984); Available Aircraft—CBO estimates from Air Force data.

reasons. First, it is not clear how much money the Congress will appropriate for the Department of Defense (DoD) over the next five years and how much the Congress will allocate to tactical air forces. The Congress makes these detailed decisions about the overall defense budget and its allocation to specific programs only for the current budget year, not for five years. Second, DoD's long-term plans, which are highly detailed, cannot be used as a guide. Except for the up-coming budget year, the Administration views these plans as internal working documents, and they are not routinely supplied to the Congress. The Congress does receive long-term plans about the numbers of aircraft that will be purchased and other selected information, but it does not receive details about operating costs and other factors required to estimate the total funds that would be needed to support Administration plans for tactical air forces.

Nonetheless, CBO has estimated the funds that could be available to meet tactical air needs after making several important assumptions. First, CBO estimated the direct cost of procuring and operating tactical air forces in fiscal year 1984, a year for which detailed decisions have already been made. This estimate excludes the facilities, operating costs, research and development costs, and other indirect costs that would increase the tactical air budget, but which cannot be estimated precisely. 6/ Then CBO assumed that this direct budget could increase by 5 percent a year in real terms in years beyond 1984; this is consistent with the percentage increase allowed by the Congress in last year's budget plan for the entire Department of Defense. Thus the projection assumes that the Congress retains last year's budgetary funding and that money is not reallocated from other parts of the defense budget to allow a larger increase for tactical aircraft. Under these assumptions, the money available for tactical forces would increase from $12.7 billion of budget authority in fiscal year 1985 to $18.6 billion by 1989 (see Table 3).

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6. Research, Development, Test, and Evaluation (RDT&E) costs were excluded in the tactical aircraft budget for this analysis. The reason for doing this was that CBO would only be able to capture those costs associated with existing aircraft--which are decreasing over the five-year period. Had these costs been included in the 5 percent real growth budget, it would provide increasing funds for development--while all options would include decreasing development funds. This could produce unrealistic savings as the Air Force plans development of an F-16F and an Advanced Tactical Fighter and it is more likely that costs in the development account during this decade will go up rather than down.

TABLE 3. COST OF VARIOUS TACTICAL AIR FORCE GROWTH PLANS, FISCAL YEARS 1985-1989 (In billions of dollars of budget authority, under Administration inflation assumptions)

Planned Growth	1985	1986	1987	1988	1989	Total 1985-1989
5 Percent Real Growth	12.7	14.0	15.4	17.0	18.6	77.7
Administration Plans						
Current Readiness Spending a/	14.6	16.8	17.6	19.2	19.6	87.9
Administration Readiness Spending b/	14.7	17.1	18.0	19.7	20.2	89.8

SOURCE: CBO estimates from Fiscal Year 1984 Budget (5 percent real growth) and Fiscal Year 1985 Budget Request (Procurement) plus CBO estimates of operating and support costs.

NOTE: Numbers may not add to totals due to rounding.

a. Projected by CBO based on readiness spending levels programmed in the 1984 defense budget.

b. Projected by CBO assuming readiness spending increases equal to those planned by the Administration for the Department of Defense as a whole.

This 5 percent increase would not be sufficient, however, to pay for the Administration's planned growth in tactical aircraft. Indeed, the Administration's plan would exceed the amount available by $10.2 billion over the five fiscal years 1985-1989 (see Table 3). This shortfall assumes the detailed procurement costs shown in the Administration's February 1984 budget. 7/

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7. Procurement costs were taken from the February 1984 budget submission. The Air Force has indicated that the marginal costs of the derivative fighter that were submitted to Congress were F-16E costs. As the marginal costs for that plane were the higher than those

Moreover, the shortfall could be even larger. The preceding shortfall estimate assumed that the Administration would provide enough extra operating money from the operation and maintenance (O&M) appropriation to pay for additional aircraft and wings that would be needed to meet the Administration's plans. This estimate did not assume that additional funds would be provided to improve readiness of new and existing forces. Yet in recent years the Air Force has requested more money to improve readiness. The Administration only provides the Congress with information about its plans for increased spending on readiness, for the Department of Defense as a whole; it does not provide detailed information at the level of tactical force readiness. But CBO estimated the shortfall, assuming that the Administration would add funds to the operation and maintenance appropriation for tactical aircraft to improve readiness and do so at rates similar to its plans for the DoD as a whole. 8/ Under this "Administration readiness spending" assumption, the Air Force's tactical force budget would exceed a 5 percent budget for tactical air forces by a total of $12.1 billion over the five fiscal years 1985-1989 (see Table 3).

The Congress could, of course, decide that the Air Force share of the defense budget, or the tactical aircraft share of the Air Force budget, should be greater than the amounts assumed by CBO. Such a decision might permit the Air Force to buy the planned forces and improved readiness. Indeed the two major strategic programs that compete with tactical aircraft for Air Force funds--MX and B-1--should be largely complete by 1987, if they continue on schedule. There may, however, be some cause for pessimism that MX or B-1 funds will be available for tactical aircraft in the

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Footnote Continued

associated with the F-15E which was selected, the out-year dollars associated with derivative fighter procurement should be lower, although the funds in the May 1984 budget submission for this aircraft are the same as those in the February budget for fiscal year 1985. F-15 quantity for 1985 at least, in the May 1984 budget submission, was reduced and F-16 quantities for 1986 through 1989 were reduced. Although these actions will move costs toward 5 percent real growth, they are not enough to get there.

8. The Defense Resources Model (DRM), which was used to estimate operation and maintenance (O&M) expenses for the tactical forces, also estimates total O&M spending for the Department of Defense. Comparing spending levels between these totals, using Administration inflation rates and defense projections for O&M, shows defense O&M spending at considerably higher levels. The percentage difference between DRM and Administration plans was applied to O&M costs in the tactical air force budget.

1980s, since the MX and B-1 programs may be delayed. Since they clearly have higher priority under this Administration than tactical air forces, they would continue to compete with them effectively for Air Force funds through the 1980s if this occurred, at least within the Department of Defense. Additionally the Air Force has several developmental projects that could become competitors in the late 1980s. Among these are the new, small missile program for the strategic forces, the Stealth bomber, and large portions of the new Strategic Defense Initiative. Also, the C-17 transport aircraft, a high priority of the Air Force as well as the Army, is planned to enter production in 1988, the same time that tactical fighter procurement is expected to go over 300 aircraft per year.

Additionally an intrinsic aspect of tactical aircraft procurement makes it an attractive target for defense budget cutters. It is possible to cut aircraft procurement by slowing but not cancelling programs, hence avoiding the difficult step of terminating a project. And, because of the expense of tactical aircraft, such slowdowns yield large savings in the near term.

For these reasons the assumption of 5 percent real growth in the tactical air force budget might not be overly pessimistic. Indeed it might be even more realistic to assume 3 percent real growth. Despite its long-term plan for 5 percent real growth in the defense budget as a whole, the Congress only appropriated enough money in fiscal year 1984 to allow for 3 percent real growth. If the tactical air forces were to receive funds for only 3 percent annual real growth in the 1985-1989 period, the shortfall would be substantially worse, about $14.6 billion over the five years under current readiness spending and about $16.6 billion under the Administration's readiness spending.

CHAPTER III. ALTERNATIVE APPROACHES TO TACTICAL AIR FORCE EXPANSION AND MODERNIZATION

As has been shown, the Administration's plans for the Air Force tactical forces may well exceed likely future funding levels. Thus Congress may wish to consider changes to the plans that would reduce their costs to levels more consistent with fiscal reality. This chapter considers several alternative changes to the plans that would reduce their costs, including two that cancel procurement programs.

Taking action now to change long-term plans, even cancelling programs in anticipation of funding problems, would be consistent with a study released last year, the Affordable Acquisiton Approach. In that study, an Air Force panel said that the Air Force now takes longer to complete its procurement plans than it did in the preceding decades and that, as a result, they cost more. A major contributing factor, according to the study, is that today's plans assume higher increases in funding than the Air Force is likely to obtain. When funding levels are lower than expected, the Air Force delays completion of their programs and this causes a rise in the unit costs of systems procured. The study argues that, while delaying procurement programs remains an option, the Air Force should consider program cancellation as well.

POSSIBLE CHANGES IN KEY GOALS

The Administration plans discussed in Chapter II embody three key goals:

- Build up the force structure;
- Retire old F-4 aircraft; and
- Modernize the force.

Under tighter budgets, the Administration may be forced to choose among these three goals. Possible changes in each are discussed below.

Tactical Forces Buildup

For many years, the current and preceding Administrations have indicated a desire to attain 40 tactical air wings (that is, wing equivalents). Until fairly recently, this Administration also had a stated goal of reaching 44 wings in later years. Currently, force size is slightly over 36 wings.

The goal of increased forces reflects the Administration's perception that the Soviet threat is growing. The size and nature of that threat, however, is highly uncertain, and the process of setting force goals to meet the threat is therefore judgmental. Indeed, the Administration has modified its tactical force goals substantially downward in recent years, even though it has not announced any major decreases in the expected Soviet threat. The wing goals have been delayed with every consecutive plan (see Figure 4). In the plan submitted in January 1982, the Administration announced it planned to reach 40 tactical air wings by 1986, with a further increase to 44 wings in later years (dark bars on the figure). 1/ By the time the DoD February 1983 plan was submitted, the goal of 40 wings had slipped to 1987; 44 wings were no longer discussed in the annual report, although they were mentioned in hearing testimony (white bars on the figure). 2/ In the February 1984 plan, the 40-wing goal is set for 1989 and the 44-wing goal has been dropped, at least through the early 1990s (hatched bars on Figure 4). The most recent budget revision postpones the 40-wing goal until 1990. Not all the changes have been caused by reductions in anticipated purchases of aircraft. CBO analysis suggests that, even if the Air Force had realized its plans for aircraft procurement presented in its January 1982 plan, it would have been very difficult to achieve the 44-wing goal, as planned procurement was not sufficient to meet this goal.

The malleability of these force goals--and the absence of a clear connection between the goals and procurement plans--may suggest that further changes are possible in light of intense budgetary constraints.

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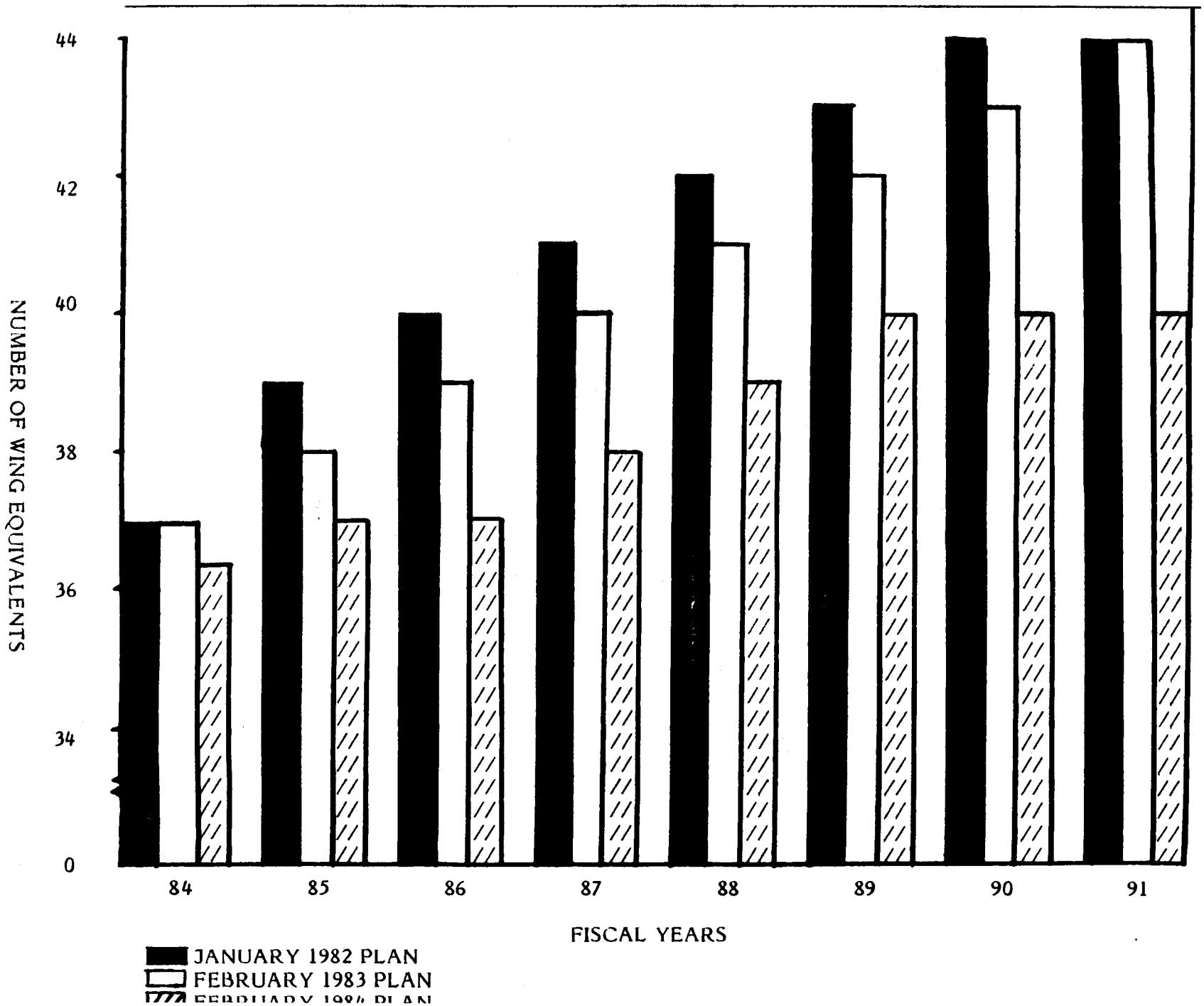
1. Because the details of the schedule for reaching 40 wings are classified, the chart assumes that the buildup takes place steadily between now and the target year of 1989.

2. Department of Defense Appropriations Hearings, Defense Subcommittee of Senate Appropriations Committee, 98:1 (1983), pt. 5, p. 562.

FIGURE 4. TACTICAL FORCE STRUCTURE, BASED ON 1982-1984 PLANS



F-4 Retirement

The second key aspect of the Administration's plans is the retirement of existing F-4 aircraft after about 20 years of service. The U.S. tactical inventory currently contains about 1,200 F-4 aircraft, and almost all of these aircraft are over ten years old. Assuming a 20-year retirement of these aircraft, they would have to be replaced entirely by 1996 and, because of their age distribution, replaced in large quantities in the late 1980s (see Figure 5). The F-4 could be kept in the inventory longer, which would reduce procurement requirements, without undue danger of structural failure. The issue is whether the old F-4s would remain capable against the likely enemy threats.

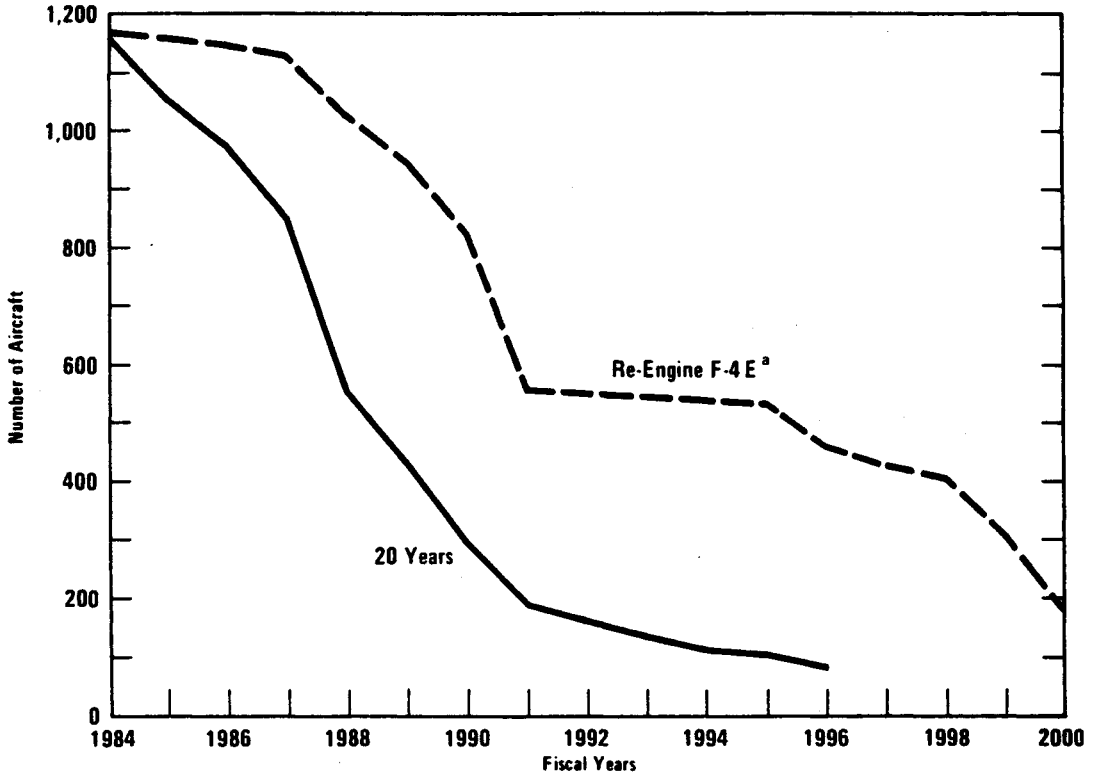
One approach to extending the service life of old F-4s would be to modify them to improve their capability. The Boeing Company and the Pratt and Whitney Group of United Technologies Corporation have presented DoD with an unsolicited proposal to reengine the F-4--giving it the PW-1120 engine, a turbojet derivative of the F-100 engine now used in the Air Force F-15s and F-16s, as well as enhancing its avionics and providing conformal fuel tanks for the aircraft. (These tanks are streamlined to reduce drag.) The new engine would provide more thrust for the F-4s and hence greater capability in combat against newer Soviet fighters; the conformal fuel tanks would extend its range.

The Air Force opposes reengining their F-4s, arguing that they would begin to reach the desired 20-year retirement age before the proposal could be completed and developed. This is true. Even assuming the procurement schedule assumed by Boeing, which the Air Force believes is optimistic, the aircraft would be reaching 20 years of age by the time reengining could occur. The actual structural service life of the aircraft is much longer, however, and, if capability were sufficiently enhanced by reengining, the proposal might be worth considering. Indeed Dr. Richard DeLauer, Under Secretary of Defense for Research and Engineering, has argued that the proposal would improve the F-4 enough to extend its useful service life for ten more years. Reengining the F-4 and so extending its life to 30 years would substantially reduce numbers of aircraft needed to meet Air Force requirements over the next few years (see Figure 5).

Force Modernization

The third aspect of the Administration plan for the tactical air forces is the quality mix of aircraft investment plans. This mix substantially affects costs, since the most capable aircraft are also more expensive. Three key questions suggest the nature of the choices concerning force modernization:

Figure 5.
F-4 Inventory: Two Retirement Profiles



SOURCE: CBO estimates based on Air Force data.
[a] Re-engine option assumes retirement as follows: F-4E at 30 years; F-4C/D at 23 years; and F-4G at 25 years.

- What portion of the forces should be made up of the most capable F-15 fighter and what portion of the less capable F-16?

- Whether to pursue development of the F-15E or its competitor, the F-16E, and what portion of the force should be composed of one of these follow-on aircraft?

- When should the Air Force introduce an entirely new fighter--the Advanced Tactical Fighter--and what should be the tradeoff between capability and cost in design of this new aircraft?

CBO has not attempted to analyze these questions in detail in this preliminary paper. Some, like the portion of forces to be made up of the F-15 and F-16, may not be susceptible to quantitative analysis and may depend on the judgment of the Administration and the Congress. This report does indicate the percentages of the inventory made up of F-15 and F-16 aircraft under various options but the analysis cannot specify the correct levels for the percentages. Other questions--for example, the capability of the follow-on F-15E versus the follow-on F-16E (a two-seat F-16XL)--may be more amenable to analysis, which CBO may attempt in its final report.

ALTERNATIVES

Various combinations of changes in these three key Air Force goals could be proposed to hold down costs. This section compares the Administration approach (Option I) with four such alternative approaches (see Table 4).

The alternative approaches would hold down costs by relaxing one or more of the three goals discussed earlier: expanding to 40 wings, retiring older F-4 aircraft at 20 years, and modernizing with the F-15 and F-16 fighters. The first two options would keep the 40-wing goal but reduce or cancel F-15 procurement and keep F-4s in the force beyond 20 years. The last two options would abandon the 40-wing goal in favor of today's 36 wings. This would allow these options to avoid keeping F-4 aircraft much beyond 20 years of service and to minimize the reductions in the fraction of the force made up of newer fighters.

Specifically the first two alternatives (Options II and III) would attempt to reduce costs while still maintaining the goal of increasing the number of wings to 40 by 1989. Both alternatives would maintain planned purchases of the F-16 aircraft, which is the cheaper of the two fighters now in production. But both options would reduce purchases of the more expensive F-15 aircraft. Option II would reduce procurement to 36 per year (the

TABLE 4. DESCRIPTION OF ALTERNATIVES TO THE ADMINISTRATION PLAN FOR TACTICAL AIR FORCES (By fiscal year, in numbers)

Option	Force Goal by 1989	Plane	Procurement 1985	1986	1987	1988	1989	Total 1985-1989
Option I-- Administration	40 Wings	F-15	48	56	24	24	24	176
		F-15E/F-16E	0	4	48	72	72	196
		F-16	150	216	216	216	216	1,014
		F-4 Reengine	0	0	0	0	0	0
		Total	198	276	288	312	312	1,386
Option II-- Keep 40 wings 36 F-15 per year Same number of F-16s as Administration Keep F-4 as needed	40 Wings	F-15	36	32	0	0	0	68
		F-15E	0	4	36	36	36	112
		F-16	150	216	216	216	216	1,014
		F-4	0	0	0	0	0	0
		Total	186	252	252	252	252	1,194
Option III-- Keep 40 wings Cancel F-15 Reengine F-4 Same number of F-16s as Administration F-4 C/D as needed	40 Wings	F-15	0	0	0	0	0	0
		F-15E	0	0	0	0	0	0
		F-16	150	212	168	144	144	818
		F-16E	0	4	48	72	72	196
		F-4 Reengine	0	0	0	9	147	(156)
		Total	150	216	216	225	363	1,170

(Continued)

TABLE 4. (Continued)

Option	Force Goal by 1989	Plane	Procurement 1985	1986	1987	1988	1989	Total 1985-1989
Option IV--	36	F-15	36	32	0	0	0	68
36 wings	Wings	F-15E	0	4	36	36	36	112
F-15 at 36		F-16	150	200	200	200	200	950
per year		F-4	0	0	0	0	0	0
Slow F-16		Total	186	236	236	236	236	1,130
purchases								
Option V--	36	F-15	0	0	0	0	0	0
36 wings	Wings	F-15E	0	0	0	0	0	0
Cancel F-15		F-16	150	212	168	144	144	818
Same number of		F-16E	0	4	48	72	72	196
F-16s as		F-4	0	0	0	0	0	0
Administration		Total	150	216	216	216	216	1,014
Retire F-4 as								
needed								

SOURCE: February 1985 Budget Submission (Option I).

number the Congress allowed for fiscal year 1984) which would still allow production of the new F-15E derivative. Option III would terminate F-15 procurement. Both options make up for the reduced numbers of F-15 procurements by maintaining F-4s in the force longer. Option II would simply extends the F-4 retirement age from about 20 years to about 23 years. Option III reengines some F-4 aircraft to prolong their life to 30 years and extend others.

As later discussion shows, only Option III could be pursued within the limits of a 5 percent budget. Neither Option II nor III could be afforded if only 3 percent real growth is permitted. Thus this paper considers two alternatives (Options IV and V) that would abandon the plans to expand the size of tactical forces and leave them at today's levels. Option IV would do so by keeping the F-15 procurement at 36 per year and slowing the F-16 procurement to reflect lower force goals. This approach has the advantage of keeping the two aircraft lines open and two contractors producing aircraft. This would provide more surge capability in case of war and would also stimulate competition between the two contractors. Option V would cancel the F-15 while keeping the Administration procurement plan for F-16s, which would be quite feasible if the goal were to maintain today's force levels. This approach might be required if a 3 percent growth rate were adopted.

Affordability of Alternatives Assuming Constant Readiness Spending

Table 5 shows how well the options would meet the savings needed to reduce costs to 5 percent real growth, assuming "constant readiness spending"--that is, no added money for readiness except that associated with adding new aircraft and wings. Over the next five years, about $10 billion would have to be cut from the Administration plan to achieve 5 percent real growth, and three of the four options would achieve that reduction under this readiness assumption.

Table 5 suggests it would probably not be possible to achieve a 40-wing goal if the budget is constrained to 5 percent real growth. Option II, which would keep 40 wings but hold F-15 procurement at 1984 levels of 36 per year, would not save enough money to get down to 5 percent. 3/ Option III,

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3. For options that involved reduced F-15 procurement, the aircraft unit costs were increased to reflect production rate decreases. Options that involve cancellation of the F-15 include cancellation costs, and since it was assumed that without an F-15E, a derivative aircraft would still need to be procured, costs for the F-16E were included in

TABLE 5. AFFORDABILITY OF ALTERNATIVES ASSUMING CONSTANT READINESS SPENDING (By fiscal year, in billions of then-year dollars in budget authority) a/

Option	1985	1986	1987	1988	1989	Total
Savings in Tactical Air Forces from Administration Plan Required to Attain 5 Percent Real Growth						
	1.9	2.8	2.2	2.3	1.0	10.2
Options Savings						
Option II (40 Wings)						
Investment	0.6	1.2	1.6	2.4	2.2	8.0
Operating Costs	---	---	---	---	---	---
Total	0.6	1.2	1.6	2.4	2.2	8.0
Option III (40 Wings) b/						
Investment	2.2	2.5	2.7	3.4	0.8	11.6
Operating Costs	---	---	---	---	---	---
Total	2.2	2.5	2.7	3.4	0.8	11.6
Option IV (36 Wings) b/						
Investment	0.6	1.5	1.9	2.7	2.5	9.2
Operating Costs	0.1	0.2	0.3	0.5	0.7	1.7
Total	0.7	1.7	2.2	3.1	3.1	10.9
Option V (36 Wings) b/						
Investment	2.2	2.5	2.8	3.6	3.3	14.4
Operating Costs	0.0	0.2	0.3	0.5	0.7	1.7
Total	2.2	2.7	3.1	4.1	4.0	16.1

SOURCE: CBO projections from Fiscal Year 1984 Budget (for 5 percent real growth and operating costs); and CBO projections from Fiscal Year 1985 Budget Submission (investment).

NOTE: Numbers may not add to totals because of rounding.

a/ Administration inflation assumptions.

b/ Could be bought at 5 percent real growth.

which would also include Administration plans for 40 wings, could be afforded within 5 percent real growth only by cancelling the F-15 and procuring F-16s at currently planned Administration rates. But Option III would also reengine the F-4. 4/ A total of 400 would eventually be reengined under this option but, because of the time required to develop the program, only 156 could be procured during the five-year period. If the costs for all 400 of the aircraft had been included in Option III, it too would exceed 5 percent. Thus Option III would remain within 5 percent real growth only because it would not fully pay the costs over the next five years.

Realistically, then, only the two options (Options IV and V) that would keep the current force structure would probably be attainable at 5 percent real growth. Option IV would retain current force levels but keep the two fighter lines--F-15 and F-16--open at slower rates. This option would raise unit costs but might prove to be the most appealing of the options affordable at 5 percent, since it would produce a smaller but certainly more capable force structure than that produced by Option III and maintain the competition inherent in two fighter lines. Option V, which would hold the tactical forces to 36 wings and cancel the F-15, might be necessary should the Congress decide that 3 percent real growth is sufficient.

Administration Readiness Spending

The preceding discussion assumed that readiness rates were held at today's levels. Yet the Administration plans to increase readiness for all defense forces, with commensurate increases in costs of operations and maintenance. If tactical air readiness spending growth is consistent with overall increases, investment resources would be even more constrained in a 5 percent real growth budget. Indeed, relative to current plans, it would be necessary to cut $12 billion over the five years (see Table 6). This would clearly increase the difficulty of reducing spending to achieve 5 percent real growth. As can be seen in Table 6, only the lowest cost option, Option V, fits within a 5 percent real growth budget under these readiness-spending assumptions.

Footnote Continued

those options. The costs are $1.6 billion over the five years and, should the Congress decide that a derivative is too expensive, that money could be taken out of Options III and IV.

4. For F-4 reengining (Option III), contractor costs were used with a factor added for spare parts funding.

TABLE 6. AFFORDABILITY OF ALTERNATIVES ASSUMING ADMINISTRATION READINESS SPENDING, WITH INCREASES IN OPERATIONS AND MAINTENANCE COSTS (By fiscal year, in billions of then-year dollars in budget authority) a/

Option	1985	1986	1987	1988	1989	Total
Savings in Tactical Air Forces from Administration Plan Required to Attain 5 Percent Real Growth						
	2.0	3.1	2.6	2.7	1.6	12.1
Options Savings						
Option II (40 Wings)						
Investment	0.6	1.2	1.6	2.4	2.2	8.0
Operating Costs	---	---	---	---	---	---
Total	0.6	1.2	1.6	2.4	2.2	8.0
Option III (40 Wings)						
Investment	2.2	2.5	2.7	3.4	.8	11.6
Operating Costs	---	---	---	---	---	----
Total	2.2	2.5	2.7	3.4	0.8	11.6
Option IV (36 Wings)						
Investment	0.6	1.5	1.9	2.7	2.5	9.2
Operating Costs	0.1	0.2	0.3	0.5	0.7	1.8
Total	0.7	1.7	2.2	3.2	3.2	11.0
Option V (36 Wings) b/						
Investment	2.2	2.5	2.8	3.6	3.3	14.4
Operating Costs	0.1	0.2	0.3	0.5	0.7	1.8
Total	2.3	2.7	3.1	4.1	4.0	16.2

SOURCE: CBO projections from 1984 budget submission and in 1985 budget submission of DoD-wide readiness increases (5 percent real growth and operating costs); and CBO projections from 1985 budget submission (investment).

NOTE: Numbers may not add to totals because of rounding.

a. Administration inflation assumptions.

b. Could be bought at 5 percent real growth.

TABLE 7. EVALUATION OF ALTERNATIVES USING QUALITATIVE MEASURES (By fiscal year)

	Numbers		F-4 Retirement Age	Average Age of Inventory by 1991	Inventory Mix by 1991 (In percents)	
	Wings by 1989	Quantity Procured 1985-1989			F-15	F-16
Option I	40	1,386	21	9.1	23	42
Option II	40	1,194	23	10.1	18	42
Option III	40	1,014 (156) b/	26 a/	10.9	14	43
Option IV	36	1,130	20	9.5	19	44
Option V	36	1,014	21	10.3	14	45

SOURCE: CBO estimates from Air Force Data (Option I); CBO analysis (Options II, III, IV, and V).

a. Includes reengining 400 F-4Es and retiring them at 30 years of age.

b. Number of F-4Es to be reengined during fiscal years 1985-1989.

EVALUATION OF ALTERNATIVES

Costs are, of course, not the only issue in evaluating tactical air forces. The effectiveness of the U.S. tactical forces hinges both upon the quantity and quality of their aircraft, as well as the readiness of both the aircraft and their crews and the ability to sustain the aircraft with spare parts and weapons in a protracted war. CBO has not attempted to evaluate in detail the capabilities of the various aircraft considered in these options. A qualitative assessment of the combat effectiveness of these alternative forces would necessitate detailed computer simulation and analysis, which are beyond the scope of this report. So, too, is an analysis of the readiness of the aircraft and their crews and the ability to sustain the aircraft in war.

This paper does present some simple measures that are proxies for capability: average age of the force and percentage of the inventory made up of newer and more capable aircraft, the F-15 and F-16. Although these measures are not a substitute for detailed judgments about capability, they do suggest the direction of qualitative changes resulting from the various options.

Evaluation of the Administration Option

For many years, the Air Force has used the age of the forces as a proxy for effectiveness. The Air Force has set ten years as an upper bound for the average age of the force. By fiscal year 1991, the force would be under that limit if the Administration's plans--which would procure some 1,400 aircraft--were followed (see Table 7).

Another indicator of capability is the percentage of relatively newer aircraft types in the force structure. Thus the analysis provides the percentage of the inventory in fiscal year 1991 that consists of F-15s and F-16s. While the F-16 is a capable aircraft, the Air Force believes the F-15 is the most capable in the tactical forces. And, according to the Air Force, the follow-on F-15E will be superior to its competitor, the F-16E, in the air-to-surface role. Hence the percent of F-15s could be viewed as the most capable part of the inventory, with the percent of F-16s indicating the newer but somewhat less capable portion of the mix. Because of the composition of procurement under the Administration plan, approximately 23 percent of the inventory would be F-15s and 42 percent of the inventory F-16s by 1991.

Effects of the Options

The options confront the Administration and the Congress with some clear if difficult trade-offs. If the United States is to expand the number of tactical forces to 40 wings, while also holding down costs to somewhere near 5 percent annual real growth, it would have to accept an approach like Option III, which would produce a force substantially older than the Air Force wants and would eliminate competition among aircraft manufacturers by buying only one type of fighter. Option II would also maintain 40 wings and produce a fairly capable inventory though less so than the Administration program. Under this option, the force would be only a year older than the Administration program. Unfortunately it is also too expensive to procure at 5 percent real growth.

On the other hand, if the Administration was willing to accept today's force levels, it could stay within a 5 percent budget. Moreover, it could hold average age below the ten-year ceiling set by the Air Force. This alternative would also keep the percent of capable F-15s within four percentage points of the Administration plan and the percent of F-15s and F-16s together within just 2 percentage points of the Administration plan (see Option IV in Table 7). Thus the choice about numbers of future forces will have to do much with the quality of those forces, at least under a 5 percent real growth budget.

CHAPTER IV. LONGER-TERM CONSEQUENCES OF CURRENT DECISIONS

This chapter discusses problems in the 1990s that might occur as a result of decisions about the Air Force tactical forces made in the next few years. One of the potential problems involves the Advanced Tactical Fighter (ATF), which the Air Force expects to field by the mid to late 1990s. It may appear that this is too far in the future to be of relevance to the current budget debate, but many key decisions about the future of the tactical aircraft will be made in the next few years.

The reason for concern is the likely high cost of the aircraft, given the capability the Air Force wants. The Air Force has indicated that it will have to fight more capable Soviet fighters in an environment that the service expects to have denser enemy defenses and offenses. In order to do this, the Air Force wants its tactical fighter to have much more capability than existing aircraft. Among the improvements is enhanced avionics; the fighter, for example, is to have voice-activated controls and very sophisticated displays to help its pilot. The plane is also to incorporate stealth technology--which would reduce its visibility to enemy radar. Sustaining supersonic cruise speed for long periods--without the need for an afterburner--is another desired capability. The ATF, according to the Air Force, should also have a short take-off and landing capability to enable it to operate from battle-damaged runways. And finally the aircraft is to be highly reliable and maintainable.

While all of these goals are commendable, they clearly will come at a cost. Indeed, this fighter may be many more times more capable than the F-15--which it is to replace--but it also will probably be more expensive. History may be some guide here. The F-15 was, according to the Air Force's Affordable Acquisition Approach Study, 3.4 times more capable than the F-100 aircraft over which the study describes as the F-15's predecessor. Also, according to that study, it was 14 times more expensive.

Given the potential expense, can the Air Force maintain a 40-wing force without prohibitive increases in costs? The severity of the challenge depends in part on procurement over the next few years. If the Air Force realizes its planned procurement levels in fiscal years 1985-1992, and continues to buy F-16 aircraft at the high rate of 216 annually through the early 1990s, then it should need to buy only about 180 planes a year between 1995 and the year 2000 to maintain 40 wings with an average aircraft age of 10

years, the Air Force goal. Purchasing 180 aircraft a year seems reasonable since Air Force is buying 180 aircraft in 1984. But in 1984 the Air Force is buying mostly F-16s. Buying 180 aircraft in the 1990s, if it consisted mostly of ATFs, would be dramatically more expensive.

Moreover, the Air Force may well not realize its planned high procurements in the rest of the 1980s. If, instead, it is only able to buy 180 aircraft a year through the mid-1990s, then it would have to purchase 260 aircraft a year between 1995 and the year 2000 to attain the 40-wing goal by the year 2000 while keeping an average age of 10 years. If most or all these 260 aircraft were ATFs, it is likely that the cost would be prohibitive. Clearly, the Air Force could lower the needed level by giving up its goal of 40 wings but, even at 36 wings, it would probably have to buy more aircraft than it is buying today and do it with a much more expensive fighter.

These potential problems suggest the urgency of holding down the costs of the tactical air fleet of the 1990s. This could involve future improvements to the capabilities of aircraft already in the force so that they could be retained longer. This might also involve design of a less costly fighter as a companion to the Advanced Tactical Fighter--similar to the F-16 development in the 1970s as a companion to the more expensive F-15. But holding down the costs of future tactical aircraft would also depend on designing an ATF that is reasonably affordable while also meeting key tactical requirements. Thus the Congress may wish to ensure that cost is one of the key design ingredients in the ATF.

Nor is it too early to worry about ATF costs. The aircraft will not be deployed until the mid or late 1990s, and its development costs today ($35 million in 1984) are relatively modest. But many key decisions that will determine future ATF costs will be made in the next few years. If costs are to play a fundamental role in the design of the ATF, decisions about funding will probably have to be made in the next few years.

APPENDIXES

APPENDIX A. ADDENDUM: NEW PLANS FOR TACTICAL AIR FORCES

Two recent documents--an Air Force briefing paper of its plans for the tactical forces 1/ and the Administration's May 1984 budget revision--show changes to the program discussed in the main body of this report, both in terms of reduced aircraft procurement and altered force goals. Unfortunately, the two sources do not provide a clear statement of the details of the new program. In this appendix, CBO analyzes a combination of the two plans that appears to be the probable new program. This addendum first presents CBO's assumptions about the new plan. The remainder of the section provides an analysis of the new plan's consistency and affordability.

ASSUMPTIONS ABOUT THE NEW PROGRAM

The Tactical Fighter Roadmap shows a new procurement schedule for the F-15 that would hold procurement constant at 60 aircraft per year in fiscal year 1986 and beyond, rather than increasing to 96 aircraft annually by 1988 as planned in the February 1984 budget. In the Roadmap document, F-16 procurement was kept at the February 1984 budget level of 216 annually in 1986 and beyond. In the May 1984 budget revision, however, the Department of Defense reduced F-16 annual procurement quantities from 216 aircraft per year in 1986 and beyond to 180 annually. It also indicated that the goal of 40 wings would be delayed yet another year to fiscal year 1990. While F-15 procurement quantities for fiscal year 1985 were reduced, the May budget revision does not provide new out-year procurement quantities for the fighter. The analysis that follows assumes that the Administration has accepted the Air Force plan for reduced F-15 procurement in addition to the other changes (see Table A-1 for details).

CONSISTENCY AND CAPABILITY OF THE NEW PLAN

In contrast to the February 1984 budget plan, the assumed new procurement plan would no longer fully support the planned force increases--assuming F-4s are retired at 20 years of age (see Figure A-1). The inventory would be about 250 airplanes short of requirements in fiscal year 1990,

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1. U.S. Air Force, The Tactical Fighter Roadmap, briefing paper (April 1984).

TABLE A-1. AIRCRAFT PROCUREMENT UNDER POSSIBLE NEW ADMINISTRATION PLAN (By fiscal year, in numbers of planes)

Plan	1985	1986	1987	1988	1989	Total 1985-1989
Air Force Plan						
F-15C/D	42	52	12	0	0	106
F-15E	--	8	48	60	60	176
May 1984 Budget Revision						
F-16	150	180	180	180	180	870
Total						1,152

SOURCES: U.S. Air Force, The Tactical Fighter Roadmap (April 1984); and Administration's May 1984 Budget Revision.

NOTE: May 1984 plans call for a force goal of 40 wings by fiscal year 1990.

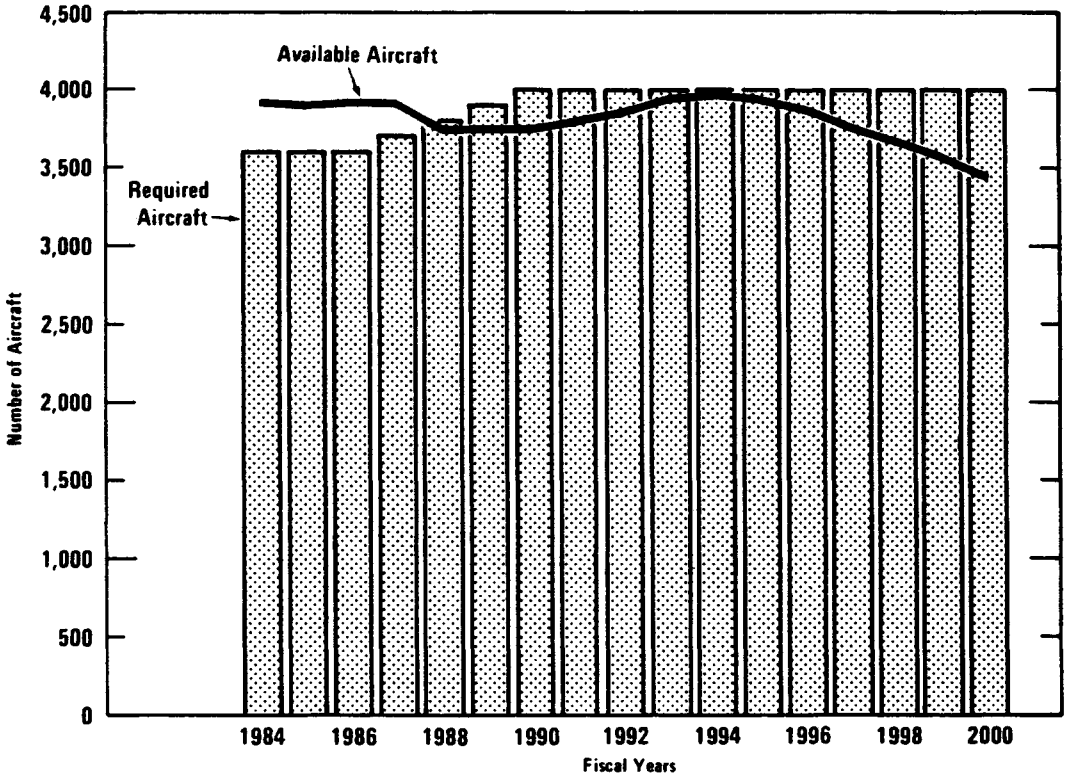
and it would not contain enough planes to meet the requirements associated with the 40-wing goal until fiscal year 1993--three years after the Administration plans to meet that goal. In fact, under the new procurement schedule, aircraft inventory levels would not even regain the levels experienced in the mid-1980s until about 1993. Moreover, inventory levels would only meet requirements for two years; by fiscal year 1995 requirements and peacetime crashes would cause another shortfall.

One way of meeting requirements under this new procurement plan would be to retire F-4s later than 20 years of age. To meet the shortfall shown here, F-4s would have to be retired on average after about 22 rather than 20 years. This would raise the average age of the force to 10.2 years--slightly above what the Air Force has described as the acceptable maximum age of ten years.

As this plan delays modernization, the percent of the force consisting of F-15s and F-16s would also be reduced, to 21 percent and 39 percent, respectively, by fiscal year 1991. This compares to 23 and 42 under the February submission.

Figure A-1.

Air Force Requirements Versus Available Aircraft



SOURCE: Required Aircraft—CBO estimates from Department of Defense Plans—FY 1985 Budget Revisions, May 3, 1984, Available Aircraft—CBO estimates from Air Force data with revised procurement schedules for F-15/F-16 from May 3, 1984 Plan.

AFFORDABILITY OF THE NEW PLAN

Since the force appears to be smaller, older, and less modern than the February 1984 program, it is not surprising that it is also cheaper. CBO has not estimated the costs of this new plan in detail. But it seems clear that the new plan, though cheaper, would still require more than 5 percent annual real growth in the budget for the tactical air forces. The new plan would reduce operating and support costs slightly below those of Option II as a result of the delay in achieving the 40 wings. But investment costs would be higher than those associated with Option II. As Option II exceeded 5 percent real growth by $2.2 billion, the new program would certainly exceed it as well.

APPENDIX B. MODEL METHOD

Projecting aircraft inventories requires a model that accounts for numerous details about Air Force plans. This appendix describes the CBO model used in this analysis.

The model starts with an inventory as of the end of fiscal year 1983 provided by the Air Force (see Figure B-1). To this baseline, aircraft deliveries, dependent upon procurement schedules, are added. Air Force delivery schedules--which lag about two years behind procurements--were used. Several kinds of deletions from inventory are then made. First, in any year the Air Force can expect to lose aircraft because of accidents; in fiscal year 1982, for example, 52 tactical aircraft were lost. Planning factors from the Air Force based upon historical rates--and based upon hypothesized flying levels, also from the Air Force--were used to delete these "attrition" aircraft. 1/

Second, as the inventory also supplies aircraft for strategic defense interceptors, these aircraft are deleted to meet the Air Force's expressed goals for modernization of those forces. Specifically, the Air Force has indicated that it intends its strategic interceptor force to be composed entirely of F-15 and F-16 aircraft by 1990. There are 15 squadrons, with 18

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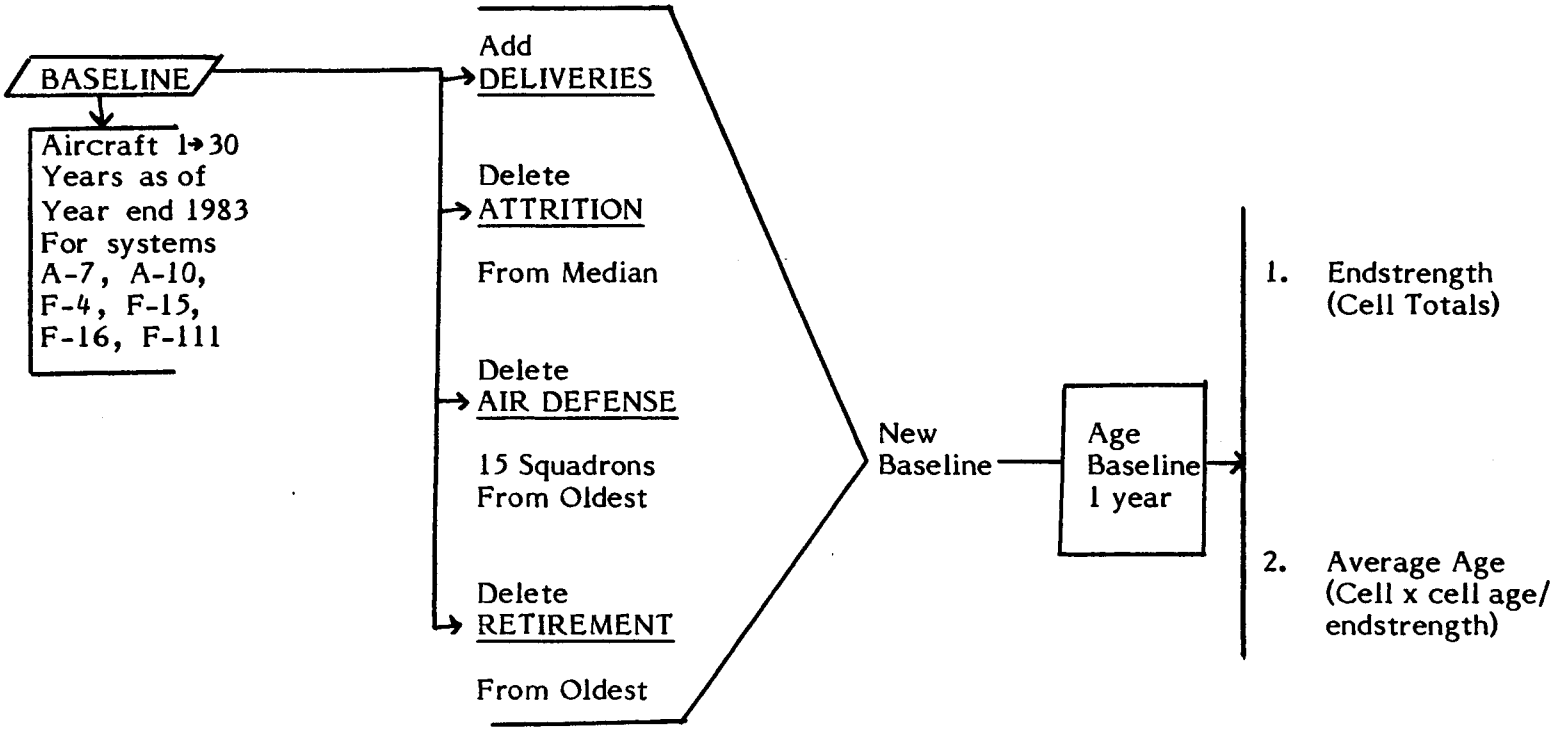
1. There is some controversy over whether the attrition rates that the Air Forces uses are accurate or not. Over the past several years, the General Accounting Office (GAO) has published several reports indicating that averaging historical attrition rates, as the Air Force has done, captures the higher attrition rates typically associated with the early years of introduction of an aircraft to the fleet, thus inflating the rates when they are applied to mature aircraft. As attrition forms a relatively small portion of those factors influencing the inventory, and as the results of this analysis are fairly insensitive to small changes to them, CBO accepted the Air Force planning factors. For more in depth information on the subject, see Statement of Werner Grosshans, GAO, Planning Director, National Security and International Affairs Division, before the Subcommittee on Legislation and National Security, House Committee on Government Operations (June 2, 1983); and Report to the Congress by the Comptroller General of the United States, The Congress Should Require Better Justifications of Aircraft for Noncombat Missions (July 22, 1980).

FIGURE B-1. MODEL METHOD



aircraft each, in the strategic force, and the mix of the two aircraft was assumed to be 8 squadrons of F-15s and 7 squadrons of F-16s. For the purposes of this analysis, enough F-15s and F-16s to modernize these squadrons were removed from the inventory on the basis of a schedule that was kept constant for all alternatives. This modernization schedule could be slowed should procurement be reduced.

Finally aircraft are deleted based upon the assumed retirement age; this age was varied in some of the options to meet force requirements. According to the Air Force, aircraft are retired either because of obsolescence in face of the threat or because of structural fatigue. As a general principle, the Air Force would like to retire aircraft at 20 years of age, although projected structural service lives for most aircraft far exceed this goal. For example, the F-4E, which has been in the fleet for an average of 15 years, has approximately 17 years of service life remaining. Thus, if the F-4E were retired on the basis of structural fatigue, it would be retained until it was over 30 years old.

But retirement around 20 years may still, in the Air Force's view, be required by the caliber of the Soviet fleet against which U.S. forces would fight. While the Soviet tactical air forces have been larger than U.S. forces for many years, the Air Force has maintained that qualitative differences--such as greater maneuverability, longer-range radar and missiles, and so forth--would improve U.S. chances against a numerically superior force. Press reports have indicated that three Soviet aircraft entering the fleet now or within the next few years--the Sukhoi SU-27 Flanker, Mikoyan MIG-29 Fulcrum, and the MIG-31 Foxhound--have a qualitative edge over older U.S. aircraft, and potentially have as good an aerodynamic performance as the F-15s and F-16s. If this proves to be true, obsolescence in face of an increasingly capable threat might require replacing older aircraft with more capable, younger F-15s and F-16s, and speeding development of the Advanced Tactical Fighter.

All these additions and deletions translate the end-1983 baseline into an estimate of strength at the end of fiscal year 1984 (the new "end-strength"). This procedure was repeated for each year through the year 2000.

The model also calculates the average age of the fleet. 2/ The Air Force has used average age as a proxy for capability, indicating that it

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2. The calculation of average age assumes that aircraft are at the mid point of their age "cell." Thus aircraft that are between zero and one years of age at the end of a year are assumed to be one-half years old.

would prefer to keep the average age of the inventory at no more than ten years. This is simply a different way of looking at the 20-year retirement goal discussed earlier. This proxy was included in the analysis to display any aging effects associated with the different options.