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This study examines the sources of topline budget turbulence and the current process for coping with it. Several improvements to the current process are evaluated and quantitative assessments are made of mutually exclusive strategies. The study concludes with specific recommendations for improvements which could be implemented now and concepts which should be further studied.

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STRATEGIES FOR DEALING WITH THE DEFENSE BUDGET

for

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BOOZ·ALLEN & HAMILTON INC.

4330 EAST WEST HIGHWAY · BETHESDA, MARYLAND 20814-4455 · TELEPHONE: (301) 951-2200 · TELEX II: 710-824-0552

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EXECUTIVE SUMMARY

The objectives of this research are to develop an information base about topline budget turbulence and its causes, and to develop and evaluate alternatives to the current strategies for dealing with turbulence.

This study relates to Secretary of Defense Weinberger's remarks concerning "topline instability" in his Fiscal Year 1984 Annual Report to the Congress (February 1, 1983). Mr. Weinberger noted that, "Although we are now making an effort to achieve program stability within the existing budget, it will take some time for this new way of approaching the problem to be fully implemented in our planning process." Our study offers decision-makers additional options both for diminishing the degree of instability that currently exists and for better coping with the residual turbulence.

1. APPROACH

Our study approach consisted of the following sequential steps:

- Performing a literature search to obtain data and information applicable to the study. Two hundred and forty (240) citations resulted.
- Defining topline budget turbulence.
- Describing the current budget and PPBS processes to provide a baseline and identifying potential sources of turbulence.
- Analyzing historical budgets back to 1950 and quantifying the turbulence.
- Identifying the causes of turbulence based on turbulence data and previous studies.
- Identifying and describing the current process for coping with budget turbulence.
- Identifying the perceived shortcomings in the current process for coping with turbulence.

- Identifying candidate improvements to the current process and new strategies for coping with turbulence based on identified shortcomings in the current system, the causes of turbulence, and the quantitative characteristics of the turbulence.

- Analyzing and evaluating the candidate improvements and the new strategies for coping with turbulence.

- Summarizing the findings and conclusions.

- Developing recommendations.

2. SIGNIFICANCE AND IMPACT OF TURBULENCE ON THE EFFICIENCY AND MANAGEMENT OF DOD MATERIEL ACQUISITION

Topline budget turbulence is a significant factor in materiel acquisition. Analysis of budget data from FY 64 to FY 81 reveals that the procurement account is approximately twice as turbulent as the DOD TOA and the next most turbulent account, O&M. The analysis shows the standard deviation of the annual percent change for procurement as approximately 15 percent compared to approximately 8 percent for the total DOD TOA and the O&M account. The standard deviation for the absolute change in the procurement account is approximately $7.5 billion compared to $4.4 billion for O&M. These numbers verify the postulate that procurement is the "discretionary account" and therefore takes the brunt of budget turbulence. The analysis quantifies the degree of turbulence and the relative turbulence in procurement as compared to other accounts.

The analysis also shows the turbulence in specific procurement accounts to be further exacerbated. Although the aircraft and missile accounts generally experience the same turbulence as total procurement, the standard deviation for shipbuilding and conversion and for weapons and combat vehicles is 45.5 percent and 43.5 percent, respectively. These two accounts are approximately three times as turbulent as the total procurement, aircraft, and missiles accounts.

An analysis was also performed to determine the transmission of turbulence from one budget level to another. The transmission of Gross National Product (GNP) turbulence to the various budget levels was analyzed. This analysis consisted of correlating the turbulence at one budget level with the turbulence at other procurement budget levels. The results of correlating the year-to-year percentage change in economic and budget data with other budget data are shown in Table 1. Column 2 of this matrix shows the correlation between annual percent changes in the GNP and the Federal, DOD, procurement, aircraft, missile, ships, weapons/combat vehicles, and other budget accounts. The value -.15 for the coefficient of correlation between GNP and the Federal budget indicates that there is no significant correlation between the GNP and the Federal budget for the 1964-1981 time period. Column 3 of the matrix shows a correlation of 0.54 between the Federal and the DOD budgets -- not a very strong correlation. The lower level budget accounts shown in Column 3 show even lower correlations. Column 4 shows a strong (.94) correlation between the total DOD budget and the procurement account. The correlation weakens between the DOD budget and the specific procurement accounts with moderate correlation with aircraft (.71), weapons and combat vehicles (.78), and other procurement (.78), and much weaker correlation with ships (.52) and missiles (.28).

The results of this analysis are rather surprising when compared to the "conventional wisdom:"

- GNP turbulence does not correlate with the Federal budget, the DOD budget, the procurement budget or any of the procurement accounts.

- Federal budget turbulence has very little correlation with the total DOD budget or any of its procurement accounts.

- As expected, however, there is high correlation between the total DOD budget and the procurement budget; however, there is not a high correlation between the procurement budget and all of the various accounts from which it is aggregated.

The analysis shows that, in general, turbulence above the DOD budget need not be considered when deriving and analyzing strategies to deal with budget turbulence.

3. MAJOR CAUSES OF TOPLINE BUDGET TURBULENCE

There are two major categories of topline turbulence that affect program execution efficiency. One category is topline budget turbulence (TLBT) in the budget as passed by Congress. The second category of turbulence is associated with the planning process -- the PPBS -- and is called topline planning turbulence (TLPT) in this study.

TABLE 1
Correlation Between Annual Percent Change in
Economic and Budget Categories

	GNP	FED	DOD	PROC	A/C	MSLE	SHIPS	W/COMB	OTHER
GNP	1.0								
FED	-.15	1.0							
DOD	.26	.54	1.0						
PROC	.31	.39	.94	1.0					
A/C	.09	.49	.69	.71	1.0				
MSLE	-.20	.07	.22	.28	.27	1.0			
SHIPS	.32	.03	.53	.52	.33	-.22	1.0		
WEAPONS & COMBAT VEHICLES	.24	.17	.76	.78	.41	.05	.67	1.0	
OTHER PROCURE- MENT	.53	.26	.78	.78	.51	-.08	.83	.69	1.0

The major causes of topline budget turbulence were no surprise. Wars cause the greatest turbulence, followed by changes of administration. Congressional actions are a significant source of program-specific turbulence, but not as large a contributor to topline budget turbulence as defined in this report. The analysis demonstrates that turbulence in the GNP or the total Federal budget is not directly transmitted to the Defense budget nor to procurement. It also reveals the unexpected result that, at the macro level, increases in the threat have not led to immediate changes in the budget nor in topline budget turbulence.

This study was not able to examine FYDP data to examine planning turbulence directly, but the current literature identifies optimism in the planning process as a major factor. This optimism has two key components: unexpected cost growth and higher-than-realistic out-year funding projections.

4. CURRENT DOD PROCESS FOR COPING WITH TURBULENCE

The literature is not clear on the current DOD process for coping with turbulence. However, our analysis indicates that the following strategies are being used to cope with both topline planning turbulence (TLPT) and topline budget turbulence (TLBT):

- Reducing cost growth by improved cost estimates, improved cost control, and more realistic inflation estimates

- Acquiring a mix of systems appropriate for less-than-FYDP level of funding via prioritization (principally at the Service level with DOD-wide direction and constraints) and affordability tests for new programs

- Providing extra protection for top-priority programs via stable program lists and multiyear contracting

- Stretching-out/speeding-up programs

- Stopping and restarting programs on the margin

- Taking actions at the program level to minimize negative impacts of turbulence.

5. CONCEPTUAL FRAMEWORK FOR THE ANALYSIS OF COPING WITH TURBULENCE

We found it desirable to develop a new conceptual framework for the analysis of strategies for coping with turbulence based on our analysis of historical budget data. The essence of this concept is that the role of the prioritization process in the PPBS should be to establish the mix of systems which is "affordable" -- and optimum -- for a given long-term level of funding, specifically the long-term mean level of future budgets. This level is generally less than the mean level of the FYDP. Then, year-to-year variances from this long-term trend - turbulence - should be coped with by mechanisms other than reprioritization. A similar conclusion applies to planning turbulence, the year-to-year fluctuation in FYDP out-year funding levels.

6. PERCEIVED SHORTCOMINGS IN THE CURRENT PROCESS FOR COPING WITH TURBULENCE

The study identified perceived shortcomings in the current process for coping with turbulence as:

- <u>Reducing cost growth</u>. Improvement will be achieved but the strategy will not be fully effective; preplanned product improvement (P^3I) is a viable element of this strategy but it is only partially implemented.

- <u>Acquiring a mix of systems appropriate for less-than-FYDP levels of funding</u>. This is an essential step, but the annual cycle will still lead to too much reprioritization; the concept is poorly understood, and the level of funding chosen is often higher than the future budget level.

- <u>Providing extra protection for top-priority programs</u>. This will increase turbulence impacts in nonprotected programs and may not be the most economic strategy.

- <u>Stretching-out/speeding-up programs</u>. The accompanying program instability may be costly.

- <u>Stopping/restarting programs on the margin</u>. This may not be economically justified if the start/stop costs are high.

- Coping at the program level. Project managers have neither the guidance on the amount of turbulence for which to plan nor a well-researched and tested family of strategies and techniques to use.

7. CANDIDATE IMPROVEMENTS TO CURRENT STRATEGIES FOR COPING WITH TURBULENCE

Our evaluation of candidate improvements to the present strategy led to nine recommendations that we believe are viable, that offer substantial improvements, and that are mutually supporting and need not be prioritized relative to each other. These improvements are summarized below with additional study indicated where needed:

- Integrate Preplanned Product Improvement (P^3I) into the PPBS and Major System Acquisition Process. This can lead to full implementation of P^3I with its cost control benefits.

- Create a second, independent, inflation projection and use the higher one in the PPBS. This can further reduce the optimism in future inflation projections which historically have been a source of planning and budget turbulence. This improvement was suggested by analogy with current DOD policy on cost estimates, but more study would be required to develop an implementable second basis for inflation projections.

- Make wider use of Mission Area Analyses. This can strengthen and focus the prioritization process better but will not be a full "cure."

- Perform PPBS prioritization based on the long-term budget trend. This would complement the present affordability tests and should reduce turbulence and reduce the too-large influence of near-term issues in the prioritization process.

- Conduct Quadrennial Reviews, indepth reviews of the defense program timed for the first PPBS cycle of each new Administration. These can also reduce turbulence and the influence of near-term issues.

- Include turbulence analyses in the PPBS cycle. This can lead to increased top-management focus on turbulence and should thereby lead to reduced turbulence.

- Provide turbulence budgets to project managers. This has potential political liabilities if Congress were to use large turbulence budgets as a basis to kill or cut back programs. However, if a politically viable mechanism can be developed, such action might lead to effective action at the project level to reduce the negative impacts of turbulence. Additional study is needed.

- Include turbulence provisions in multiyear contracts. These would include, as a minimum, pricing of a range of production rates so that the costs of various strategies for coping with turbulence would be explicit. Contract incentives might also lead to contractor action that would reduce the cost of turbulence.

- Develop turbulence contract incentives. These could motivate or fund action by the contractor to minimize the cost of turbulence. Additional study is needed of specific actions that might be worth funding.

8. COMPETITIVE STRATEGIES FOR COPING WITH TURBULENCE

Three competitive (mutually exclusive) strategies (complete fencing, even distribution, and hybrid) were evaluated and compared to the three competitive elements of the current process (extra-protection, stretching-out/ speeding-up, and stopping/restarting).

Complete fencing and stopping/restarting are considered politically nonviable as mechanisms for coping with turbulence; further, they have a negative impact on the industrial mobilization base. However, if the costs of stopping and restarting were low and the economic benefits of greater program stability for fenced programs (not priced out by this study) were high, then some variants involving stopping and restarting programs might be attractive.

Our analysis showed generally small (few percent) differences in the relative costs of the other strategies with the costs favoring strategies with fencing if programs have steep cost-quantity relationships, and favoring even distribution if the programs are near their maximum economical production rates. If the economic benefits of fenced programs are very great, however, the hybrid strategy (some programs fenced) and the extra-protection strategy may be significantly less costly for some cases. We found negligible (less than 1 percent) differences in discounted mission effectiveness over time if the same number of systems are ultimately built. This is the case because effectiveness over the long life of today's systems dominates differences in short-term effectiveness during the production period. As a result, we have concluded that these competitive strategies must be evaluated on a case-by-case basis with program-specific cost data.

These results are summarized in Table 2.

9. RECOMMENDATIONS

Based on our findings and conclusions, we make the following recommendations.

(1) Use of Conceptual Framework for Evaluation

The conceptual framework developed in this report (Section 6.1) should be used as the basis for future evaluation of topline planning turbulence and topline budget turbulence. Specifically, the issue of which programs to retain and which to cancel should be based on whether programs fit in the mix of systems which is optimum for the expected long-term levels of future budgets. This mix may change from year-to-year in response to changes in threat, technology, strategy, or similar fundamental factors, but it should not change in response to budget turbulence. Year-to-year turbulence should be handled by strategies which do not change the mix but either reduce the turbulence or minimize its negative impact.

(2) Improvements for Coping with Turbulence

The following improvements to the current process should be implemented for coping with top level planning and budget turbulence:

- Integration of Preplanned Product Improvement (P^3I) into the PPBS and the Major Program Acquisition Processes

- Wider utilization of Mission Area Analysis

TABLE 2 - Evaluation of Competitive Strategies For Coping With TLPT/TLBT - Relative Ranking

Strategy	Politically Viable	Relative Cost of 20% Turbulence[1] (Level Budget = 1.00)		Relative Mission Effectiveness Over Time (Hybrid = 1.00)	Impact on Industrial Mobilization Base (rank)
		Exponential Cost-Quantity	Near Economical Production Rate		
	****************** PURE STRATEGIES		******************		
Complete Fencing	No	.90-1.03[2]	1.02-1.07	1.00	2
Even Distribution of Turbulence	Maybe[3]	.97	1.01	1.00	1
Hybrid: 50% fenced; 50% even distribution	Maybe[3]	.95[4]	1.02[4]	1.00	1
	****************** CURRENT STRATEGIES		******************		
Extra Protection for top Priority Programs	Yes	~ Complete fencing or hybrid		≈ 1	1
Stretching-out/Speeding-up Programs	Yes	~ Even distribution		≈ 1	1
Stopping/Starting Lowest Priority Programs	No	No direct analogy-part of complete fencing		≈ 1	2

(1) Relative cost of same quantity bought in each case.

(2) Net cost of stopping and starting marginal programs compared to added savings from stable programs varied between 0 and 30% of marginal program cost.

(3) Too rigid for Congress as a "pure" strategy; possibly viable with exceptions.

(4) Does not include savings from the additional stability in the fenced programs. Such savings would reduce these numbers and make this strategy more attractive.

- Prioritization based on long-term budget trend

- Performance of Quadrennial Reviews to provide in-depth reexamination of optimum program mix timed for each new Administration's first PPBS cycle

- Preparation of budget category turbulence analyses by the services and OSD staff as part of the annual PPBS cycle

- Implementation of turbulence provisions in multiyear contracts.

(3) Studies

Studies should be chartered to develop adequate guidelines for the implementation of the following improvements to the current process:

- Creation of a second independent inflation projection, and use of the highest projection in the PPBS and budget process

- Preparation of turbulence budgets for program managers

- Provision of turbulence contract incentives.

(4) Marginal Programs

A marginal program should be stopped or started only if that action is based on long-term affordability and not on reaction to topline turbulence.

(5) Current Strategies for Coping with Turbulence

The following current strategies should be continued for coping with TLPT and TLBT:

- Provision of extra protection for top priority programs

- Allowance for stretching out/speeding up other programs.

The mix of programs should be achieved by allowing for the optimum combination of systems for the expected long-term level of future budgets. The combination of strategies chosen should be based on careful analysis of the costs peculiar to each program, on industrial mobilization requirements, and on other program-specific judgmental factors. The economic gain created by giving extra protection to stable programs should be explicitly estimated and included in the cost analysis.

1.0 INTRODUCTION

The Defense Systems Management College (DSMC) research topic addressed in this report is the development of strategies for coping with topline budget turbulence.

1.1 PURPOSE AND SCOPE

The statement of work for this task states that the objectives of the research are "to develop an information base upon which conclusions and recommendations can be based with respect to how to deal with budget turbulence, and to develop a set of carefully reasoned alternatives to the current strategies for dealing with turbulence." The reasons given in the statement of work for performing the research are:

- Topline budget turbulence has resulted in acquisition program turbulence which, in turn, causes quantity cuts and schedule stretchouts leading to acquisition cost growth.

- Although the Acquisition Improvement Program (AIP) action number 4 dealing with program stability may protect programs on the stable program list from topline budget turbulence, it has the potential for creating even greater turbulence in unprotected programs.

1.2 BACKGROUND AND DEFINITIONS

Turbulence is obviously not a new phenomenon to the national economy, the Federal budget, or the Department of Defense (DOD). Turbulence is inherent in our democratic institutions and may indeed be beneficial to our society. As Nobel Prize-winning economist Paul Samuelson points out:

> But past history does seem to suggest this . . . iron without "give" will break suddenly under strain; flexible steel will bend. Brittle economic systems without the flexibility to accommodate themselves in an evolutionary manner to accumulating tensions and social changes however strong such systems may appear in the short run - are in the greatest peril of extinction, as science and technology constantly change

> the natural lives of economic life. If a system is to continue to function well, social institutions and beliefs must be able to adjust themselves to these changes.[1]

Our form of government provides for changes in national goals and priorities through the political process. These changes in goals and priorities result in DOD budget turbulence on a yearly basis. Therefore, while it may be possible to devise mechanisms to reduce this turbulence, much of it is inherent in the working of our political system and cannot be eliminated. Means are needed to institutionalize strategies for coping with this ever-present topline budget turbulence.

Topline budget turbulence, as used herein, is defined as the annual variations about the long-term mean level of funding actually appropriated by Congress. The budget, as enacted into law by Congress, contains a number of appropriation categories, such as operations and maintenance, procurement, aircraft, missiles, and weapons. Therefore, year-to-year variations in these categories are also considered to be topline budget turbulence. This turbulence impacts the DOD acquisition process and contributes to a lack of stability in individual programs.

On March 2, 1981, the Deputy Secretary of Defense directed a 30-day assessment of the Defense acquisition system with the following priority objectives: (1) Reducing cost, (2) making the acquisition process more efficient, (3) increasing the stability of programs, and (4) decreasing the acquisition time of military hardware. The Acquisition Improvement Program (Carlucci initiatives) resulted from this assessment. Recommendation number 4 of the initiatives is for increased program stability in the acquisition process. This recommendation states that "program instability is inherently costly in both time and money." Recommendation number 4 also states that 41 percent of all cost growth is due to quantity and schedule changes and that the most common cause for these changes is financial.[2]

In his Fiscal Year 1984 Annual Report to Congress[3], Secretary of Defense Weinberger made the following statement regarding increasing program stability and topline stability:

> Program instability has undermined both our modernization efforts and the long-range planning conducted by industry. Our guidance to the

Services now emphasizes the need to cancel lower-priority programs in order to provide funding stability for our highest-priority programs, particularly in the out-years. Accordingly, we have established a stable program list to provide certain major production programs an extra degree of protection against fluctuations in the budget.

In addition, we have developed mechanisms to ensure that stability and other management initiatives are prominently considered in the planning, programming, and budgeting process as well as in our major system milestone reviews. One of these initiatives is designed to screen major systems new start proposals from the Services. Only 10 new starts were accepted this year, down from the 15 accepted for FY 1983.

The Department has lived with topline instability for too long. Although we are now making an effort to achieve program stability within the existing budget, it will take some time for this new way of approaching the problem to be fully implemented in our planning process.

Topline budget turbulence can be caused by the normal political process, by the priority and budgeting processes within DOD, and by unanticipated cost growth. Some of the topline budget turbulence introduced by these causes is uncontrollable. Strategies for coping with this type of turbulence need to be developed. Other topline budget turbulence can be controlled by DOD revisions to the acquisition and budgeting processes. For example, one of the defense acquisition improvement initiatives is the implementation of multiyear procurement for the purpose of controlling the turbulence in high-interest, important production programs. This study addresses both controllable and uncontrollable turbulence and evaluates strategies for dealing with them.

Acquisition program stability can be impacted by changes in funding levels appropriated in the budget passed by Congress. Program stability can also be impacted by changing funding levels in the planning reflected in the DOD Five Year Defense Plan (FYDP). We have treated both types of turbulence. Variance in the official budget relative to its long-term trend is called topline budget turbulence (TLBT), and "out-year" changes in the DOD planning resource levels (FYDP) are called topline planning turbulence (TLPT).

1.3 STUDY APPROACH

This study was initiated with an extensive literature search which produced 240 documents with varying degrees of applicability. These documents are listed in Volume III, Appendix F, Bibliography. The key words used in the search and the number of citations by reference source are also given in this appendix. Pertinent data from the bibliography and official budget data were used to classify types of turbulence and to determine the magnitude of turbulence in the various classes of turbulence.

The structure of this study is shown in the Study Flow Diagram Figure 1-1. Classifying types of turbulence and determining the magnitude of turbulence by type were the first and second steps. The third step was to determine the sources of turbulence. The next step in the study was to describe the current processes for coping with turbulence. Based on turbulence characteristics and the current process for coping with budget turbulence, the shortcomings in the current process for coping with turbulence were identified. Identification of these shortcomings is shown as step five of Figure 1-1.

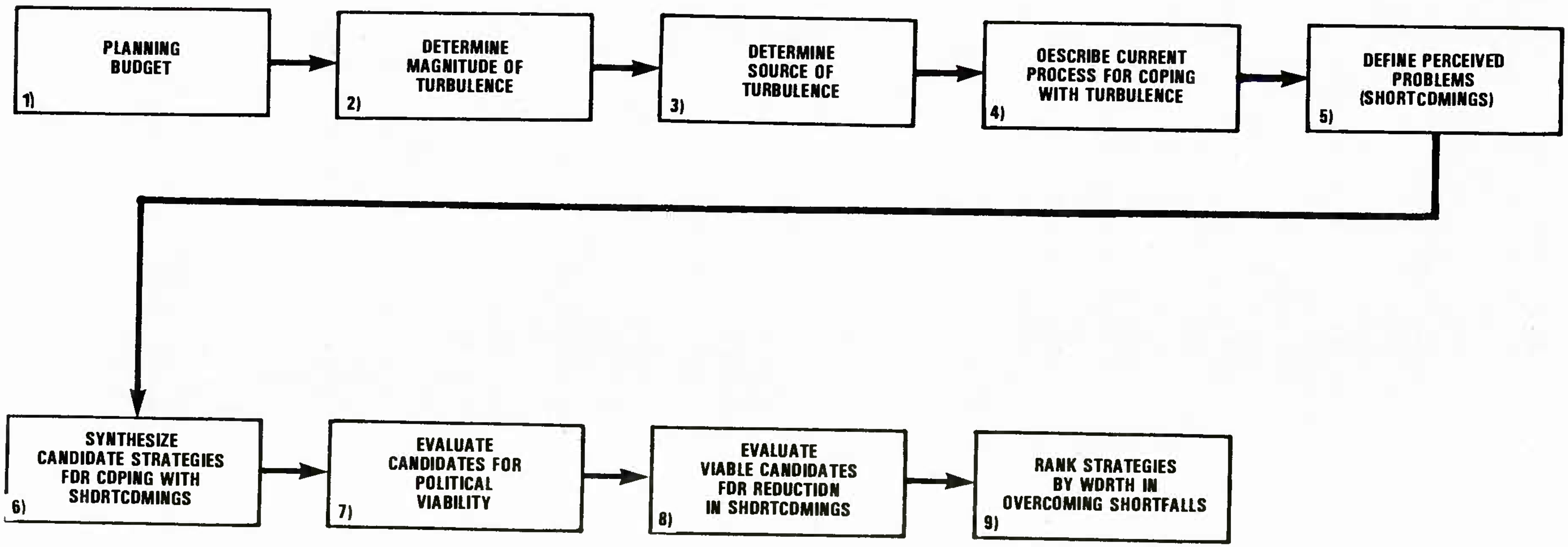
Following the definition of shortcomings in step five of the figure, we synthesized candidate strategies for coping with the shortcomings in the current process (step six). These candidate strategies fell into two groups: (1) Candidate improvements to the current process for coping with turbulence, and (2) three additional competitive (mutually exclusive) strategies (complete fencing to the budget limit, uniform distribution of the turbulence, and hybrids). As shown in step seven of the figure, the candidate strategies were evaluated on the basis of a political viability criterion. The budget prerogatives of Congress and top officials in the Executive Branch are well established and will tend to negate strategies that impact these prerogatives.

The results of the work in steps six and seven were combined in our evaluation of viable candidate strategies in step eight. The candidate strategies were evaluated on the basis of both qualitative and, where possible, quantitative criteria. Finally, competitive (mutually exclusive) strategies were then compared and ranked according to their worth as shown in step nine.

1.4 REPORT ORGANIZATION

Our study resulted in a three-volume report. Volume I, the main part of the report, is described below.

FIGURE 1-1
Study Flow Diagram



Volume II contains appendices which provide more detail than Volume I in the areas of (1) description of the budgeting and planning system, (2) the characterization of budget turbulence, (3) the analysis of the causes of turbulence, and (4) detailed computations for the economic and effectiveness comparisons of alternative ways to cope with turbulence. Volume III contains (1) the budget data that were obtained from the Data Resources, Inc., computerized database and (2) the bibliography that resulted from our literature search.

Following this introductory chapter, Chapter 2.0 of this volume describes, in summary form, the budget process, the sources and types of turbulence, where and how the turbulence is introduced, and some of the general characteristics of the turbulence.

Chapter 3.0 gives the characteristics of topline budget turbulence. The DOD budget is given in relation to the total Federal budget and major economic indicators. The turbulence between the various levels of the budget is quantified and characterized by amount and types of turbulence.

The causes of topline budget turbulence are analyzed in Chapter 4.0. The categories of turbulence causes are identified and defined. Turbulence can be caused by sources both internal and external to DOD. The correlation of turbulence with causes is identified and the magnitude of these correlations is derived.

The current strategies for dealing with topline budget turbulence are given in Chapter 5.0, along with their major characteristics and status. The perceived shortfalls in the current process are identified in Chapter 6.0.

Candidate strategies were synthesized during the course of the study and are described in Chapter 7.0.

The evaluation of the existing system and the synthesized candidate systems is given in Chapter 8.0. Chapter 9.0 provides the findings and the conclusions which resulted from the research, and Chapter 10.0 contains recommendations.

1.5 REFERENCES

1. Paul Samuelson, Economics, Tenth Edition, McGraw-Hill Book Company, New York, N.Y., p. 150.

2. Memo from the Deputy Secretary of Defense, Improving the Acquisition Process, April 30, 1981.

3. Caspar W. Weinberger, Secretary of Defense, Annual Report to Congress, Fiscal Year 1984.

2.0 THE BUDGET AND BUDGET FORMULATION PROCESS

A prerequisite for analysis of topline budget turbulence and strategies for coping with this turbulence is a fundamental understanding of the budget and the budget formulation process. Volumes have already been written on these subjects so only the essential facts necessary for understanding budget turbulence are presented here. Appendix A presents a slightly more detailed description of the budget and budget formulation processes as they impact turbulence.

This chapter includes several essential factors about the budget and its formulation, their impact on topline budget turbulence, and strategies for coping with this turbulence. The discussion is divided into the following topics:

- Definition of the budget
- Budget responsibilities
- Introduction of turbulence
- Reasons for turbulence.

To establish the proper context for understanding the budgeting system and budget turbulence, it is first necessary to focus on the broader Federal Government budgeting system within which DOD participates and the specifics of DOD's Planning, Programming, and Budgeting System (PPBS).

From an examination of the PPBS process, it is clear that the top-level turbulence that affects the DOD acquisition process is a complex phenomenon. There is turbulence in the <u>budget</u>, as appropriated by Congress, with its direct impact, particularly on procurement accounts as will be shown in Chapter 3.0. However, as shown in this chapter, the <u>planning process</u> can be a contributor to this turbulence in that the Administration's budget submission is developed from the plan. Further, as we show, year-to-year turbulence in the "outyear" plans (plans for the years beyond the budget year) can also cause disruption and inefficiencies in affected projects. Because of the inseparable relationships between the "plan" and the budget, we have classified and examined two principal types of turbulence in this study:

- Topline budget turbulence TLBT
- Topline planning turbulence TLPT.

2.1 THE FEDERAL GOVERNMENT BUDGETING SYSTEM

In broad historical perspective, the central focal point for budget decision-making is Congress. This fact is embodied in the U.S. Constitution. However, the progression of the budget process since 1789 has been for Congress to "share" some of its budgeting powers with the Executive branch; over time, the scope of Executive participation in the budget process has broadened. It is still correct to affirm that ultimate decision authority for the budget for any given fiscal year lies with the Congress.

The current Federal budget system definitions and processes are built upon the foundation of the 1921 Budget and Accounting Act. This act established the concept of the Executive Budget. Under this concept, the President presents an explicit administrative and fiscal program to be acted upon by Congress, and Congress returns a definite enactment to be carried out by the Executive branch.

The next major modification to the budgeting system came 53 years later with the Congressional Budget and Impoundment Control Act of 1974 (PL 93-344). The act was adopted for the following reasons stated in the law:

- To ensure effective Congressional control over the budgetary process
- To provide a system of impoundment control
- To provide for the Congressional determination each year of the appropriate level of Federal revenues and expenditures
- To establish national budget priorities
- To provide for the furnishing of information by the Executive branch in a manner that would assist the Congress in discharging its duties.

From a TLBT viewpoint, Congressional control of the budgetary process precludes the consideration of alternative strategies which may be seen to diminish this control. Also, Congressional establishment of budget priorities impacts the budget and can induce turbulence at all levels of the budget.

Through its budget power, Congress plays a major part in all stages of the resources allocation process that can impact the stability of an acquisition program. Figure 2-1 depicts the money flow process from the total economy down to a specific acquisition program. Congress makes tax policy (i.e., determines the appropriate level of Federal revenues each year) which ultimately may have an impact on acquisition program resource levels. This possible introduction of turbulence is shown as the tax policy decision function in Figure 2-1. The Executive and the Congress determine the Federal spending policies which can cause turbulence in the total budget and its many elements.

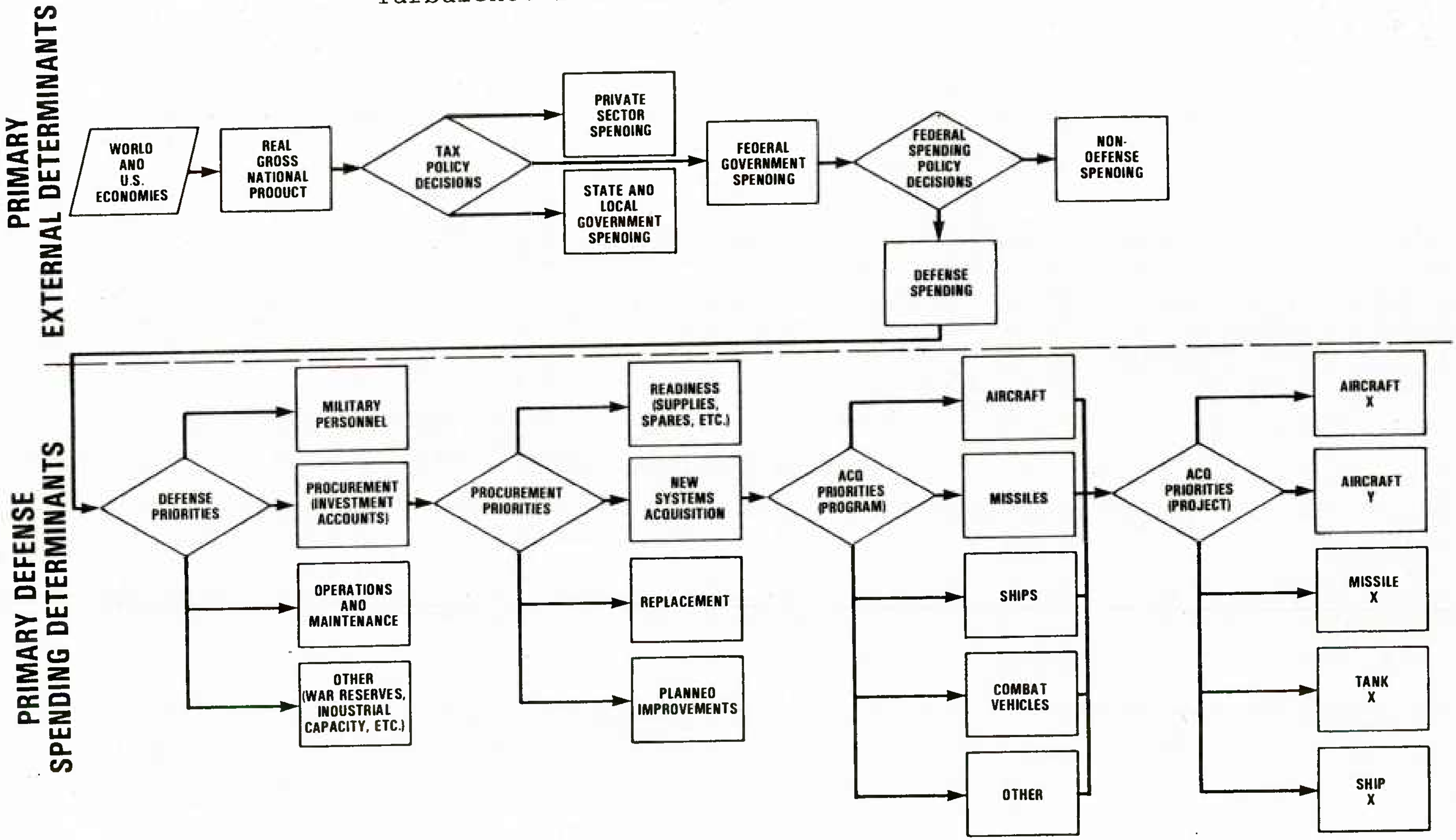
The defense budget is an example of a turbulence-causing element. Figure 2-1 also shows the process by which turbulence can be passed through or created internally at various levels within the defense budget. Because of our interest in the impact of TLBT on acquisition programs, Figure 2-1 focuses on the four levels of internal priorities that lead to individual system procurements, reflecting the intended focus of this research effort.

2.2 THE DOD PLANNING, PROGRAMMING AND BUDGETING SYSTEM

DOD has been the leading Executive agency of the Federal Government in the development of an internal budgeting system that seeks to improve the visibility of budgeting alternatives and their associated impacts and implications. PPBS is the system instituted by DOD to accomplish this improvement.

In contrast to "traditional" budgeting, a central distinctive feature of the PPBS in DOD is that budget guidance flows from the top down. In the "traditional" budgeting approach, top-down planning is not the central feature of budget development. Instead, each lowest level activity develops its budget and sends it to the next higher level for review, adjustment, and approval. Budget battles are fought at each approval stage in the traditional system. To an extent, the same is true of the PPBS as it actually operates. However, the PPBS is designed to focus on objectives and long-term planning and seeks to assess all programs and projects in a given budget against priorities. Prioritization of programs and projects within the constraints set by the Secretary of Defense (SECDEF) is supposed to characterize the development of programs and budgets through the PPBS. Given such prioritizations, budget "decisions" at alternatively higher

FIGURE 2-1
Fundamental Money Flow: Opportunities for Turbulence Introduction and Priority Setting



and higher levels of authority in DOD should be relatively easy to assess in terms of impacts and implications.

Figure 2-2 shows the place of the PPBS in relation to the budget turbulence issue. The key document at the beginning of the annual PPBS cycle is the Defense Guidance (DG). SECDEF bases this guidance on the following:

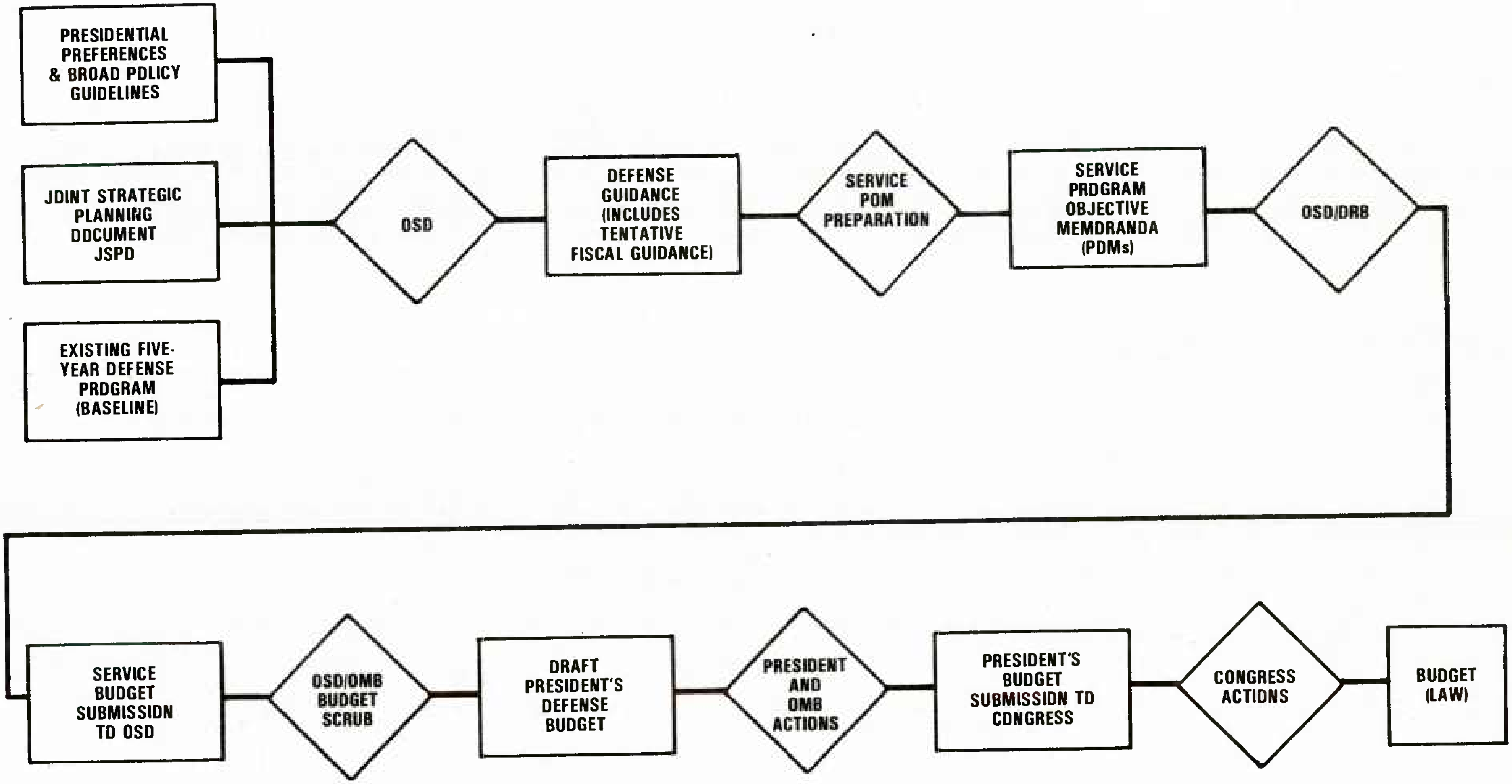
- Internal OSD analyses
- Presidential direction (via National Security Decision Memoranda coordinated by the National Security Council)
- Analyses and judgments of the Joint Chiefs of Staff and the unified commanders (via the Joint Strategic Planning Document (JSPD) among others)
- Existing 5-year plan, the FYDP.

The DG sets defense policy for new administrations and makes adjustments to this policy each year. It sets defense-wide priorities among missions, services, readiness and modernization, and the like. The DG can be specific and can protect (that is, fence) specific acquisition programs. The DG also provides fiscal policy by setting fiscal limits for the outyears of the FYDP for the overall DOD program and for major component pieces, including each Service's topline budget.

The essential feature to recognize in the DG is that this is a baseline set of direction and fiscal guidance upon which the DOD program and budget will be developed each year. As such, it can be the first key means by which topline budget turbulence is introduced into the DOD PPBS.

Figure 2-2 shows the next step in the process, the Services' Program Objectives Memorandum (POM) preparation. The POM preparation is the process by which the Services and other DOD components take the information, direction, and constraints in the DG and prepare a proposed budget and an "outyear" update to the FYDP known as the POM. We will discuss this process in more detail in Chapter 5. It is important to note here that the Services' POM processes involve massive effort to reconcile budget inputs from all their component organizations with "top-down" outyear and budget year planning activities at headquarters. The objective of this effort is to develop an optimum mix of programs and funding levels to meet the

FIGURE 2-2
Simplified Budget Process/Turbulence Introduction



Services' perceptions of their mission needs for the FYDP time period. The Service POMs have a major impact on ultimate budgets because from that point forward, changes are made in a process fairly described as management by exception. Consequently, the POMs can be a significant source of both planning turbulence (if year-to-year changing priorities lead to major changes in out-year programs) and budget turbulence (if year-to-year changes in the Service budget recommendations are not dampened out by the Secretary of Defense or Congress).

POMs are submitted to OSD for analysis and evaluation. This starts the POM issue paper cycle. The JCS and OSD staff offices responsible for sections of the POM may challenge the structure and contents of the POMs by writing issue papers that require decision by higher authority. An issue paper will contain alternatives that can be selected by higher authority such as the Defense Resources Board (DRB) or the SECDEF. The issue paper cycle may result in adjustments to the defense-wide priorities and challenges, on an exception basis, of Service priorities. Late changes in fiscal or budget guidance are accommodated at this time. These decisions, recorded in the SECDEF Program Decision Memoranda (PDMs), can also be instruments of topline turbulence and program instability.

Following issuance of the PDMs, the Services and DOD components submit their budget requests to OSD. These will form the basis for the President's budget submission to Congress the following January. The PDMs also result in changes to the FYDP, which are incorporated in the October FYDP update.

Following the Service budget submissions to OSD in October, the budgets are analyzed for pricing considerations and executability. In addition to the OSD staff, OMB participates in this "budget scrub" process. This process is intended to ensure the most accurate possible budget submission and is not intended to be a forum for program changes and reprioritization. However, changes to top-line budget request levels and specific programs can occur. This introduces additional budget turbulence and program instability. At the end of the budget scrub, the SECDEF makes final budget decisions and passes the DOD budget to OMB and the President for their subsequent presentation of the budget to Congress in January. The President and OMB may make final "changes" to the DOD budget after the SECDEF has made his "final" decisions. These changes may be to Total Obligational Authority (TOA) or to specific appropriations, programs, or projects. The Services and OSD are charged with spreading last-minute changes and adjustments down through the details of the budget. In this last round of changes and adjustments, additional budget turbulence and program instability can be introduced into the process.

Finally, the DOD budget is submitted to Congress as part of the President's January budget. Once in Congress, the budget becomes the creature of the Congress, and additional changes and adjustments can be introduced that bring top-line turbulence and program instability.

Appendix A, The Budgeting System From the DOD Perspective, presents more details of the U.S. and DOD budget processes with emphasis on the following areas:

- How the processes work
- Their major features
- How turbulence is introduced
- Who introduces turbulence.

3.0 TURBULENCE CHARACTERISTICS

During the course of this study, quantitative budget turbulence characteristics were derived to provide a basis for sythesizing candidate strategies and for evaluating strategies. This chapter presents a brief description of the analysis and the summary results. A detailed description of the analysis and supporting data is provided in Appendix B.

The budget structure and budget formulation process described in Chapter 2.0 provide a qualitative characterization of budget turbulence and a framework for the quantitative characterization of budget turbulence delineated in this chapter. The topline budget turbulence quantitative analysis is based on an evaluation of historical budget and economic data back to 1950. This period of time was selected because (1) it provides a reasonable data base for statistical analysis, (2) it contains two wars with different characteristics, and (3) the budget data are reasonably consistent.

Turbulence was characterized at each level of the fundamental money flow process shown in Figure 3-1. The possible external determinants of turbulence, including the national economy, as represented by the gross national product (GNP), and Federal Government spending, were tested for their impact on acquisition program turbulence. These possible external determinants are shown in blocks 1 and 3 of Figure 3-1.

Quantitative turbulence characteristics for the DOD appropriations categories were also derived in this study. These categories are shown in blocks 5 through 11 of Figure 3-1.

3.1 BUDGET TURBULENCE HISTORY

Historical budget data were analyzed to characterize the amount of turbulence. As these data include both long-term budget trends and budget turbulence, an analysis was performed to remove the long-term trends for the budget categories of interest.

Figure 3-2 is a conceptual plot of budget dollar levels for some period of time and represents the primary data used in the analysis. The value of the budget for 1

FIGURE 3-1
Fundamental Money Flow: Opportunities for Turbulence Introduction and Priority Setting

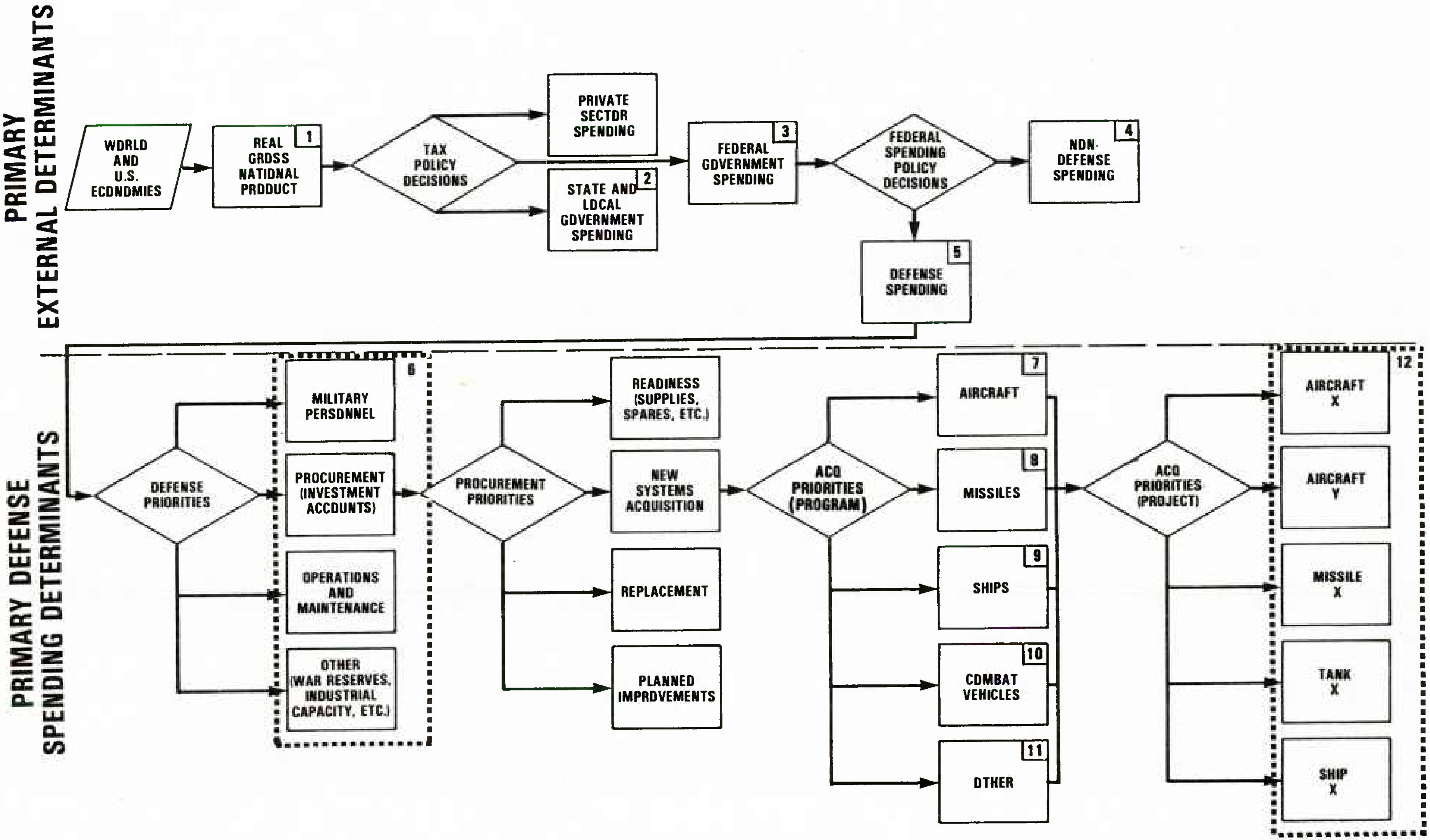


FIGURE 3-2
Conceptual Annual Budgets
(Constant Dollars)

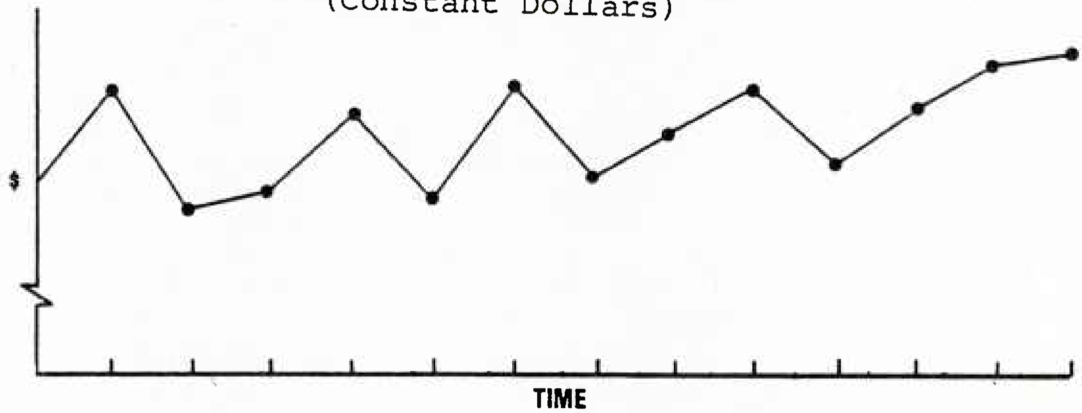


FIGURE 3-3
Conceptual Budget Turbulence
(Year-to-Year Changes)

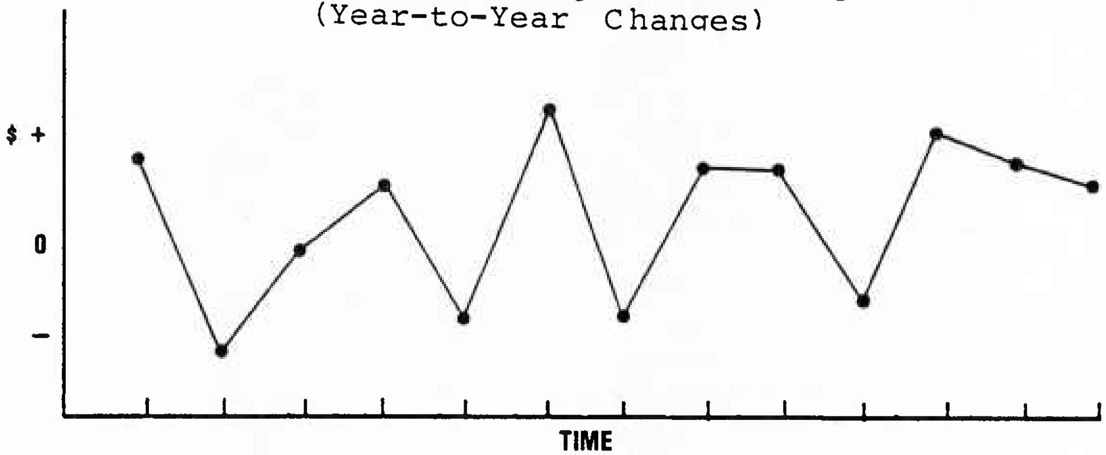
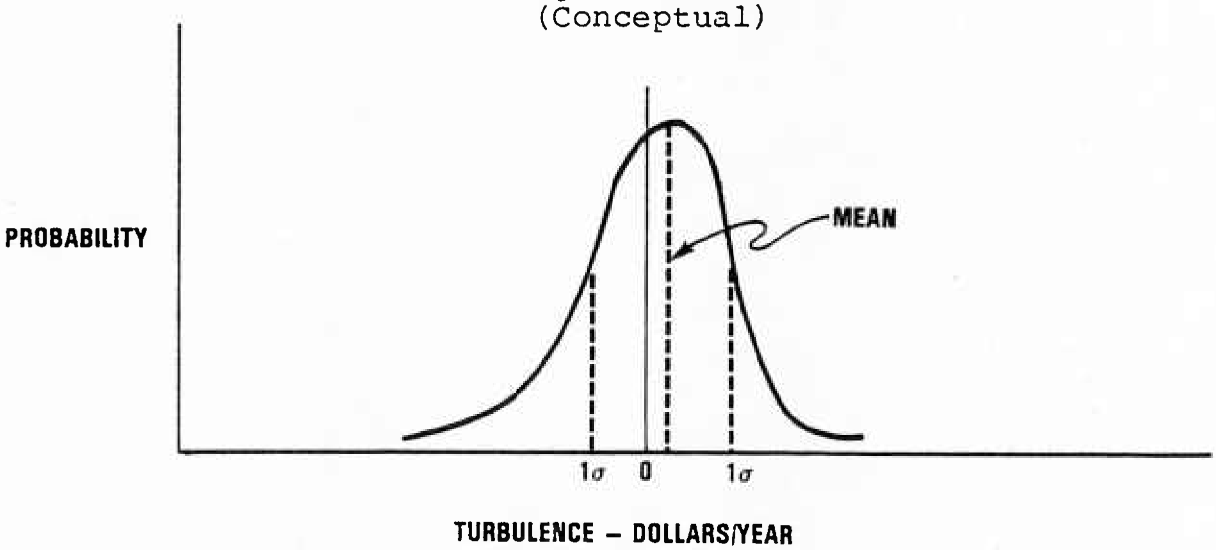


FIGURE 3-4
Probability Distribution of
Budget Turbulence
(Conceptual)



year was subtracted from the value of the preceding year to obtain the change from the preceding year as shown conceptually in Figure 3-3, shown on previous page. Each budget category of interest was so analyzed and curves were plotted for each category.

The data were further analyzed to obtain the median dollar value of the turbulence in each selected budget category. The absolute high and low values were determined along with the range from high to low. Also, the standard deviations of the data were calculated assuming a normal distribution. Figure 3-4, shown on previous page, is a representation of the statistical properties of the budget turbulence data. The zero of the coordinate system represents no change from one year to the next. The mean value is the long-term average change per year. The mean gives the budget average growth or decrease over the budget time history considered. The 1 sigma value is the standard deviation in dollars per year.

An identical analysis was performed to obtain the percentage change in budgets and the statistical data for these percentage changes. The percent changes in an account were obtained by dividing the amount of year-to-year change by the value of the preceding year's budget and multiplying by 100.

Curves were plotted for both absolute and percentage changes in the budget categories of interest. The statistical data were noted on each plot. These curves are contained in Appendix B. A typical curve is shown in Figure 3-4. The summary statistical data are included in this chapter.

Table 3-1 shows the statistics for turbulence in the total DOD TOA and the major budget appropriation categories as measured by annual dollar fluctuations about their median value over the three-decade period. Constant FY 83 dollars were used in this analysis. Turbulence in the procurement appropriations, as measured by the standard deviation, is the largest of the major budget appropriation categories. These statistics confirm and quantify the general observations reported in the literature that procurement is the most turbulent of the appropriations categories.

Table 3-2 shows the statistics for the percentage, i.e., relative changes in the DOD TOA and the major budget accounts. Changes in the procurement account are striking -- almost twice the turbulence as DOD TOA and the next largest major account.

TABLE 3-1

Major Budget Account Turbulence
(Absolute Dollar Changes)

Budget Account	Billions of Dollars - FY 83 $			
	Range	Max	Min	Standard Deviation
Defense TOA	61.6	39.9	-21.7	14.73
1. Procurement	30.5	21.1	-9.4	7.48
2. O&M	18.1	11.0	-7.1	4.39
3. Military Personnel	13.8	7.2	-6.6	3.52
4. RDT&E	4.5	2.0	-2.5	1.10
5. Retired Pay	0.4	0.8	0.4	0.10

TABLE 3-2

Major Budget Account Turbulence
(Percent Changes in Budgets)

Budget Account	Percent			
	Range	Max	Min	Standard Deviation
Defense TOA	31.4	21.7	-9.6	7.57
1. Procurement	59.9	44.3	-15.6	15.74
2. O&M	32.1	20.6	-11.4	7.97
3. Military Personnel	21.8	11.4	-10.4	5.64
4. RDT&E	22.7	11.8	-10.9	5.66
5. Retired Pay	9.9	12.8	2.8	3.01

Statistics for absolute changes in the procurement account and its major components are shown in Table 3-3. To make these statistics more precise, the FY 64 - FY 81 time period was used. Accounting changes between this period and the preceding period make it difficult to maintain consistency of data. The table shows that, in absolute dollar levels, the large aircraft budget category experienced the largest absolute turbulence. However, a more appropriate measure of turbulence is percentage change, shown in Table 3-4. This shows that the Navy's shipbuilding and conversion (SCN) account is the most turbulent, closely followed by the weapons and combat vehicles account. The SCN and the weapons and combat vehicle accounts have approximately three times as much turbulence as the aircraft and missiles accounts.

3.2 TRANSMISSION OF TURBULENCE

The previous section described the measurement of budget turbulence as it occurs throughout the money flow process. There is a more fundamental question that remains to be answered: Does the turbulence at one level of the money flow process induce turbulence at another level of the money flow process? More to the point, what are the highest budget levels that must be considered when studying sources of turbulence in acquisition programs? One method of determining an answer to these questions involves the statistical measurement of turbulence at one level and the corresponding turbulence at another level. For example, are large changes at one level directly associated with large changes at another level over a given time period? Or are changes at one level randomly associated with changes at another level? In the former case, we may conclude that there is some degree of correlation or relationship. In the latter, we may conclude that there is little relationship between the two.

The degree of the relationship among the budget levels can be quantified by use of the statistical correlation coefficient. The correlation coefficient provides a measure of the degree of linear dependence between two variables. When the variables are independent, the correlation coefficient is zero. Positive correlation coefficients result if large positive values of one variable are associated with large positive values of the other variable. When one variable is perfectly predictable from the other on the basis of a linear function, the correlation coefficient is +1 or -1. The larger the correlation coefficient (in absolute value), the greater the degree of linear dependence between the variables.

TABLE 3-3

Turbulence in Procurement Accounts
(Absolute Dollar Changes)

	Billions of Dollars - FY 83 $			
	Range	Max	Min	Standard Deviation
Procurement TOA	70.3	36.8	-33.5	10.82
Aircraft*	31.39	21.18	-10.21	5.59
Missiles*	12.03	6.93	-5.10	1.58
Shipbuilding and Conversion*	7.57	3.99	-3.58	1.06
Weapons and Control Vehicles*	3.70	3.20	-.50	.79
Other*	18.29	11.29	-6.99	3.95

*Total Direct Program Obligations

TABLE 3-4

Procurement Budget Turbulence
(Percent Changes in Budgets)

	Range	Max	Min	Standard Deviation
Procurement	53.5	36.0	-17.4	15.22
Aircraft	59.5	29.0	-30.5	12.27
Missiles	46.4	23.4	-23.0	16.74
Shipbuilding & Conversion	158.0	106.0	-52.0	45.5
Weapons & Combat Vehicles	159.1	126.1	-33.0	43.5
Other	118.2	85.8	-32.4	27.52

The correlation between the turbulence at one budget level and the next lower level can be visualized by graphing the two levels in the same figure. Figure 3-5 shows the changes for both the GNP and the Federal budget for the 1950 to 1980 time frame. Visual inspection of this figure reveals very little similarity between the GNP and the Federal budget plots. The correlation coefficient for these two time series is 0.06, which indicates no statistically significant correlation between the turbulence in the dollar changes in the GNP and the Federal budget.

Plots of the year-to-year percent change differences from the long-term mean in the GNP and the Federal budget for the 1950 to 1980 time frame are given in Figure 3-6. The lack of similarity between these two plots is readily observed. This lack of correlation is borne out by a correlation coefficient of 0.11, which indicates no statistically significant correlation. Turbulence data for the 1950 to 1980 period were also plotted comparing changes in: (1) the Federal and the defense budgets and (2) the defense and the procurement budgets. These comparisons are shown in the figures in Appendix B.

Correlation coefficients were calculated to measure the turbulence transmission through the money flow process into several major elements of the procurement budgets. For consistency, the 1964-1981 budget data discussed in the preceding section were used in this analysis. The results of these calculations are presented in two tables. Table 3-5 presents a correlation coefficient matrix that reflects the relationship of absolute year-to-year dollar changes from one money flow, i.e., budget, level to another. Table 3-6 presents a correlation coefficient matrix that reflects the relationship of the percent dollar change from one money flow level to another. Both tables present similar information. First, budget turbulence does not seem to be transmitted from the macroeconomic level of the total national economy down to the topline DOD level or below. This is shown by reading down the first column in both tables. For example, the first number in Table 3-6, column 1 and row 1, is 1.0. This is the correlation between GNP and GNP which is obviously perfect or 1.0. The number -0.15 reflects the correlation between GNP and Federal budget, 0.26 reflects the correlation between GNP and DOD budget, etc. These relatively low correlation values suggest no significant statistical relationship between GNP and lower levels of the money flow process. Similarly, the impact of Federal budget

Figure 3-5
CORRELATION BETWEEN CHANGES IN GNP & FEDERAL BUDGET
(BILLIONS OF FY83 $)

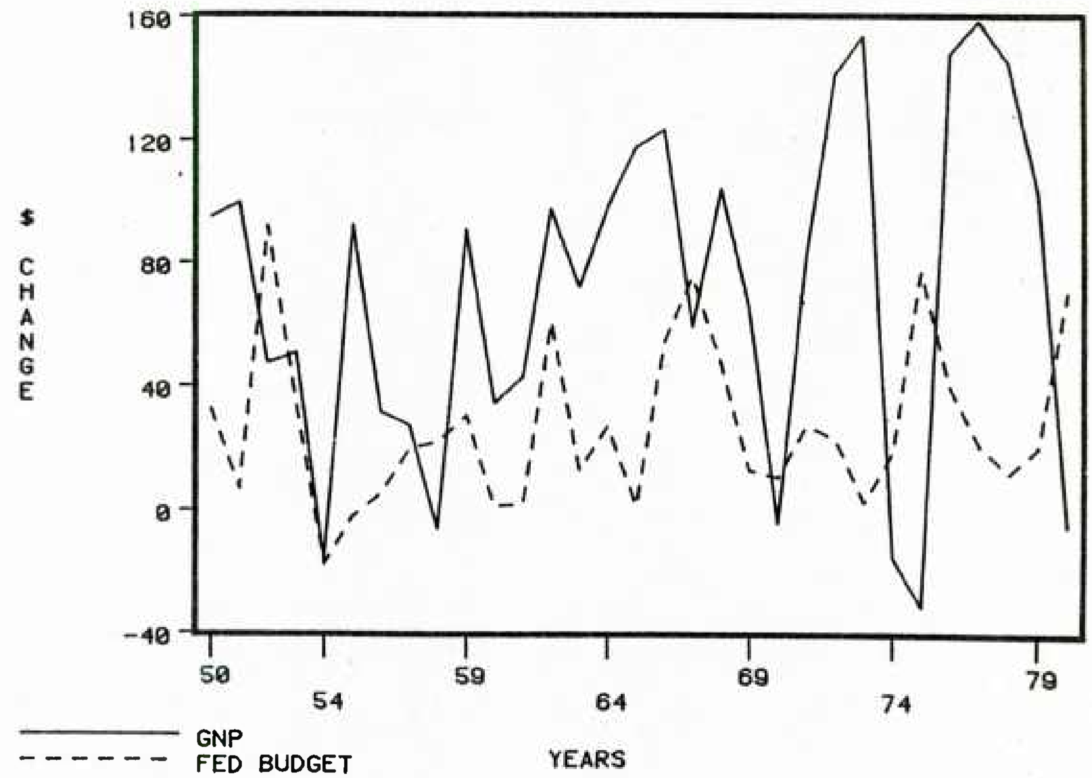


Figure 3-6
CORRELATION BETWEEN % CHANGE IN GNP & FEDERAL BUDGET

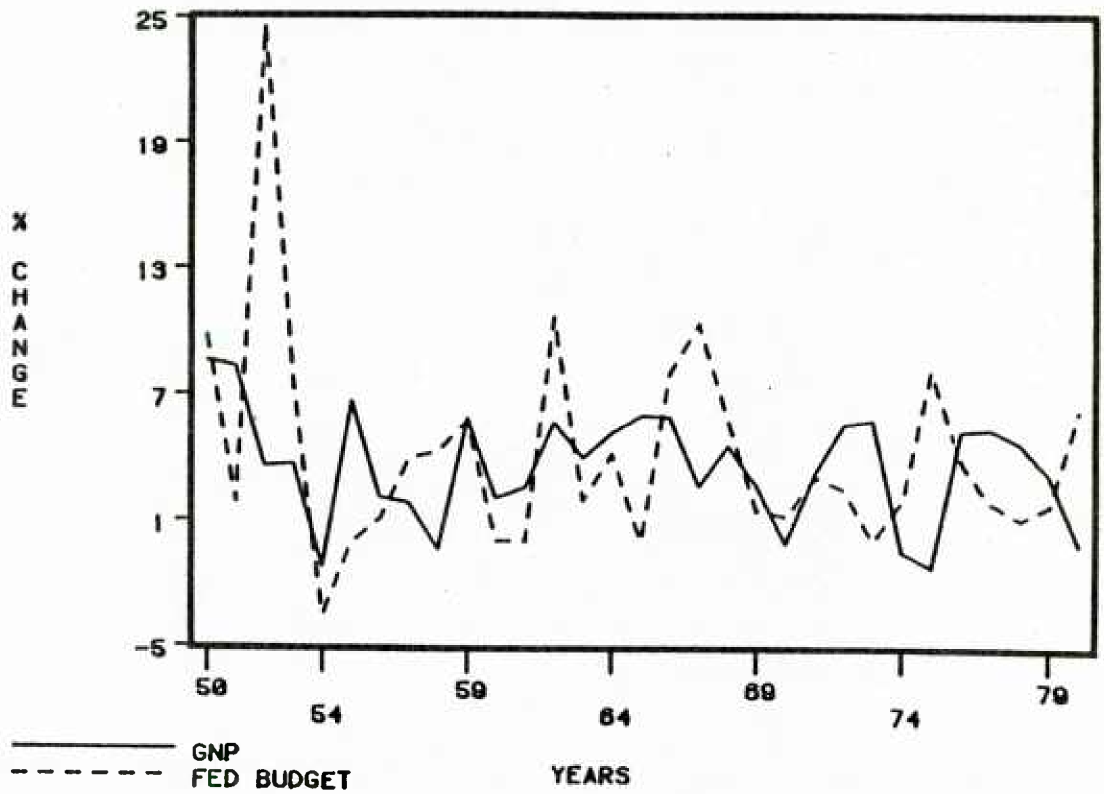


TABLE 3-5
Correlation Matrix - Absolute Change
(1964-1981)

	GNP	FED	DOD	PROC	A/C	MSLE	SHIPS	W/COMB	OTHER
GNP	1.0								
FED	-.26	1.0							
DOD	.21	.52	1.0						
PROC	.26	.36	.92	1.0					
A/C	.06	.35	.63	.73	1.0				
MSLE	-.15	.25	.18	.22	.17	1.0			
SHIPS	.22	.07	.59	.64	.20	-.25	1.0		
W/COMB	.17	.27	.75	.81	.39	.30	.58	1.0	
OTHER	.39	.37	.85	.85	.48	-.10	.79	.62	1.0

TABLE 3-6
Correlation Matrix - Percentage Change
(1964-1981)

	GNP	FED	DOD	PROC	A/C	MSLE	SHIPS	W/COMB	OTHER
GNP	1.0								
FED	-.15	1.0							
DOD	.26	.54	1.0						
PROC	.31	.39	.94	1.0					
A/C	.09	.49	.69	.71	1.0				
MSLE	-.20	.07	.22	.28	.27	1.0			
SHIPS	.32	.03	.53	.52	.33	-.22	1.0		
W/COMB	.24	.17	.76	.78	.41	.05	.67	1.0	
OTHER	.53	.26	.78	.78	.51	-.08	.83	.69	1.0

turbulence on the lower levels of the money flow process is seen by reading down column 2. Here again the results presented in both tables suggest no significant statistical relationship between changes (both absolute and percent) in Federal budget and changes in lower level budgets.

The data in both tables do suggest that turbulence is transmitted from the DOD level to the Procurement appropriation level. Note the very high correlation between changes in DOD budget and the Procurement budget. For absolute change, the correlation coefficient is 0.92 and for percentage change, the correlation coefficient is 0.94.

Similarly note how the budget turbulence is transmitted to the components of Procurement. Aircraft, Ships, Weapons/Combat Vehicles, and Other all exhibit significant turbulence related to turbulence in the Procurement budget. Missiles is the only budget category that seems to be independent of changes in the Procurement budget.

3.3 ACQUISITION PROGRAM TURBULENCE

Analyses were performed to determine budget turbulence associated with specific acquisition programs as shown as block 12 of Figure 3-1. Examples of specific acquisition programs are the F/A-18, the Pershing II Missile, and the AEGIS Cruiser (CG-47).

The analysis was limited only to the effects of Congressionally induced turbulence as deduced from data in Data Resources, Inc.'s BUDGETRACK system. BUDGETRACK provides data on funding changes to acquisition programs in the President's proposed budget during the Congressional budget process. It was originally planned to use FYDPs, decision papers, etc., to determine the magnitude and causes of turbulence; however, because these data were not available for this study, only the BUDGETRACK data were used.

Specific programs (a total of 42) within each of the Service procurement categories were selected to provide a means of measuring budget turbulence within specific program element numbers (PENs). Program selection criteria were based on those PENs identified as stable programs within DOD and on those reported to Congress in the Selected Acquisition Reports. In addition, several of these programs have been the subject of numerous studies and Congressional hearings on weapon systems cost growth, system acquisition management, program stretchout, and efficiency of weapon acquisition policies and procedures.

BUDGETRACK data start in FY 80; therefore, the conclusions deduced from these data cannot be accepted with great confidence. The BUDGETRACK data on the 42 acquisition programs selected for consideration in this study are contained in Appendix E of this report. The BUDGETRACK data provide the actions of Congress on specific acquisition programs and therefore show the turbulence introduced by Congress.

Analysis of BUDGETRACK data was made to determine the maximum dollar changes, both increases and decreases, made by Congress in the President's proposed budgets for programs in the acquisition accounts. Table 3-7 shows these Congressional changes by procurement appropriation and identifies the specific acquisition program changed within these appropriations. The largest FY 81 fluctuations in procurement dollars occurred in the LSD-41 program which was incremented by $349.9M. In FY 82, the major change was in the TRIDENT submarine program which experienced a decrement of $960.8M. In FY 83, the maximum change was a decrement of $1,446M for the MX missile.

Another measure of Congressional turbulence in the acquisition programs is the number of programs in the procurement appropriations that were not changed, changed less than 5 percent, changed between 6 and 10 percent, and changed by more than 10 percent. Table 3-8 shows these changes for FY 81, FY 82, and FY 83. The table indicates the number of programs increased with a positive sign next to the number; decreases are shown by a negative sign. During this 3-year period, Congress displayed a propensity to reduce defense budget requests. In FY 83, Congress changed 34 percent of the sample programs by more than 10 percent. However, in FY 81, Congress changed only 10 percent of the acquisition programs by more than 10 percent of their requested budgets.

The 3 years of data contained in BUDGETRACK are too small to draw any trend conclusions.

TABLE 3-7
Largest Congressional Changes to President's Budgets

	Increases ($M)	Decreases ($M)
A/C:		
F-16	+22.1 (FY82)	
SH-60		-361.3 (FY83)
SHIPS:		
SSBN		-960.8 (FY82)
LSD-41	+349.9 (FY81)	
MISSILES:		
MX		-1,446.0 (FY83)
SIDEWINDER	+1.6 (FY82)	
COMBAT VEHICLES:		
ABRAHMS		-547.9 (FY83)
LVT7A1	+1.7 (FY82)	

Reference: BUDGETRACK

TABLE 3-8
Congressional Action on 42 Selected Programs
(See Appendix E for Details)
Percent Changes in Procurement by Fiscal Year

	No Change	0-5%		6-10%		10%	
FY 81							
A/C	6	2+	5-				
SHIPS	1	1+	3-			2+	
MISSILES	9		2-			1+	1-
COMBAT VEHICLES	3	2+					
(TOTAL)	(19)	(15)				(4)	
FY 82							
A/C		2+	4-		4-	2+	2-
SHIPS			1-	1+	1-	1+	2-
MISSILES		3+	6-		1-	1+	4-
COMBAT VEHICLES	1	1+	2-				
(TOTAL)	(1)	(19)		(7)		(12)	
FY 83							
A/C	3		3-		1-	1+	6-
SHIPS			5-		1-		
MISSILES	6		4-		1-		5-
COMBAT VEHICLES	1		1-		1-		2-
(TOTAL)	(10)	(13)		(4)		(14)	

#+ (#-) = # of programs undergoing an increase (decrease)

Reference: BUDGETRACK

4.0 CAUSES OF TURBULENCE

Understanding the causes of turbulence is a prerequisite for devising strategies to cope with turbulence and for evaluating these strategies. Three methods were used to determine the causes of turbulence. One was to compare turbulence data with suspected causes and observe obvious correlations. A second was to hypothesize causes suggested in the literature or the "conventional wisdom" and test these hypotheses with turbulence data. A third method was to use prior studies that identified causes of turbulence.

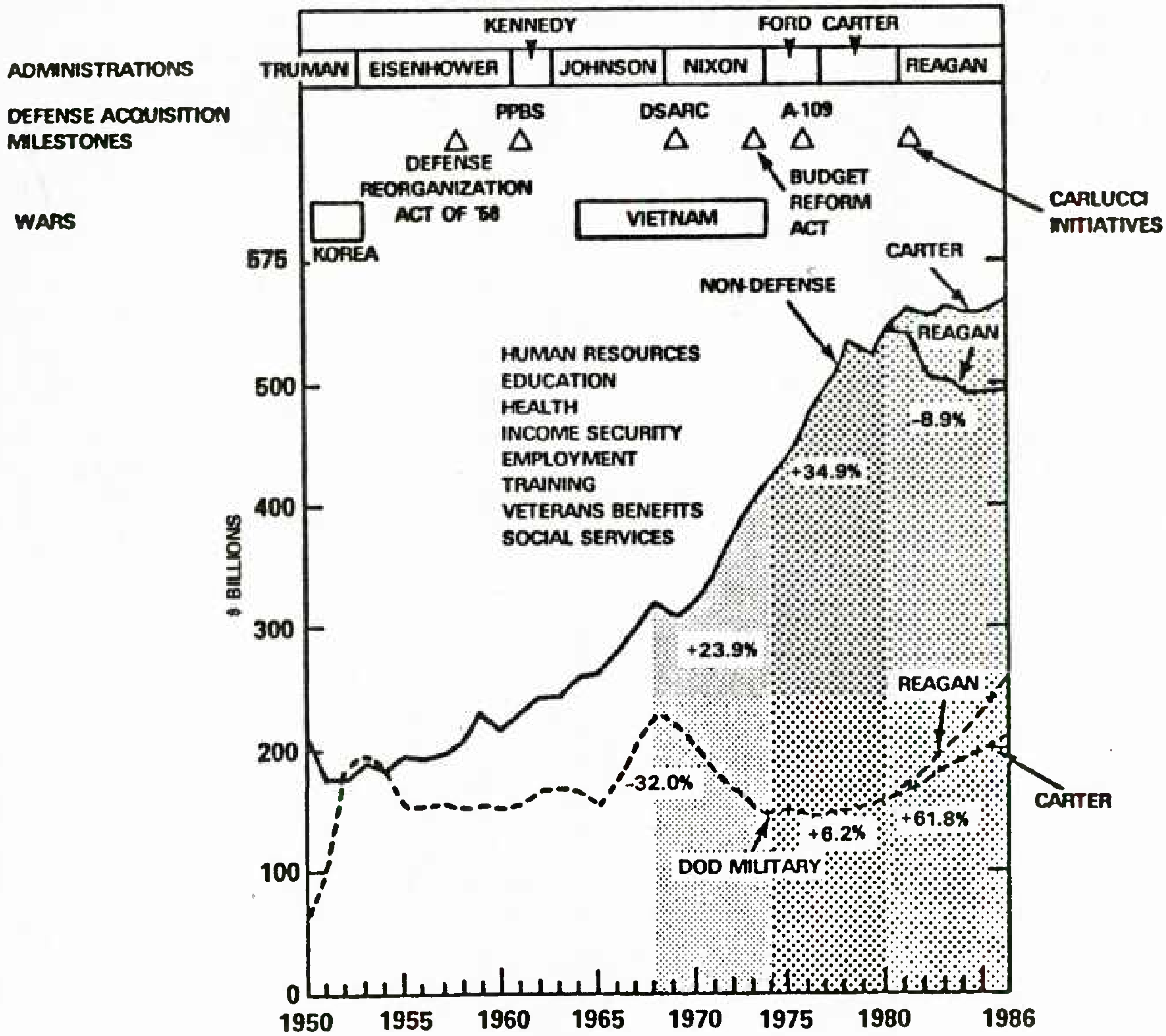
4.1 WARS AND TOPLINE TURBULENCE

Analysis of the causes of turbulence was initiated by comparing the Federal outlays since 1950 with administrations, defense acquisition milestones and wars. Figure 4-1 displays this information. A cursory review shows, as expected, large changes in DOD outlays during the Korean and the Vietnam wars. Defense TOA and outlays for the same time period and administrations, defense acquisition milestones, and wars are shown in Figure 4-2. This figure shows major changes in both TOA and outlays during the wars. As a further indication of turbulence induced by wars, Figure 4-3 displays the same information as Figure 4-2 except that the cost of the Vietnam war has been removed. These figures show, on a macro level, that wars are a major cause of changes in the defense budget.

It was shown in Chapter 3.0 that there is a moderate correlation of turbulence in the procurement accounts with DOD TOA over the past three decades. Therefore, it is more important to consider changes in the procurement account in relationship to the wars. Figure 4-4 shows changes in both the total defense budget and the procurement account. It also shows the time periods of both the Korean and the Vietnam wars.

In Figure 4-4, it is seen that the Defense budget had the largest one-year increase in dollars at the start of the Korean war, approximately $140 billion, and that it had the largest decrease at the termination of the war, minus approximately $60 billion. The change from the peak war effort to the drop after the war was approximately $199 billion.

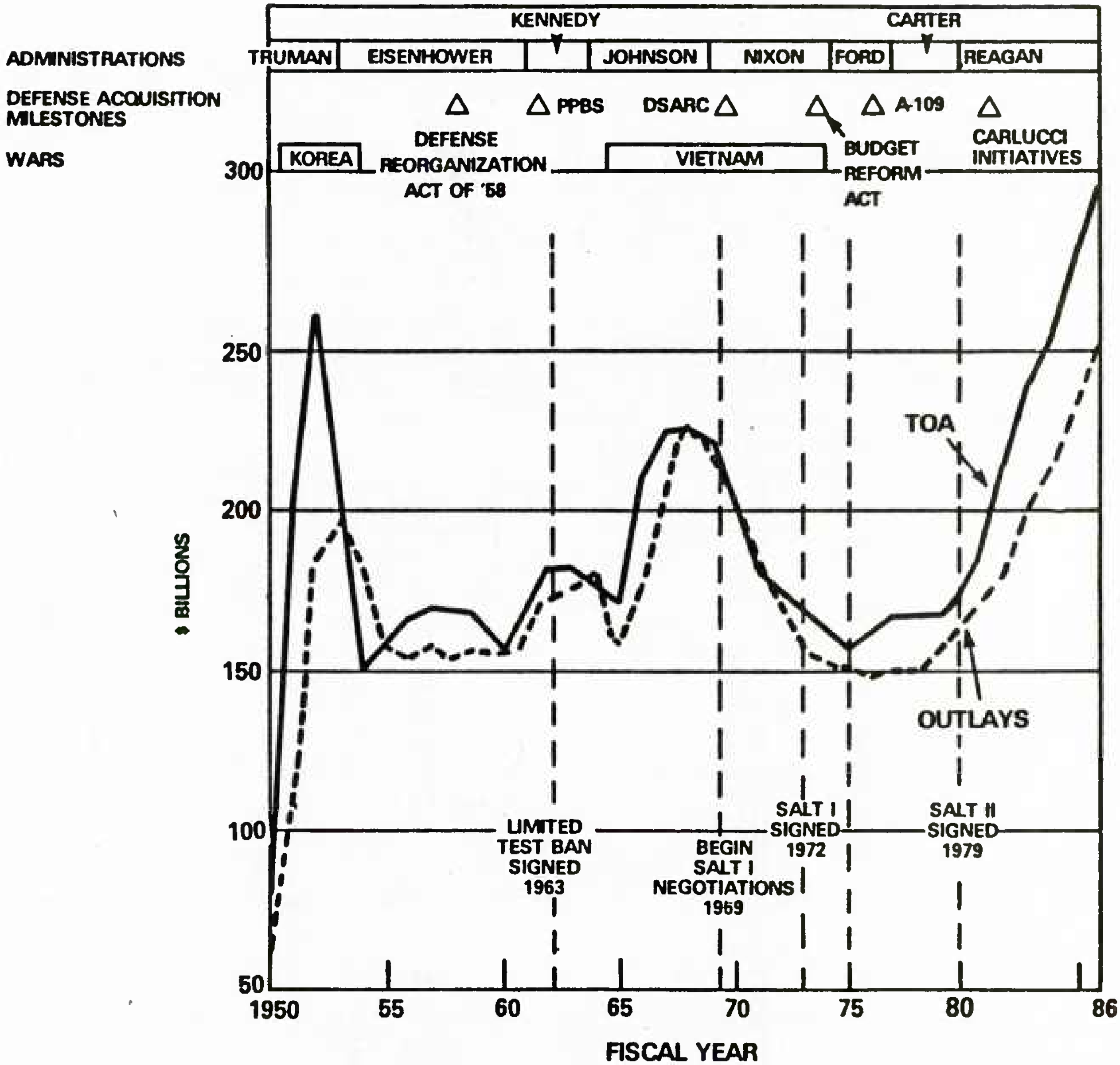
FIGURE 4-1
Defense vs. Nondefense Programs
(Federal Outlays)
Constant FY 82 Dollars



Source: Borsting, J.R., "Decision Making at the Top", Management Science, Vol. 28, No. 4, April 1982.

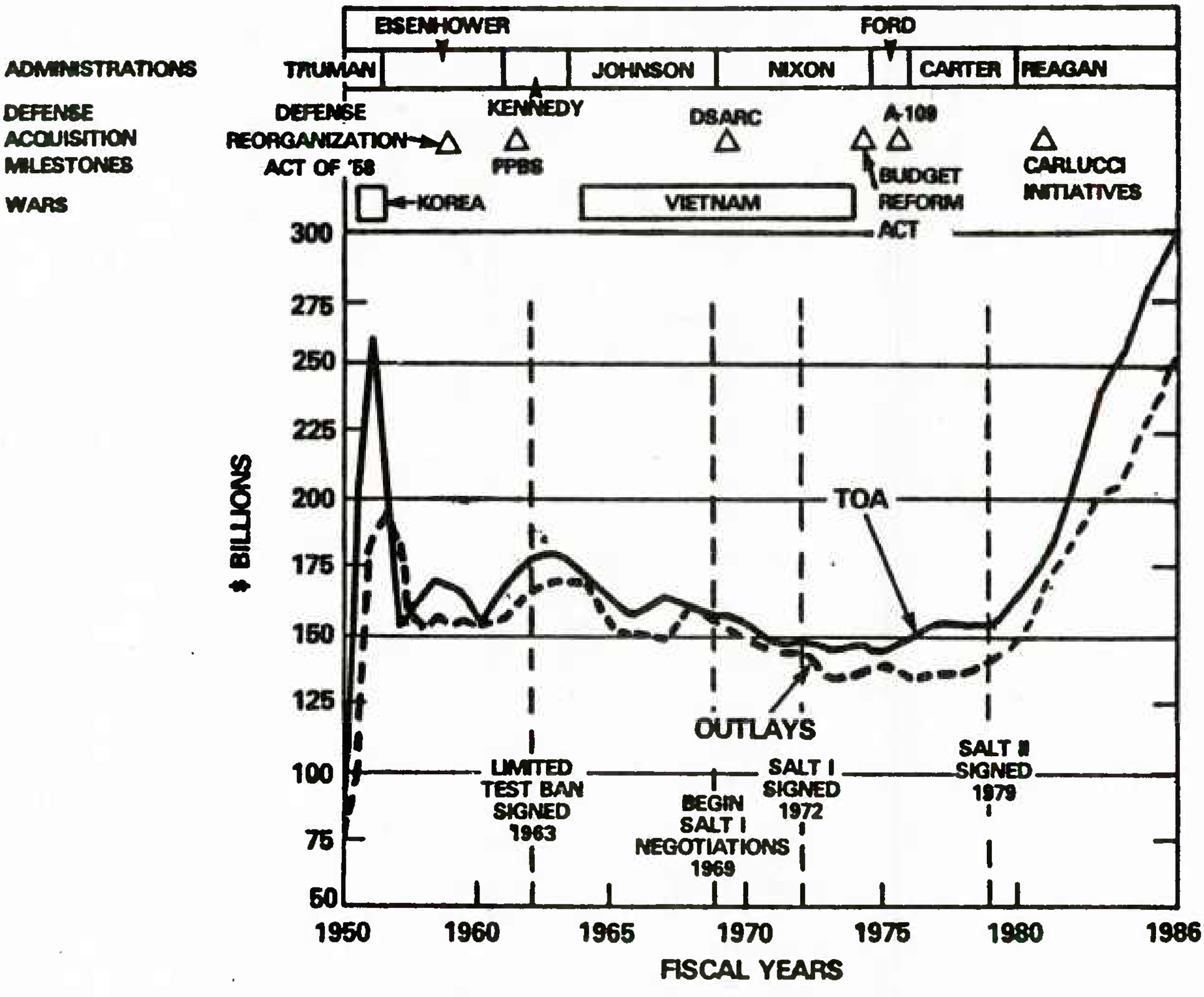
Historical information and percent change in shaded areas added by authors.

FIGURE 4-2
Defense Budget Trends
$ Billions
Constant FY 82 Dollars



Source: Congressional Military Posture Hearings for FY 82, (H.A.S.C. 97-6)
Historical information added by authors.

FIGURE 4-3
Defense Budget Trends
$ Billions
Constant FY 82 Dollars
(W/O SEA)

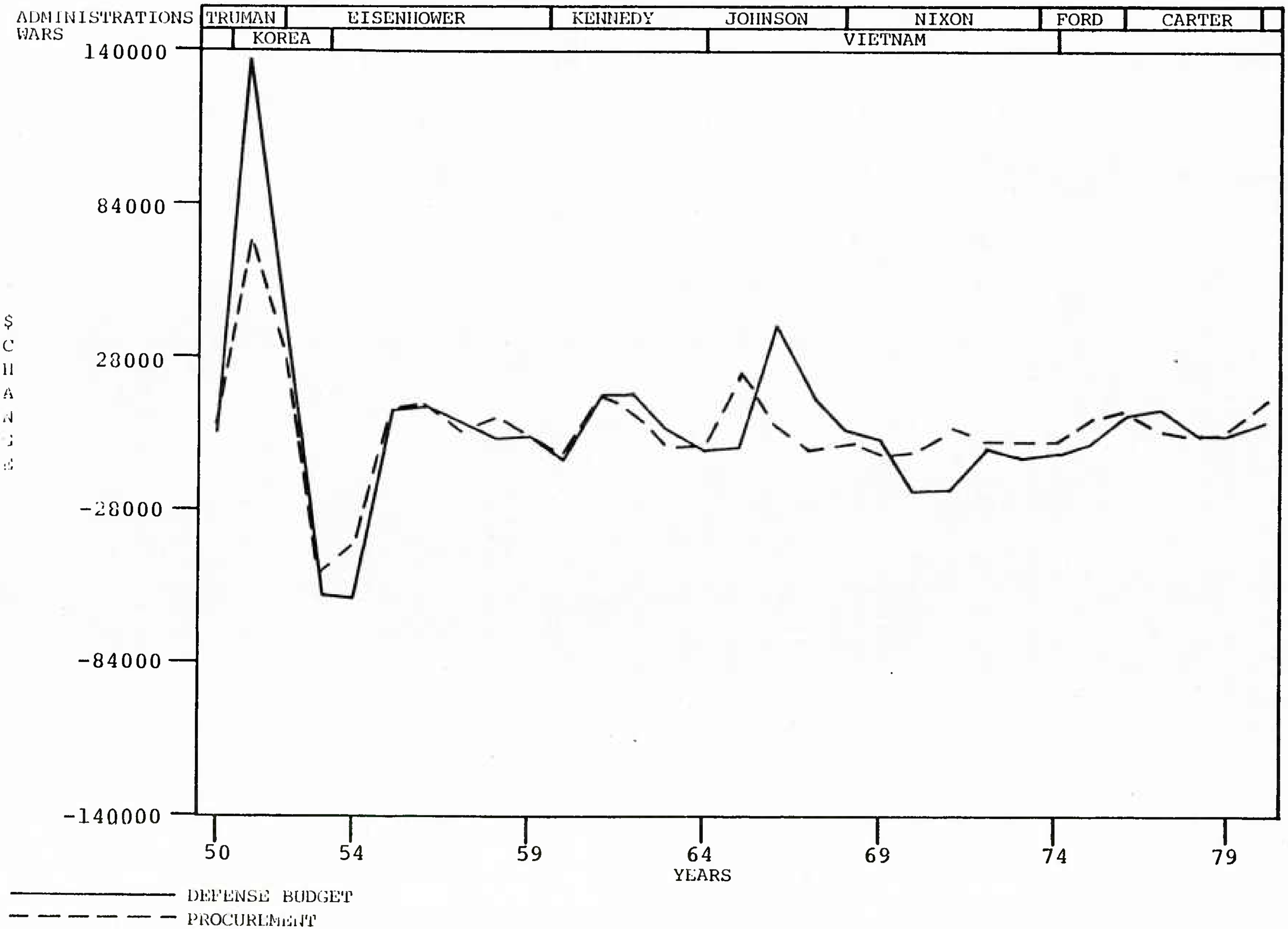


SOURCE: CONGRESSIONAL MILITARY POSTURE HEARINGS FOR FY 82, (H.A.S.C. 97-6)

NOTE: EXCLUDES RETIRED PAY AND SOUTHEAST ASIA COSTS RELATED TO THE VIETNAM CONFLICT

FIGURE 4-4

Correlation Between Changes in Defense Budgets & Procurement
(Millions of FY83 $)



When changes in the defense budget are considered on a percent basis, as shown in Figure 4-5, the Korean war dominates the changes with an increase of approximately 167 percent at the start and a decrease of approximately -22 percent at the end. The changes during the Korean war are so large they mask other causes of turbulence during this period of time. The changes during the Korean war are more than three times the next most prominent time period which was during the Vietnam war.

Figures 4-4 and 4-5 also show that turbulence in the procurement account was greatest during the Korean war, with increases of approximately $72 billion above the 30-year average (approximately 410 percent) and decreases of approximately -$52 billion below this average (approximately -60 percent). The large percentage change is particularly striking.

As expected, and as shown in Figures 4-4 and 4-5, the action in southeast Asia (SEA) is next to the Korean war as a major cause of turbulence in the three-decade period from 1950 to 1980.

A further indication of the impact of war on turbulence is the change in turbulence statistics over the three-decade period since 1950. Table 4-1 shows the statistics for DOD TOA for the period FY 50 to FY 83, the period without the war in Korea (FY 54 to FY 83), and the period FY 64 to FY 81. Note that the standard deviation with Korea is 38 percent higher than the standard deviation over the three decades without Korea.

4.2 PRESIDENTIAL ADMINISTRATIONS AND TOPLINE TURBULENCE

The large increase in the DOD budget shown in Figures 4-1 through 4-3 for the FY 80 to FY 86 time frame reflects the plans of the Reagan administration to rebuild our warfighting capability. This large increase graphically demonstrates the known fact that presidential administrations have a major impact on DOD topline budget turbulence and suggests that presidential administrations are the second largest cause, after war, of budget turbulence. These changes reflect changes in policy between administrations.

From the end of the Korean war under the Eisenhower administration, the defense budget decreased considerably from $223.4 billion in 1953 to $169.5 billion in 1960, measured in FY 83 constant dollars, approximately 25 percent. From 1960 through 1968 during the Kennedy-Johnson administrations, the defense budget grew from approximately $183 billion to a peak of $240 billion (FY 83

FIGURE 4-5

Correlation Between % Change in Defense Budget & Procurement

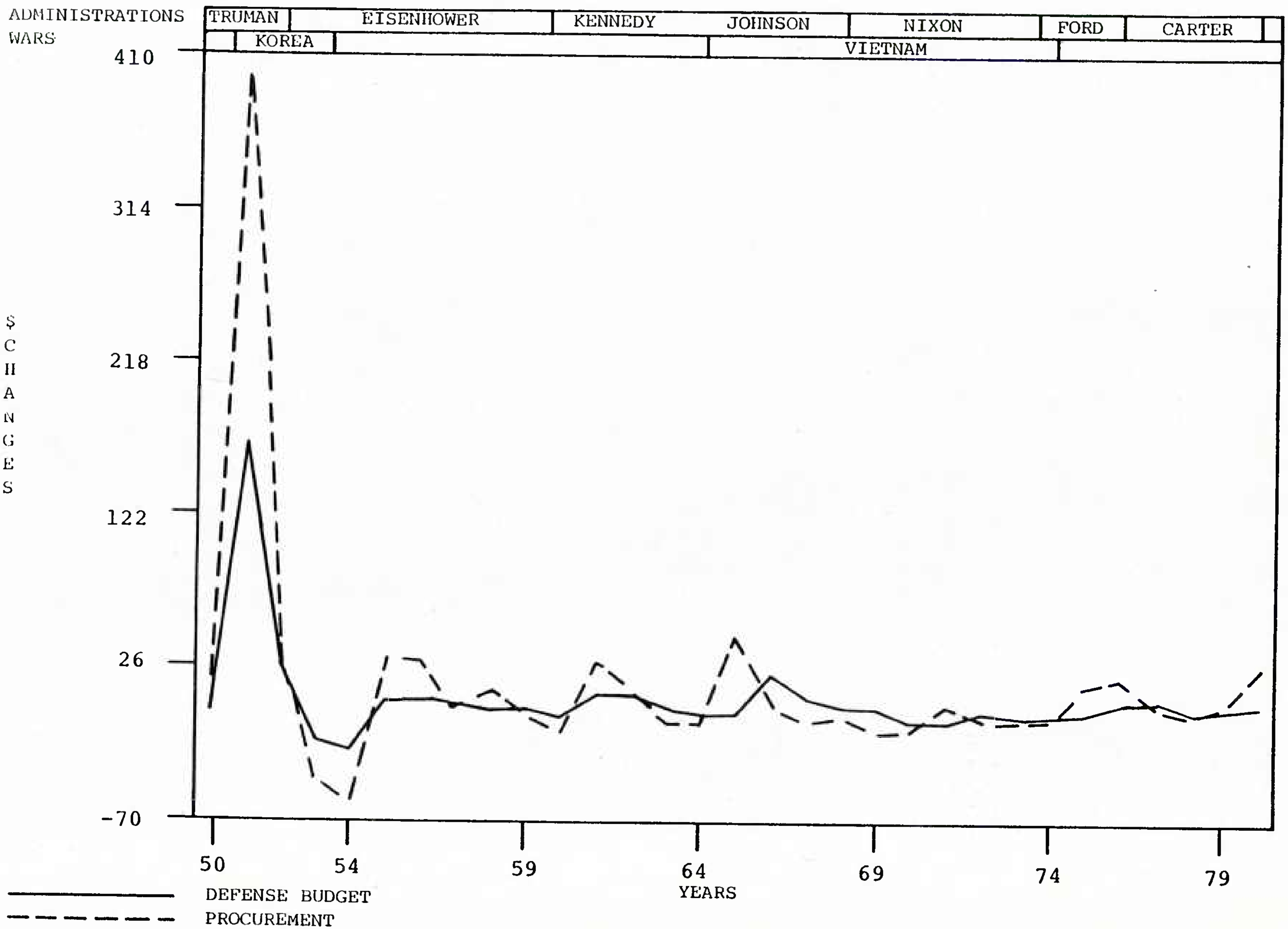


TABLE 4-1
DOD TOA Turbulence

(with and without Korea expenditures)

	Range	High	Low	Standard Deviation
FY 50-FY 83 DOD TOA ($B)	200.6	293.4	82.8	35.0
FY 54-FY 83 DOD TOA ($B) (w/o Korea)	95.6	258.0	162.4	25.3
FY 64-FY 81 DOD TOA ($B)	73.3	238.9	165.6	24.6

constant dollars), an increase of 30 percent. This impact was due to the administration's involvement in Southeast Asia. However, social programs initiated under these and previous administrations caused the total Federal budget to exceed $310 billion (FY 83 constant dollars).

The Nixon administration, 1968-74, again brought a major reverse. The defense budget decreased from approximately $235 billion to $170 billion (FY 83 constant dollars), a decrease of approximately 28 percent. At the same time, the Federal budget increased from $300 billion to $410 billion (FY 83 constant dollars), or approximately 35 percent. In 1968, approximately $100 billion (FY 83 dollars) or 33 percent was nondefense dollars. This increase to $240 billion (FY 83 dollars) is an increase of 140 percent in nondefense spending.

From 1974-80 (the Ford-Carter administrations), the defense budget remained almost level with a slight increase in 1978-79. However, the Federal budget climbed from $410 billion (FY 83) to $530 billion, increase of 27 percent. The 1980-to-present budgets reflect increases in the DOD budget.

It should be noted that the first budget an administration presents is the "election year plus two" budget. There is little the new administration can do to the existing budget except for additions/deletions by supplementals. The "election-year-plus-three" budget is the first budget where considerable influence of the new administration is attained. Thus, when the Reagan administration was elected in November 1980, the FY 81 budget was in effect. The FY 82 budget was presented to Congress in January 1981. The FY 83 budget, already in preparation for 1 year, was the first budget which the Reagan Administration had a full PPBS cycle to develop.

Examination of the DOD TOA using the "election-year-plus-three" premise shows, for the Kennedy-Johnson administration, a succession of decreases in the defense budget, while the Nixon administration is characterized by a period of lesser decreases and a return to increases. This is followed by decreases during the Ford administration and immediately reversed by increases during the Carter administration.

4.3 GROSS NATIONAL PRODUCT AND TOPLINE TURBULENCE

Although GNP, when considered over long periods of history, can have an impact on the size of the defense establishment, changes in the GNP are not correlated with changes in the Federal or the defense budgets during the past three decades. These findings are counter to the view that changes in GNP are correlated with both changes in the Federal and defense budgets.

4.4 THE THREAT AND TOPLINE BUDGET TURBULENCE

Highly publicized statements relating the threat to the budget, such as Kennedy's "missile gap" and Reagan's "window of vulnerability," argue for a direct relationship between the threat and budget and changes to the budget. The hypothesis that the threat has a significant impact on topline budget turbulence was analyzed in this study.

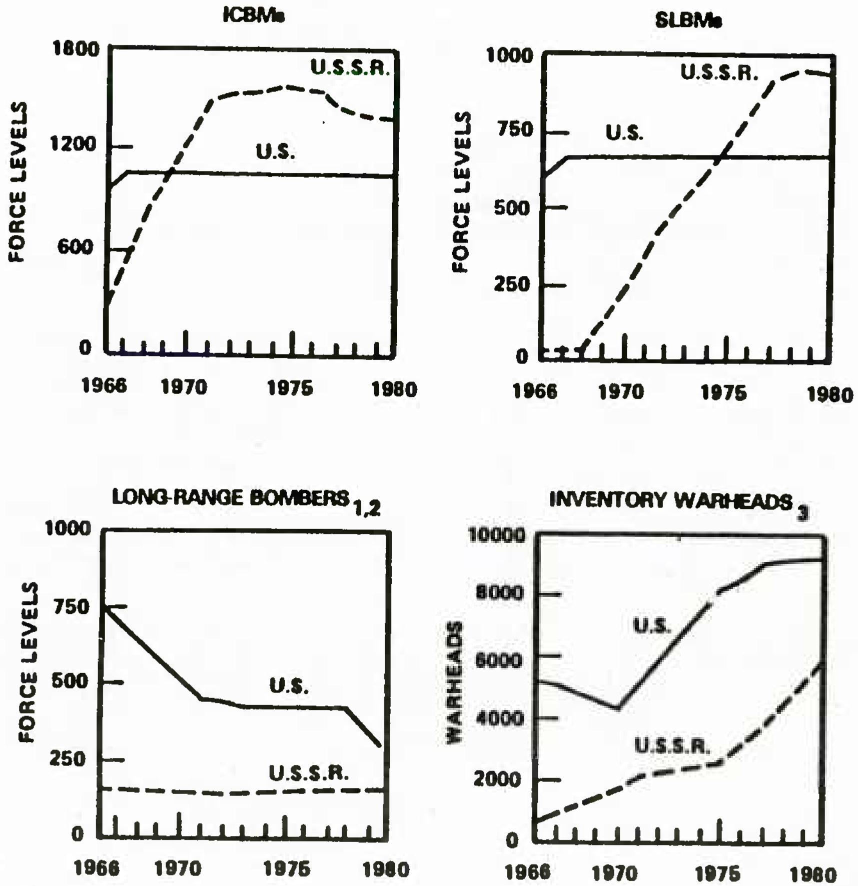
The Soviet threat can be considered on a number of levels from macro down to specific equipments and capabilities. To test the hypothesis of threat impact on topline budget turbulence, it is sufficient to consider the threat at the macro level. Figure 4-6, which shows the U.S./U.S.S.R. strategic triad levels from 1966 to 1980, illustrates the ever-increasing U.S.S.R. capability in comparison to the U.S. capability. The Soviet threat is obviously increasing. The U.S. strategic force budget has been included in this figure to test the hypothesis of a correlation between threats and budgets. It is observed that the strategic force budget did not increase with the U.S.S.R strategic threat but actually decreased as the threat increased. The United States dealt with the increasing strategic threat and decreasing defense resources by changing U.S. nuclear retaliatory force posture policies to reflect reduced relative capabilities and expectations. Figure 4-7 shows the strategic budgets and reduced expectations. These reduced expectations are reflected in the offensive strength criteria which show a reduction in expectations in three decades from superiority to parity, to sufficiency, to essential equivalence.

The correlation between the threat and general purpose forces was also investigated. Figure 4-8 shows the U.S. general purpose force goals and the general purpose force budget for FY 52 through FY 82. Although the budget remained relatively constant, except for the Korean and Vietnam wars, the relative capabilities of our forces diminished along with our expectations. The figure shows that our force levels capabilities were reduced from the capability to fight 2-1/2 wars, to 1-1/2 wars, to 1+ war.

These comparisons between the threats and budgets demonstrate that, at the macro level, there is no short-term correlation between the threat and budget turbulence.

FIGURE 4-6

U.S./U.S.S.R. STRATEGIC TRIAD LEVELS (1966 - 1980)

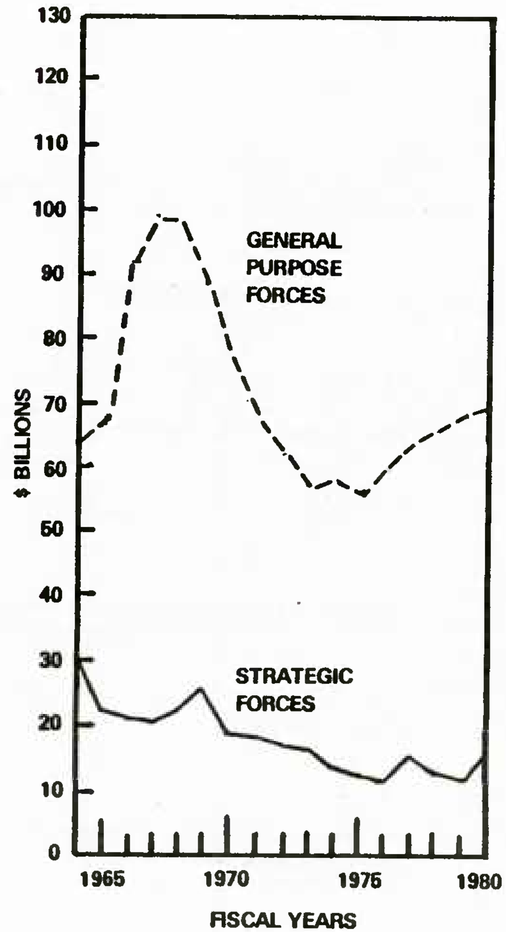


NOTES:
1. FB-111 AND BACKFIRE ARE EXCLUDED
2. EXCLUDES APPROXIMATELY 220 B-52s IN DEEP STORAGE
3. BASED ON FORCE LOADING ESTIMATES

SOURCE:
FY 82 DOD ANNUAL REPORT TO CONGRESS

STRATEGIC FORCE BUDGET (TOA)

$ BILLIONS FY 83 DOLLARS



SOURCE:
CONGRESSIONAL MILITARY POSTURE HEARINGS FOR FY 82, (H.A.S.C. 97-6)

FIGURE 4-7

U.S. Nuclear Retaliatory Force Posture Policies

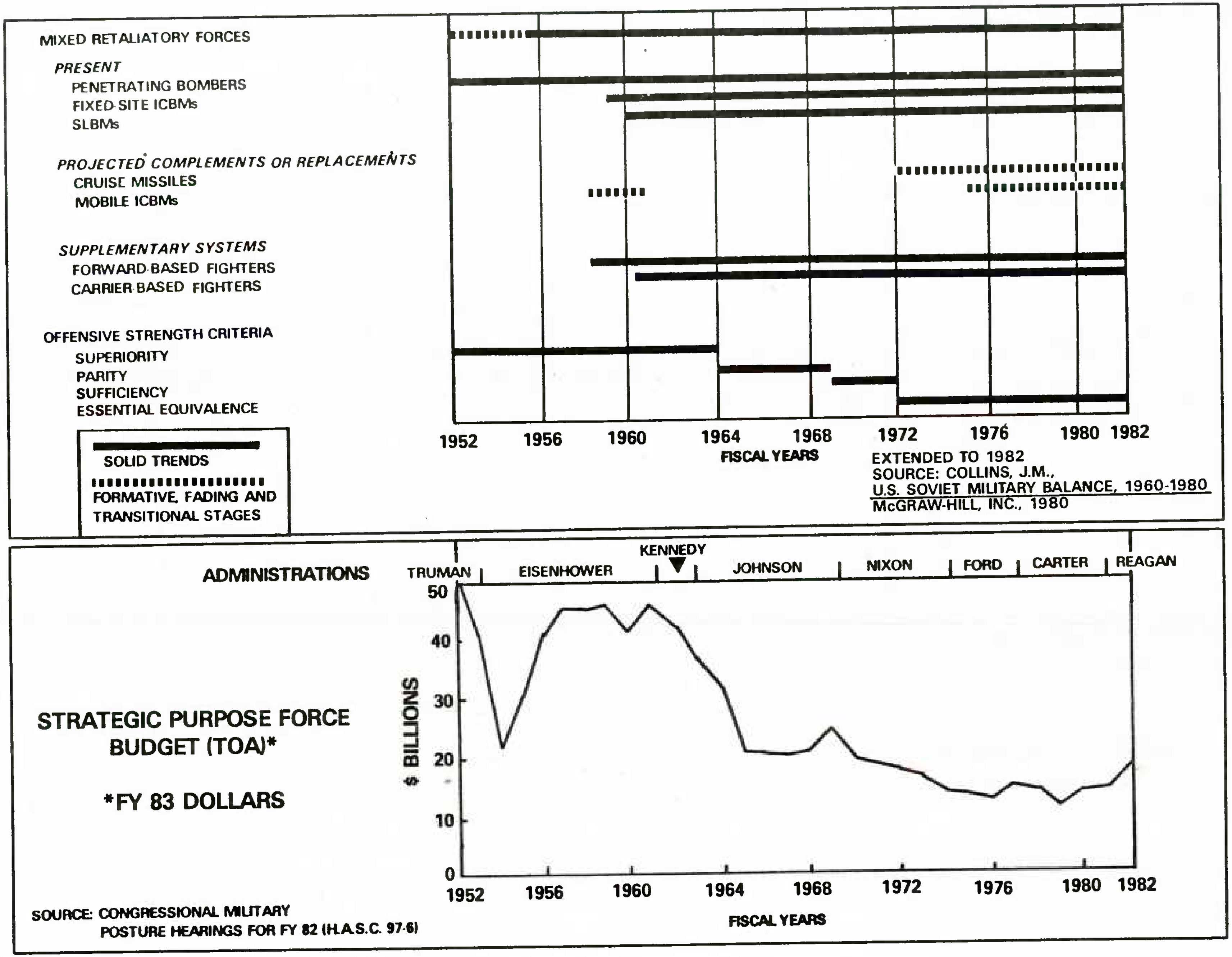
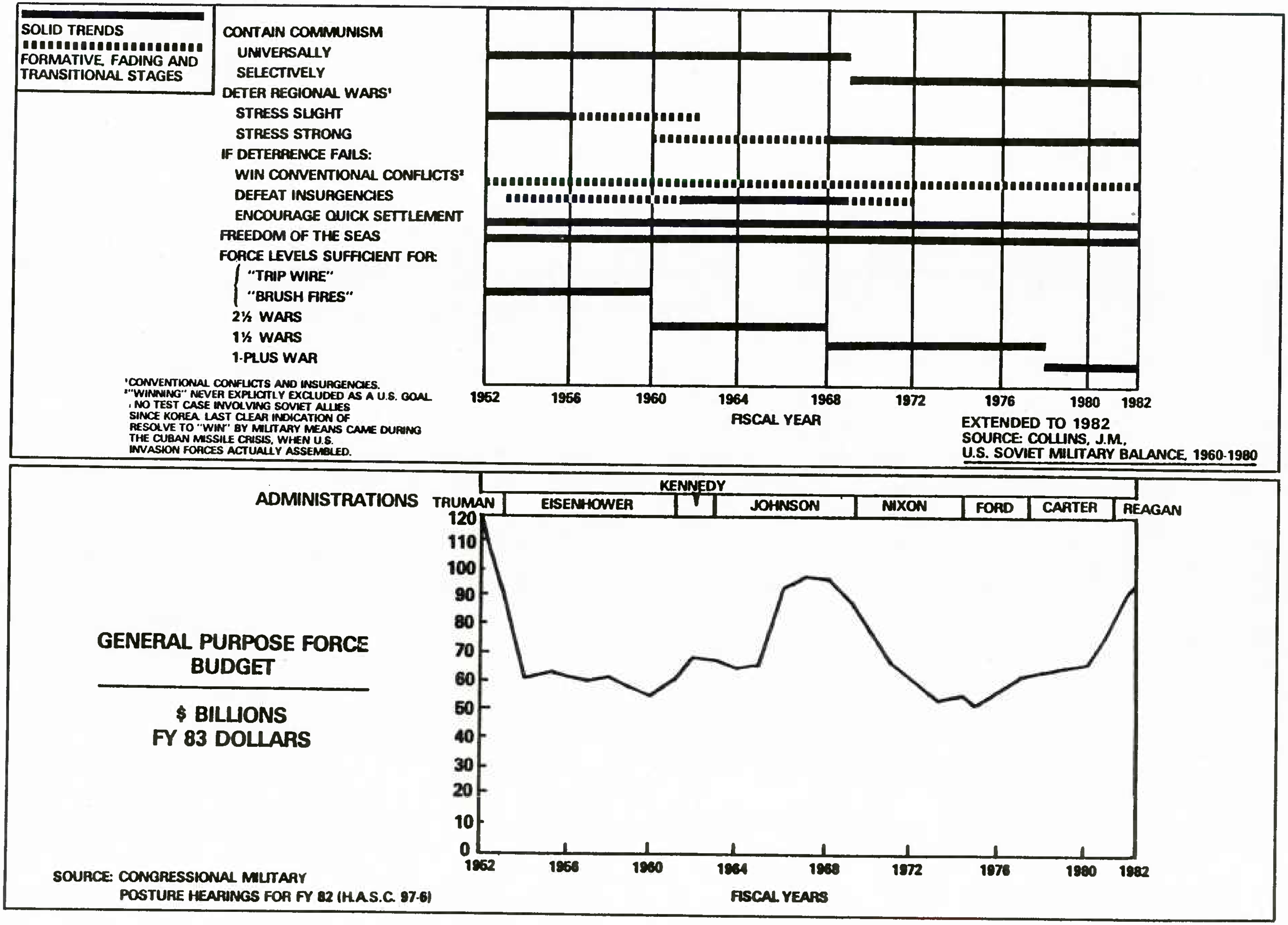


FIGURE 4-8

U.S. General Purpose Force Goals



However, the Reagan defense buildup is clearly a result of perceived threat growth; long-term correlation no doubt exists.

4.5 CONGRESS AND TURBULENCE

One step in the analysis of Congressionally induced turbulence was to look for changes in budget level associated with the 2-year election cycle analogous to those associated with changes in Administration. Examination of Defense TOA over the past three decades (e.g., Figure 4-3) does not show a significant relationship, and we conclude that Congress is not inducing significant topline turbulence in the same manner as an Administration does -- that is at the total funding level.

However, Congress does have a major impact on Defense budgets, as we noted in Chapters 2.0 and 3.0. The BUDGETRACK data in Tables 3-7 and 3-8 clearly illustrates the degree to which Congress changes the budget from that requested by the Administration. Over a 3-year period, for the programs we examined, Congress made some changes in 88 of 118 cases, or 75%. Those program-specific changes exceeded 5% for 38 cases (32%) and exceeded 10% for 30 cases (25%). Clearly Congress is a significant cause of topline budget and planning turbulence, albeit principally program-specific as contrasted to turbulence in the level of the total budget or of budget categories.

4.6 PROCEDURAL AND MANAGEMENT CAUSES OF BUDGET TURBULENCE

In addition to the budget turbulence caused by wars, changing defense policy, and Congressional actions, budget turbulence can be introduced in the defense budget by the planning process and program execution. The simplified budget process shown in Figure 2-2 illustrates the places in the planning process where turbulence may be introduced. A detailed analysis of the turbulence in acquisition programs caused by decisions during the planning process would require FYDP data which were not available for the study. Therefore, the turbulence introduced at each step in the budget process could not be determined. However, other previous analyses of the FYDP data provide a number of insights useful to this study.

Turbulence introduced by the planning process is somewhat different than turbulence caused by wars and by Executive and Congressional priorities. However, the end results of this turbulence are the same, that is (1) delays in planned fielding of equipment, (2) increased cost and sometimes reduced performance of acquired equipment, and (3) in some instances, the deletion of desired equipments. According to a recent NAVMAT report (1), a significant cause of turbulence is an optimistic planning process. Programs that are planned at higher fiscal levels than actual must be reduced in the budget year to make the program conform to budget reality. The referenced study describes the drawbacks of optimistic planning. A brief overview of this study is given in Appendix C.

4.7 REFERENCE

1. Naval Material Command, "Major Procurement Cost Growth Assessment," February 1982.

2. Borsting, J.R., "Decisionmaking at the Top," "Management Science" Vol. 28, No. 4, April 1982.

3. Brown, H., "Annual Report to the Congress for Fiscal Year 1982," Office of the Secretary of Defense.

4. Collins, J.M.,"U.S.-Soviet Military Balance Concepts and Capabilities, 1960-1980," McGraw-Hill, Inc., 1980.

5. Hearings on Military Posture and H.R. 2970, (H.R. 3519), Department of Defense Authorization for Appropriations for Fiscal Year 1982 and H.R. 745 Armed Services Procurement Policy Act of 1981, Before the Committee on Armed Services, House of Representatives, 97th Congress, 1st Session, March 1981 (H.A.S.C. 97-6).

5.0 CURRENT STRATEGIES FOR COPING WITH TURBULENCE

In this chapter strategies currently used to cope with topline budget turbulence (TLBT) are categorized and described. These strategies are summarized in Table 5-1. The literature is not clear about topline budget turbulence; therefore, we had to deduce the current strategies from evidence that was often fragmentary. This situation results from the fact that topline budget turbulence has not been as well studied as other aspects of the PPBS, budget, and acquisition processes.

Turbulence in the planning process can contribute significantly to TLBT and can cause serious problems for acquisition managers by invalidating much of their ongoing preparations for future production (see Chapter 2.0). Consequently, coping with topline planning turbulence (TLPT) is also an important focus for strategies to cope with turbulence. Every strategy identified in this chapter plays a role in coping with both TLBT and TLPT. The distinction is whether the strategy is being applied to the budget (e.g., activities ranging from preparation of the budget submission through execution of the congressionally-appropriated budget) or to the planning process for the "out-years" (the years beyond the budget year).

From our assessment of topline budget and planning turbulence we are able to discern six principal strategies currently used for coping with turbulence:

- Reducing cost growth
- Acquiring a mix of systems appropriate for levels of funding less than those projected in the FYDP
- Providing extra protection to top-priority programs
- Stretching-out or speeding-up programs
- Stopping and restarting programs on the margin
- Coping at the program level.

TABLE 5-1
Current DOD Process for Coping with
Topline Planning Turbulence (TLPT)
and
Topline Budget Turbulence (TLBT)

Reducing Cost Growth

- Improved Cost Estimates

- Improved Cost Control
  - Long-Range Planning and Program Stability
  - Goals, Thresholds, and Threshold Ranges
  - Cost Visibility and Control
  - Competition
  - Multiyear Contracting
  - Preplanned Product Improvement (P^3I)

- Realistic Inflation Estimates

Acquiring Mix of Systems Appropriate for Less-Than-FYDP Levels of Funding:

- Prioritization
- Affordability Tests

Providing Extra Protection to Top-Priority Programs

- Stable Program Lists
- Multiyear Contracting

Stretching-Out/Speeding-Up Programs

Stopping and Restarting Programs on the Margin

Coping at the Program Level

5.1 REDUCING COST GROWTH

The literature on the planning process is very clear in stating that one of the principal causes of planning turbulence, and thus a key contributor to budget turbulence, is optimism in cost estimates. Optimistic cost estimates, when supplanted by larger, more realistic estimates, result in either smaller than planned production rates or growth in a program's funding which is often provided at the expense of other programs. The current strategy for reducing cost growth involves three principal thrusts:

- Improved cost estimates
- Improved cost control
- More realistic inflation projections.

5.1.1 Improved Cost Estimates

Cost estimating has been studied and improved extensively over the past two decades but is still considered a major problem. Today two key cost estimates, generally derived by different techniques, are required for each major project: the project manager's estimate and an independent cost estimate. Both estimates are the product of in-depth analyses, but no one argues that subsequent cost increases are unlikely. A recent step to reduce the likelihood that a given program's cost estimate is too low has been to require the higher of the two estimates to be used in budget submissions and FYDP projections.(1)

5.1.2 Improved Cost Control

Strategies to control costs have been the subject of intense management attention for decades. The principal strategies currently in use include:

- Long-range planning and program stability
- Goals, thresholds, and threshold ranges
- Cost visibility and control
- Competition
- Multiyear contracting
- Preplanned product improvement (P^3I).

5.1.2.1 Long-Range Planning and Program Stability. Long-range planning and program stability were original goals for the PPBS(2) and were recently reinforced by the Acquisition Improvement Task Force initiatives.(3) One of the initiatives was to provide a stable program environment so that program costs would not suffer from turbulence. Creating a stable program list of projects to be protected from turbulence throughout the PPBS cycle was one of the strategies used. This strategy is also discussed later as a means for directly coping with TLBT and TLPT.

5.1.2.2 Goals, Thresholds, and Threshold Ranges. Establishing high-visibility goals, thresholds, or threshold ranges for all projects is now required by DODI 5000.2 as a means of controlling cost growth, a top priority throughout DOD.(4) The purpose is to make the management of costs one of the most important objectives of both Government managers and the companies doing the work.

5.1.2.3 Cost Visibility and Control. Cost visibility and control for ongoing projects is effected through a number of mechanisms including Design-to-Cost and Cost/Schedule Control Systems Criteria. The Design-to-Cost concept involves making cost a design parameter of equal importance in the development process to other performance parameters.(5) The second mechanism, Cost/Schedule Control Systems Criteria, consists of criteria for the internal control and accounting systems that contractors use for major projects.(6) One objective of these criteria is to require contractors' internal management control systems to provide data which properly relate cost, schedule and technical accomplishment.

5.1.2.4 Competition. Competition is being used as another strategy for controlling cost.(4) Although the principal objective of competition is usually cost-savings (not an issue per se with regard to TLPT or TLBT), better cost control can be a valuable by-product.

5.1.2.5 Multiyear Contracting. Cost-savings are the usual justification for multiyear contracting, but this strategy can also provide cost control. Indeed, such contracts do commit the contractor to cost quotations for many years in the future, subject to the Government meeting its funding commitments, and ensure that engineering changes do not lead to major cost changes. Such multiyear cost commitments give the Government more cost control than is available from year-to-year contracting; nonetheless, history suggests that growth will still occur in some programs.

5.1.2.6 Preplanned Product Improvement (P^3I). One of the causes of program cost growth is known to be engineering changes, in both development and ongoing production programs.[7] Changes in threat, technology, or requirements frequently lead to engineering changes and often to schedule stretch-out and cost increase impacts. Initial program plans seldom provide for orderly development and introduction of these changes. Preplanned Product Improvement (P^3I) is a strategy in which the design of a system under development is frozen at an early stage, and development of a future block upgrade is funded even before the base system enters production. Development of the base system is completed as quickly as possible, and production is started. The P^3I is phased into the production line and retrofit to previously produced systems when ready.[1] P^3I was adopted primarily to mitigate the choice between early deployment of a system with the technology available to meet a threat in a timely fashion and waiting until more advanced technology was at hand to achieve improved performance. P^3I can also play a role in cost control by reducing changes in the later phases of development and their associated cost growth.

5.1.3 Realistic Inflation Estimates

The third major strategy recently employed to reduce cost growth is to use more realistic inflation estimates for pricing systems for the FYDP. Underestimation of inflation has been a serious deficiency in the FYDP.[8] One of the Acquisition Improvement Program initiatives attempts to attack the problems created by this phenomenon by requiring inflation estimates that are more realistic than previous estimates.[3] Special weapon system commodity inflation estimates (a "DOD market basket") were introduced in the FY 83 budget in place of the Consumer Price Index. The decision to use these special estimates was based on the fact that data collected and published by the Department of Commerce's Bureau of Economic Analysis indicate that inflation in nine of the commodity accounts normally exceeds inflation in the general economy.[1]

5.2 ACQUIRING A MIX OF SYSTEMS APPROPRIATE FOR LESS-THAN-FYDP LEVELS OF TOPLINE FUNDING

A second source of major planning and budget turbulence has been a history of optimistic FYDP projections for topline funding for future years. Such unduly optimistic FYDP projections for topline funding levels have also led, in the past, to substantial reduction in planned procurements.[8]

The strategy for coping with this problem is to assume that the out-year funding projections are optimistic and select the systems to be procured on the basis that they would be needed even if a smaller overall force were funded. There are two parts to this strategy:

- Prioritization
- Affordability tests.

5.2.1 Prioritization

As noted in Chapter 2.0, a key point of the Services' role in the PPBS process is that they initiate the prioritization of the programs at their level, subject to DOD-wide prioritization effected through the Defense Guidance and refined in the POM issue process. Although the principal focus is on the forthcoming budget year, the other 4 years of the FYDP are also significantly affected. All the Services are concerned about the affordability of the programs on which they embark. They are also concerned that their prioritization results in the best possible balance of capability that can be achieved at expected near- and long-term funding levels. We believe that the Services do feel that funds are limited and that savings in one area can be used to cover needs in other areas. We also believe that there is substantial carryover of priorities from year to year and a tendency to focus on programs "on the margin," those with priorities which indicate an increase or decrease as the planning or budget levels change. The net effect of the process results in an annual reexamination of each Service's entire 5-year plan, with many changes from year to year.

The current prioritization processes of the Air Force and Army were recently described in testimony before the House Armed Services Committee's (HASC's) Special Panel on Defense Procurement Procedures. This testimony is summarized below. An analogous prioritization process was developed in the Navy many years ago[9] and is still used in modified form.

5.2.1.1 Air Force Prioritization Process. An overview of Air Force programming was given by Major General Campbell, Jr., Director of Programs, DCS/Programs and Resources, U.S. Air Force.[10] The central theme of his testimony is outlined below.

The Program Decision Package (PDP) and the Air Force Board Structure are central to the Air Force's system of prioritizing requirements. Program alternatives are expressed in the form of PDPs. Each discrete initiative is documented in a format that concisely portrays resource requirements by year and a description of the force capability and objectives achieved. Each command prioritizes PDPs within the mission areas that fall within their purview on the bases of both military requirements and value added for the investment required.

Integrating command priority lists into a single Air Force program is one of the major functions of the Air Force Board Structure. This Board is a four-tiered adjunct to the functional staff. Each tier is composed of functional experts who assess the merits of PDPs, either by mission or functional areas.

Each command presents its recommendations to those panels responsible for the PDPs on each command's prioritized lists. The recommendations of each panel are briefed to one of three committees: the Program Review, Force Structure, or Operating Budget Review Committee.

The recommendations of these three committees are reviewed by the Air Staff Board and representatives from each of the commands. The final product of the Board's activities is a fiscally constrained, prioritized list of PDPs for presentation to the Air Force Council. The Council is the highest tier of the Board Structure and is chaired by the Vice Chief of Staff. The Air Force Council, with the commanders of combat and supporting commands, makes final judgments and recommendations on the Air Force program to the Chief of Staff and Secretary of the Air Force. The resulting program reflects a careful and deliberate Air Force-wide view on the best allocation of resources for the years ahead.

The Air Force is making some attempts to use Mission Area Analyses (MAA) to improve their prioritization process. MAA attempts to weigh all the forces and systems that can contribute to a given mission (e.g., Strategic Offense) to provide a basis for trade-offs. Such analyses are very difficult, and judgment must play a major role. However, in our view, they do integrate more facets of a problem than other processes.

5.2.1.2 Army Prioritization Process. Like the Air Force, the Army's prioritization process is in transition to MAA. The Army system was explained to the HASC Special Panel on Defense Procurement Procedures by Major General Patrick M. Roddy, Director, Program Analysis and Evaluation, Office of the Chief of Staff, Army.[11] The central theme of his testimony is given below.

The prioritization process starts with the FYDP which gives the 5-year program. The next year is started by looking at the residual 4 years of the prior year's program. However, because of changes and new initiatives, a prioritization process is used to make sure the right things are in the program. To make room for new initiatives, the value of the previously established program is arbitrarily decreased by about 15 percent, and that portion of the program recompetes to get back into the total program. The new initiatives proposed since last year must also compete to get into the program, and additional OSD guidance on specific items must be accommodated.

MAA starts with the Army's long-range plan. It is based on the Chief of Staff's paper that details his 5-year strategy and on higher headquarters' guidance and force application strategies. This guidance is described in terms of mission area requirements. Current capabilities are then assessed against the mission area requirements to determine shortfalls.

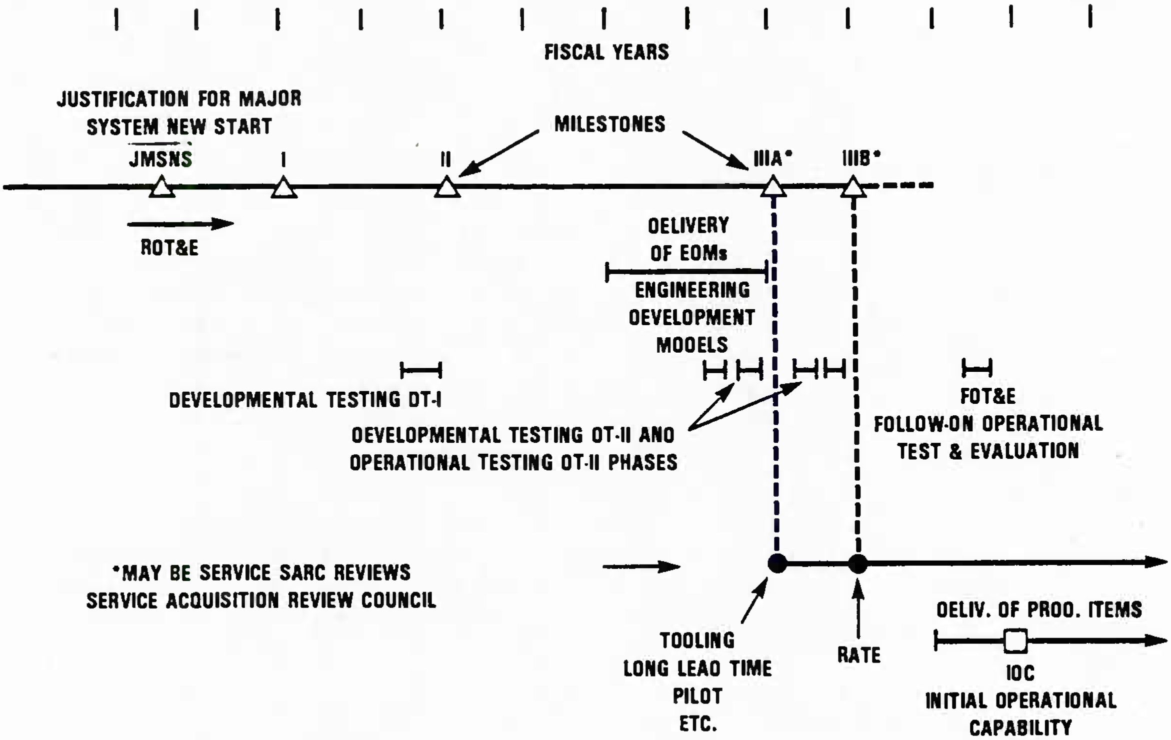
Once shortfalls have been established, a cost risk analysis is performed. The Army assigns programs into mission area categories and states how they contribute to the mission area. Capabilities and shortfalls by mission area are used to determine which shortfalls will be accommodated.

5.2.2 Affordability Tests

The Secretary of Defense currently requires tests of affordability at every system development milestone and during the PBBS process. Affordability is a function of cost, priority, and availability of fiscal and manpower resources. In particular, DOD Instruction 5000.2 requires explicit confirmation that each major program is affordable before advanced development is begun and that it is affordable even at a reduced topline budget level.[4] Further, DOD Directive 5000.1 requires affordability to be specifically verified at every key milestone, particularly before full-scale development and production begin (See Figure 5-1 for key milestones).[12]

This process should help to ensure that the mix of programs each Service pursues will be appropriate for the long-term level of funding each will actually receive. If this strategy worked perfectly, future decisions to cope with turbulence would need to address only how many of each system to buy, not which ones should be terminated (or started).

FIGURE 5-1
Milestones for a Typical Major Program



*Reference: DoDI 5000.2

5.3 PROVIDING EXTRA PROTECTION TO TOP-PRIORITY PROGRAMS

The Services and DOD have always protected their top-priority programs to some degree in the PPBS process. However, two strategies have the direct or indirect effect of providing "extra" protection for top-priority programs:

- Stable programs lists
- Multiyear contracting.

5.3.1 Stable Programs

A recently implemented strategy for coping with top-line planning turbulence is to identify stable programs that will be protected from turbulence. This strategy is one of the initiatives of the Acquisition Improvement Program. In his memorandum of April 30, 1981, former Deputy Secretary of Defense Carlucci noted that program instability, particularly that which is caused by financial constraints, is "inherently costly in both time and money." Initiative No. 4 states that "Secretary of Defense, OSD, and the Services should fully fund R&D and procurement of major systems at levels necessary to protect the acquisition schedule established at the time a program is base lined." The definition of a stable program is given in Figure 5-2.

The increased efficiencies obtained with stable programs are based on the concept of procuring systems and equipments at predictable and, in some cases, most economical production rates. The definition and characteristics of economical production rates are shown in Figure 5-3.

Implementation of the program stability initiative in the FY 84-FY 88 budget preparation process called for the Services to nominate programs for aggregation into a DOD stable programs list. The Army nominated 6 programs, totaling ($0.04B in RDT&E (0.8 percent of Army RDT&E) and $5.46B in Procurement (28 percent)). The Navy's response alternatively proposed the pursuit of multiyear programs. The Air Force nominated 10 programs, totaling $1.23B in RDT&E (9 percent) and $12.47B in Procurement (32 percent). The resulting stable programs list is shown in Table 5-2.

5.3.2 Multiyear Contracting

Multiyear contracting is a strategy for acquiring materiel over several years under one contract. The generally accepted definition of multiyear contracting is

FIGURE 5-2
Stable Program Definition

Stable program is a term applied to a Major Defense System that is of sufficient importance and priority to command consistency in funding to an approved development schedule and a production profile designed to meet a firm inventory requirement. Such a program will be afforded an extra measure of protection in the PPBS process so that the DSARC/(S)SARC-recommended program alternative, approved by the SecDef, can be successfully implemented. The term "stable program" implies a commitment on the part of OSD and the Military Departments to fully fund production engineering and planning, facilitization, rate tooling, maintenance, training and test equipment, and pursuit of production competition, P^3I, and RAM. All program features and ancillary equipments necessary to attain full operational capability (FOC) will be included within the scope of the program so stabilized. Stable programs are not to experience decrements or be subject to offset action during budget preparation so as to stretch the annual production quantities or delay acceleration to the facilitized economical rate. Conversely, recognized stable programs will be priority candidates to receive additional funding as may be required to counteract technical/schedule difficulties and unanticipated escalation costs. Stable programs will be prime candidates for application of multiyear procurement and other contractual efficiencies.

Reference (13)

FIGURE 5-3
Economical Production Rates

An economical production rate is one that makes effective and efficient use of existing manufacturing plants and facilities. An economic production profile for the FYDP also makes use of programmed facilitization and rate tooling augmentations to increase capacity in the out-years. The planned economic rate employs programmed increases in plant capacity that are cost beneficial; i.e., incremental facilitization costs result in substantial economic return on investment.

It may be expedient to produce some subsystems or equipments, such as those common to a number of systems, at a high or premium rate to achieve an efficient output of the entire system. Conversely, some systems are intrinsically of so high a unit cost as to preclude establishing an efficient rate for many component items.

An economical rate for many commodities is one at which the facility is operating nominally on a one-shift basis with cost-intensive elements on multiple shifts, resulting in a 1.3 to 1.4 shift equivalent. The nominal one-shift loading also accommodates surge and mobilization requirements by increasing manloading. The availability of manpower at requisite numbers and skill levels is always a factor to be included in arriving at an economical production rate.

Economical production rates can be plotted by deriving unit cost versus quantity curves. The minimum economical rate occurs at the knee of the curve or where further reduction in quantity incurs an inordinate increase in unit cost.

The maximum economic rate occurs when the plant capacity is exceeded; i.e., further increase in quantity incurs an increase in unit cost, including the inability to amortize further facilitization and rate tooling costs.

Reference (13)

TABLE 5-2
DOD Stable Programs List
for FY 84 PPBS Cycle

ARMY (17 September 1982)	RDT&E	Procurement ($B)
• M-1 Tank	___	1.76
• Bradley Fighting Vehicle*	.01	.86
• Blackhawk Helicopter*	___	.48
• CH-47D Helicopter Mod.*	___	.34
• MLRS*	___	.55
• AAH-64 Apache Helicopter	.03	1.47

NOTE: The Army is carrying this concept even further internally by attempting to stabilize a much larger list of programs within the Army.

AIR FORCE (5 October 1982)	RDT&E	Procurement ($B)
• ALCM	.03	.10
• F-16*	.11	2.12
• F-15	.12	2.13
• Defense Support Program*	.05	.46
• DSCS III	.04	.11
• Defense Meteorological Satellite*	.03	.04
• NAVSTAR*	.10	.14
• B-1B*	.75	6.18
• KC-10*	___	.81
• Low Level Laser Guided Bomb	___	.28

NAVY Recommends dropping concept or including only multiyear procurement candidates.

* FY 84 or prior multiyear candidates

Reference (13)

a method of acquiring more than 1 but not more than 5 years of requirements under one contract. Each program year is budgeted and funded annually. At the time of award funds need to have been appropriated only for the first year. The contractor is protected against loss resulting from cancellation by contract provisions that allow reimbursement of that part of prorated costs which were to have been compensated for in later years.

There are reasons to believe that the price of defense purchases can be reduced through the increased use of multiyear contracts. The theory behind this belief is straightforward. The Defense Department makes a commitment to purchase certain military goods for several years from the same supplier; consequently, the supplier can afford higher levels of plant automation, buy larger lots of raw materials, and schedule production more efficiently. The supplier then passes most of these savings on to the Government. The Acquisition Improvement Program recommendations call for increased use of multiyear contracting and cite cost savings of 10 to 30 percent under multiyear procedures.(3) This strategy can lead to increased program stability and can also be a de facto mechanism for fencing by making explicit the cost of changes in defense plans. If Congress or DOD cancels or causes significant change to a multiyear contract because of funding cuts or in reaction to problems in the weapon system, DOD could be liable for large cancellation fees or cost increases.

The current plan for multiyear contracting is supposed to capture the benefits of multiyear procedures while avoiding potential disadvantages through careful selection of programs to be so funded. DOD has a list of criteria for the selection of programs for multiyear contracting. The first criterion restricts multiyear contracting to programs that "yield substantial cost avoidance or other benefits when compared to annual contracting methods." The remaining criteria deal with the inherent predictability of the programs, including stability of the system funding.(14) The effect is to limit multiyear procurement to programs less likely to experience budget turbulence.

5.4 STRETCHING-OUT OR SPEEDING-UP PROGRAMS

Another means of absorbing planned out-year funding level reductions or budget cuts is to stretch out programs. This is one of the most common strategies, with stretching-out causing increased unit costs with smaller annual production runs leading to growth in total program costs. It can also be applied when the turbulence is positive, with cost-quantity benefits occurring from increased funding.

5.5 STOPPING/RESTARTING PROGRAMS "ON THE MARGIN"

A competitive strategy for coping with turbulence is to stop or restart entire programs "on the margin." Usually a myriad of reasons in addition to budgetary ones are also involved for such program stops and restarts.

5.6 COPING WITH TURBULENCE AT THE PROGRAM LEVEL

Project managers have been coping with both planning and budget turbulence for years. An example of such turbulence can be seen in the FY 82 funding planned in past years for the Navy F/A-18 program (as reflected in past FYDPs and the eventual budget):[15]

	FY 82 $M (units)
FY 78 FYDP	2,610.0
FY 79 FYDP	1,403.0
FY 80 FYDP	1,600.0
FY 81 FYDP	2,171.4 (96)
FY 82 budget submission	2,126.5 (63)
Actual FY 82 budget	2,082.8 (63)

There we see the planned funding reduced 30 percent in 1 year (FY 79), and increased 36 percent 2 years later. We also see the production rate falling 35 percent 1 year later, apparently due to cost growth and a slight decrease in funding. Such turbulence will inevitably impact ongoing planning for tooling and production lines, training, supply and maintenance support, and a myriad of other logistics support actions which a project manager must accomplish.

There are also examples of year-to-year turbulence in programs. For example, the Patriot (SAM-D) surface-to-air missile system budget history shows:[15]

	Budget Request $M (units)	Appropriation $M (units)
FY 80	426.0 (155)	396.0 (155)
FY 81	469.6 (183)	442.3 (130)
FY 82	820.8 (364)	675.6 (176)
FY 83	805.1 (376)	770.0 (287)

Here we see cost growth and congressional impact on a program, leading to significant alteration in the planned production rate build-up. Many managers cope very well with turbulence, taking actions to minimize the turbulence in their projects (e.g., Admiral Rickover's use of congressional intervention for his nuclear power programs) or reacting to turbulence to minimize its impact. Nonetheless, we found no coherent discussion of applicable strategies, nor did we have the resources in this study to examine this part of the current process in further depth.

5.7 REFERENCES

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5. DODD 5000.28 "Design to Cost," May 23, 1975.

6. DODD 7000.2 "Performance Measurement for Selected Acquisitions," June 10, 1977.

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6.0 PERCEIVED SHORTCOMINGS IN THE CURRENT PROCESSES FOR COPING WITH TURBULENCE

Determining the perceived shortcomings in the present processes for coping with turbulence is Step 5 of our evaluation flow diagram (Figure 1-3). To a great extent, these perceived shortcomings are common knowledge. There are few quantitative measures available, but we do cite some indicators of problems that are not yet fully resolved. In the discussion that follows we follow the same order of strategies as developed in Chapter 5.0. The perceived shortcomings discussed in this chapter are summarized in Table 6-1. In subsequent chapters we will introduce and analyze improvements to the current processes that will mitigate some of these shortcomings.

6.1 ANALYTICAL FRAMEWORK FOR COPING WITH TURBULENCE - BASING FORCE MIX ON LONG TERM BUDGET PROJECTION

Before discussing the strategies we need to introduce an additional concept that will be used in evaluating strategies for coping with turbulence. This concept is embodied in Figures 6-1 through 6-3. An ideal turbulence-free FYDP is postulated, and all cost growth that will occur later is conceptually established. This yields the real cost for the programs included in our turbulence-free FYDP (Figure 6-1). Next, we reconcile this projection with a conceptually perfect prediction of the long-term average level of future budgets (Figure 6-2). In this process we determine the mix of programs, accurately priced, that will be optimum for the given long-term level of future budgets. It is this mix of programs which the PPBS process should ideally develop and which should be the target of the prioritization process. As noted later, the current DoD strategy of affordability tests based on less-than-expected levels of funding is consistent with this framework. It is also worth noting that repri-oritization from the fully priced FYDP mix to a mix optimum at future budget levels (Figure 6-2) might result in some program cancellations. We believe, however, that the largest dollar contribution would come from reducing the numbers of many systems already in the chosen mix. This is not a critical issue for this study, but it is worth further analysis.

Finally, we should note that this process of determining the optimum mix of systems for the long-term level of future budgets cannot be a static process. Changes would

TABLE 6-1
Perceived Shortcomings in Current Process for Coping with Turbulence

Current Strategy	Perceived Shortcomings
Reducing Cost Growth	No known strategy is going to be fully effective.
. Improved Cost Estimates	Cost estimates are still occassionally going to be low due to overoptimism and inability to predict all future cost sources.
. Improved Cost Control	More costs will increase than decrease; P^3I is now only partially implemented.
. Realistic Inflation Projections	Too soon to tell; pressures still exist to keep projections low.
Acquiring Mix of Systems Appropriate for Less-Than-FYDP Levels of Funding	Annual cycle leads to too much reprioritization; concept is poorly understood level of funding used today is probably higher than future budget levels will be.
. Prioritization	It can be a source of turbulence; annual issues have too much impact; analytical tools are weak; long-term funding levels used are too optimistic.
. Affordability Tests	Too early to tell; early indications are positive.
Providing Extra Protection for Top-Priority Programs	Will increase turbulence impact on nonprotected programs; may not be most economical strategy
. Stable Program Lists	Will increase turbulence impact on non-protected systems.
. Multiyear Contracting	Can inhibit other strategies if it acts as defacto fencing.
Stretching-Out/Speeding-Up Programs	Considered by some to be avoiding hard decisions; program instability may be cause of inefficiency.
Stopping/Restarting Programs "On the Margin"	May not be economically justified if start/stop costs are high.
Coping at the Program Level	Project managers have no guidance on amount of turbulence for which to plan; program manager tools are not well documented.

FIGURE 6-1
Impact of Cost Growth
(Conceptual)

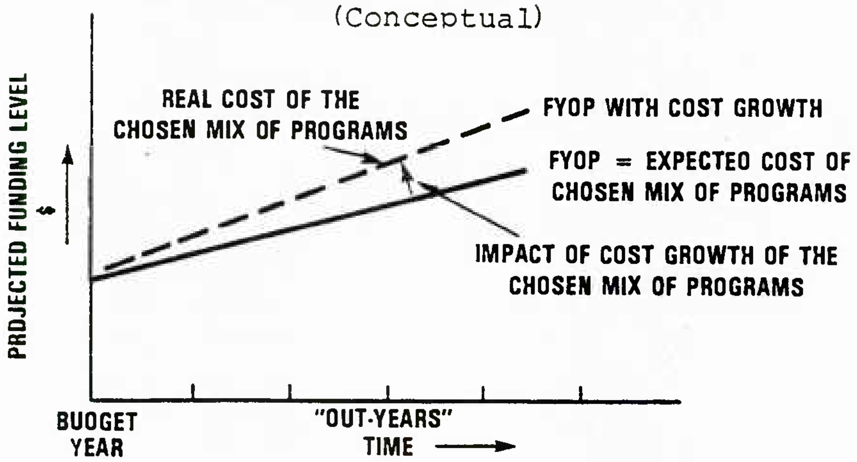


FIGURE 6-2
Expected Long-Term Level of
Future Budgets
(Conceptual)

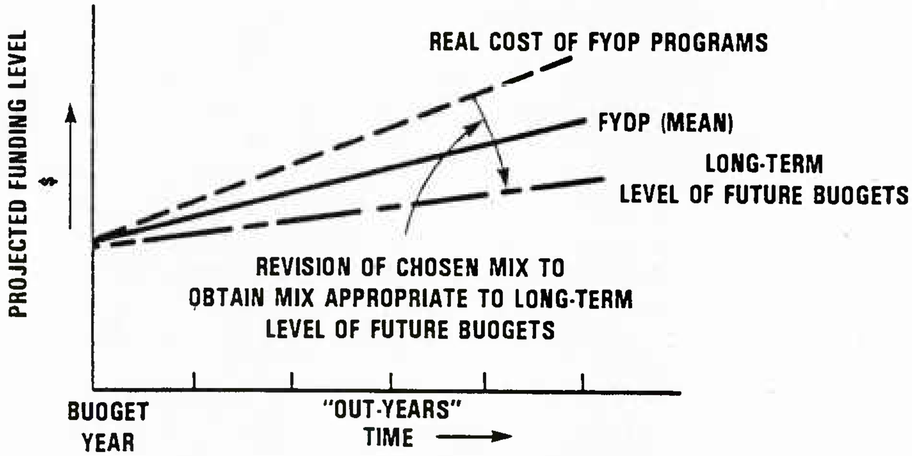
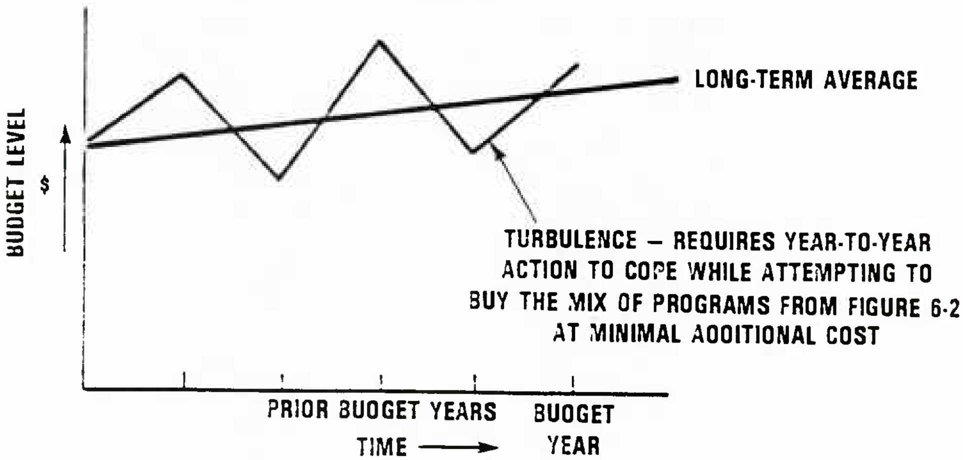


FIGURE 6-3
Budget Turbulence Year-to-Year Changes
in the Budget About the Long-Term Average
(Conceptual)



undoubtedly be required to reflect the impacts of changes in threats, technology, strategies, and even key decision-makers.

Figure 6-3 depicts the question of coping with turbulence in the annual budgets compared to the long-term average. This, we argue, is an economic issue with some other important factors to be discussed later. The key question is: What are the best strategies for obtaining the already identified mix of programs given the annual TLBT? By analogy, a similar conclusion can be reached for coping with TLPT, turbulence in the "out-years" of the FYDP.

6.2 PERCEIVED DEFICIENCIES IN REDUCING COST GROWTH

This section discusses the perceived deficiencies in the current strategies to reduce cost growth.

6.2.1 Perceived Deficiencies in Cost Estimates

The use of the highest of the independent or the project manager's cost estimates will reduce future cost growth, but there is also an element of self-fulfilling prophecy in the concept. There are myriad pressures on any project for valuable additional tasks or changes, all of which have cost implications that may not be easy to price out. Somewhat higher cost estimates are unlikely to cover all these unpriced sources of cost growth. Thus, we believe that there will be some, but not total, improvement in the accuracy of program cost estimates.

6.2.2 Perceived Deficiencies in Improved Cost Control Strategies

Cost control has been extensively studied for years. We have not attempted a comprehensive critique of the subject but make note that past efforts at cost control have been only partially successful. Current strategies, while appearing to build constructively on the past, are not expected to be fully succcessful either. In part, this is inevitable because factors causing cost growth outnumber any pressures for cost reduction or even containment. We believe all the techniques described in Section 5.1.2 to be useful and, for the most part, have not attempted to embellish them. There is one exception: -- Preplanned Product Improvement (P^3I) appears to be inadequately implemented. For example, it is not yet a required, integral part of the Major Systems Acquisition Procedures as specified in DOD Instruction 5000.2[2], nor is it seen in all out-year projections for major programs.

6.2.3 Perceived Deficiencies in Realistic Inflation Projections

The process by which inflation projections are genrated has certainly been improved by the use of more relevant inflation indices than in the past. However, we believe that there are natural pressures within any administration to be optimistic about the effect of economic policy on future inflation. These pressures will tend to cause estimates for out-years to be optimistic.

6.3 PERCEIVED DEFICIENCIES IN ACQUIRING A MIX OF SYSTEMS APPROPRIATE FOR LESS-THAN-FYDP LEVELS OF FUNDING

Annual issues, including turbulence, tend to be mixed with long-term issues in the PPBS processes leading to each year's selection of the mix of programs to support. We believe this to be inappropriate, as noted in our discussion in Section 6.1. The mix of programs should be tailored to the long-term level of estimated future budgets. We believe this concept to be poorly implemented because of year-to-year pressures and optimistic out-year funding projections, e.g., the FYDP. We discuss below prioritization and affordability tests, the two key means for developing the optimum mix.

6.3.1 Perceived Deficiencies in Prioritization

Our analysis found strong indications that the prioritization process is working well in its role of helping the Services and DOD decide on a mix of programs which is appropriate to a projected level of future funding. However, we have also identified weaknesses in this process, as discussed below.

The prioritization process by which each Service attempts to determine a mix of programs appropriate to their long-term funding is also the process by which they cope with the year-to-year variations in their budget levels. As a result, this process is both a contributor to and a means of coping with turbulence. To the degree to which priorities change from year to year (such as past swings from modernization emphasis to readiness), prioritization can help create turbulence in individual accounts. There is still significant change in priority from year to year among various segments of a program. For example, Table 6-2 shows a major shift in procurement topline plans and emphases between the FY 82 and FY 84 budget submissions. The most dramatic example is seen in the percentage of the procurement budget allocated to missiles. In the 1982 budget and plan submitted to Congress,

TABLE 6-2
Changes in Priority 1984 Compared to 1982

Activity	Current (1984) Budget and Plan for: FY 1984		FY 1986		1982 Budget and Plan for: FY 1984		FY 1986	
	$B	%	$B	%	$B	%	$B	%
Aircraft	21.2	22.5	30.6	22.3	18.4	21.8	20.1	20.4
Missiles	10.4	11.0	15.2	11.1	13.6	16.1	19.7	20.0
Shipbuilding	12.7	13.5	18.4	13.4	13.7	16.2	14.9	15.1
Combat Vehicles	5.4	5.7	6.4	4.7	4.9	5.8	6.0	6.1
Electronics	6.7	7.1	10.6	7.7	4.3	5.1	4.8	4.9
Aircraft Mod's	17.0	18.1	24.4	17.8	12.6	14.9	14.4	14.6
Munitions	5.9	6.3	8.9	6.5	3.9	4.6	4.2	4.3
Other	14.9	15.8	22.6	16.5	13.1	15.5	14.4	14.6
Total*	94.1	100.0%	137.2	100.0%	84.6	100.0%	98.7	100.0%

*Figures may not add due to rounding.

the FY 84 and FY 86 allocations were to be 16.1 percent and 20 percent of the total procurement budget, respectively. The current (1984) budget and plan calls for 11 percent and 11.1 percent, respectively, at substantially smaller percentages (and smaller total funding as well). There are many factors in these figures, including changes for unrelated reasons in specific programs (e.g., MX missile). Nonetheless, such changes in relative priorities are a source of turbulence such as that discussed above.

In the testimony quoted earlier General Campbell stated that the biggest shortfall in the POM process is understanding incremental value added or military capability obtained for incremental dollars spent. Mission Area Analysis (MAA) is being used to overcome this shortfall, but much remains to be done.(3)(4) There is not only a potential for greater usage in all the Services but also the promise of integration of DOD-wide priorities and resources for further implementation.

Finally, it is our belief that much of today's prioritization process is focused on the funding levels of the given year's budget and the FYDP topline funding levels as stipulated. We have not seen the conceptual framework articulated in Section 6.1 - basing the force mix on a realistic long term budget projection - reflected in the PPBS process.

6.3.2 Perceived Deficiencies in Affordability Tests

A recent change to system acquisition is to test, before starting advanced development, whether the program is affordable at less-than-expected levels of funding. This strategy is considered very promising, although too new to judge. The Secretary of Defense has testified with apparent satisfaction, that this screening of new start proposals has resulted in fewer new starts in FY 84 compared to FY 83 (10 compared to 15).(1)

6.4 PERCEIVED DEFICIENCIES IN PROVIDING EXTRA PROTECTION FOR TOP-PRIORITY PROGRAMS

The principal concern with providing extra protection for top-priority programs (fencing) is that it results in increased turbulence for nonfenced programs. However, as we will examine in Chapter 8, this may be the most economical process for coping with turbulence. Even so, we do not believe that this strategy would be sufficient alone to cope with topline turbulence. We discuss below the two principal component strategies: Stable Program Lists and Multiyear Contracting.

6.4.1 Perceived Deficiencies in Stable Program Lists

Stable Program Lists may be counterproductive if they thwart more economic mechanisms for coping with turbulence (e.g., possibly stretching out/speeding up) or thwart choices for absorbing turbulence that better reflect the time-value of the deployment of the systems affected. On the other hand, they may lead to so much better cost-schedule performance by stabilized programs that this compensates for the costs of increased turbulence elsewhere. The jury is still out.

6.4.2 Perceived Deficiencies in Multiyear Contracting

Multiyear contracting can inhibit other strategies for coping with TLBT or TLPT if it becomes a de facto mechanism for fencing which prevents or inhibits absorbing some turbulence. Otherwise it has no major deficiencies.

6.5 PERCEIVED DEFICIENCIES IN STRETCHING-OUT/SPEEDING-UP PROGRAMS

Stretching-Out or Speeding-Up Programs in response to cuts or additions to topline funding is one of the most common reactions. There is a perception that this is significantly more costly than a tough fencing strategy would be. We will examine this issue in Chapter 8.

6.6 PERCEIVED DEFICIENCIES IN STOPPING/RESTARTING PROGRAMS "ON THE MARGIN"

Stopping programs "on the margin" in the face of budget cuts often appears to be good management. However, our conceptual framework in Section 6.1 suggests that this strategy is not appropriate for programs that belong in the mix appropriate to the long-term budget level unless the stopping and start-up costs are small and the military implications of the different delivery schedules are satisfactory. We discuss the economies further in Chapter 8.

6.7 PERCEIVED DEFICIENCIES IN COPING AT THE PROGRAM LEVEL

The fact that topline budget turbulence is seen as such a substantial problem and is cited as a source of inefficiency and cost growth, indicates that the strategies used at the program level to cope with topline planning or budget turbulence, are not perceived as being fully effective. We know of no guidance for project managers with regard to turbulence and believe that most utilize strategies which are, in a very real sense, ad hoc.

6.8 REFERENCES

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7.0 CANDIDATE STRATEGIES FOR COPING WITH SHORTCOMINGS

The purpose of this chapter is to synthesize candidate strategies, including those from Chapter 5.0, for coping with the shortcomings identified in Chapter 6.0. (Step 6 of the Evaluation Technique Flow Diagram, Figure 1-3.) For some strategies our research has led to candidate improvements (Table 7-1). In addition, we examine several other competitive (mutually exclusive) strategies for coping with TLPT and TLBT, namely:

- Complete fencing
- Even distribution of turbulence
- Hybrids.

These strategies will later be related to the following strategies in the current process for coping with turbulence:

- Extra protection
- Stretching-out/speeding-up
- Stopping/restarting.

Our evaluation of the candidate improvements and competitive strategies is presented in Chapter 8.0.

7.1 IMPROVEMENTS TO CURRENT PROCESS FOR COPING WITH TURBULENCE

The current process is the result of years of evolutionary growth into a PPBS system which, as taken in its entirety, is remarkably resilient and capable. Our particular focus on TLPT and TLBT has, however, given us new insights which have led to specific recommendations for changes to the current process. Table 7-1 delineates these candidate improvements to the current process (taken from Table 5-1):

7.1.1 Preplanned Product Improvement (P^3I)

One of the Acquisition Improvement Program (AIP) initiatives was the current P^3I process for major weapons systems,[2] but current DOD Major System Acquisition Procedures (DoDI 5000.2) do not yet specify it.[3] We propose that P^3I be included specifically in the FYDP and budget for at least all threat-sensitive systems and that it be integrated into the system

TABLE 7-1
Candidate Improvements to Current Process for Coping With TLPT and TLBT*

Current Process	Candidate Improvement
Reducing Cost Growth	
. Improved Cost Control	
- Preplanned Product Improvement (P^3I)	- Integrating P^3I more completely into PPBS and Major Program Acquisition Process
. Independent Inflation Projections	- Creating a second, "independent" estimate and using the highest
Acquiring Mix of Systems Appropriate for Less-Than-FYDP Levels of Funding	
. Prioritization	- Wider use of Mission Area Analysis
	- Prioritization Based on Long-Term Budget Trend
	- Quadrennial Reviews
	- Budget Category Turbulence Analyses
Minimizing Negative Impact at the Program Level	- Turbulence Budget
	- Turbulence Provisions in Multiyear Contracts
	- Turbulence Contractual Incentives

* Only elements of the current process are shown for which improvements are proposed.

acquisition process as indicated below. Figure 7-1 depicts a program structure for implementing this improvement for development programs. In this figure, we show an example of program structure from DoDI 5000.2, "Major Systems Acquisition Procedures,"(3) with an added "Block 1 P^3I Program" - a "Block 1" development phase coincident with the later stages of basic development. All but the most urgent of the improvements which changing threats, requirements, and technology make necessary can be incorporated in Block 1. The Block 1 improvements will then undergo full testing and, some time after production has commenced on the basic system, the Block 1 production decision can be made. Block 1 changes are then made in the production line for subsequent new production, and Block 1 modification kits are produced and installed in systems already fielded. A major advantage of such block upgrades is to relieve the pressure on ongoing programs to incorporate changes late in development, often with poorly understood cost, schedule, and performance impacts.

P^3I can also apply to production programs. The decision about where to break into a production line with a block improvement is principally an economic one: break in where the cost of disruption is less than the cost of undisrupted production and subsequent retrofit.

7.1.2 Independent Inflation Projections

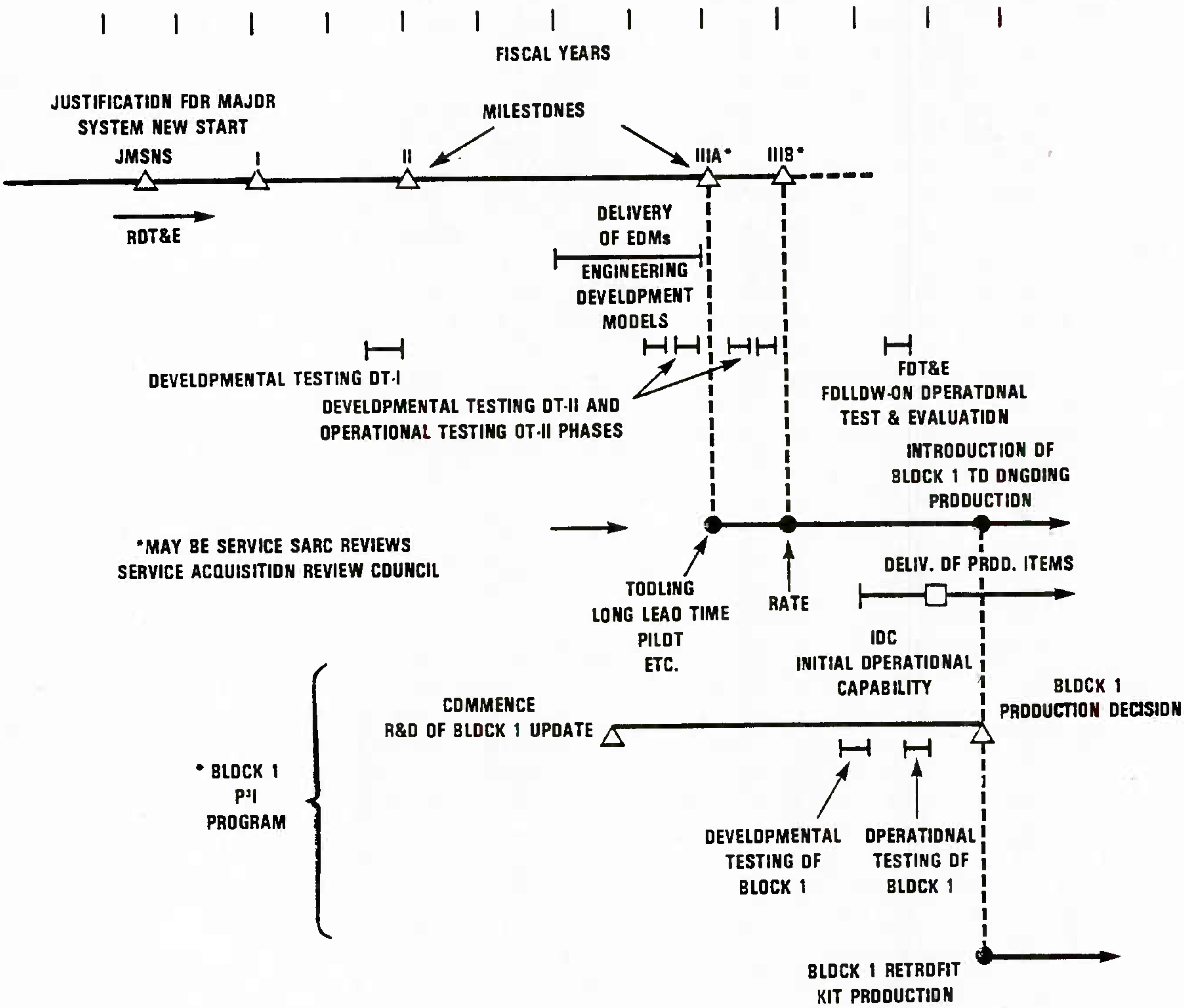
Our proposal for improving inflation projections is to create a second, independent source and then use the highest projection in the PPBS. This philosphy is already invoked for major programs where two cost estimates are developed (the program manager's and an independent estimate) and the highest is used. Because inflation projections have such a great impact on TLPT and TLBT, a similar concept appears justified. We believe that other methods for generating inflation estimates can be developed, perhaps program specific projections reflecting the specific materials and industry involved, or perhaps projections keyed to program categories (missiles, ships, etc).

7.1.3 Prioritization

We suggest four improvements to the prioritization process:

- Wider utilization of Mission Area Analysis
- Prioritization based on long-term budget trends
- Preparation of Quadrennial Reviews
- Provision for Budget Category Turbulence Analysis.

FIGURE 7-1
Example of Program Structure
With "Block 1 P^{3}I"



*Proposed addition to example program structure in DoDI 5000.2

7.1.3.1 Wider Use of Mission Area Analysis. Wider use of Mission Area Analysis (MAA) encompasses both wider use within each service and wider use between services and OSD for mission areas that include more than one service.(1) We believe MAA can improve the process for determining the "optimum" mix of systems. MAA is not capable of solving all priority problems, but it has the potential of better integrating the many factors important to prioritization decisions. MAA should be particularly used for the Quadrennial Reviews introduced below.

7.1.3.2 Prioritization Based on Long-Term Budget Trends. Based on the conceptual framework introduced in Section 6.1, we argue that PPBS prioritization decisions be aimed at producing the optimum mix of programs for DOD based on the expected long-term level of future budgets. This is, of course, a theoretical construct and is difficult to apply rigorously in practice, but we believe the construct will give valuable perspective in day-to-day PPBS deliberations. What is procured should be determined in the context of a realistic long-range funding projection. Actions to cope with turbulence should then address the question of how to buy with the least negative effects on the selected mix of systems.

7.1.3.3 Quadrennial Reviews. Another modification to the prioritization strategy for reducing turbulence induced in the planning process is motivated by two findings earlier in this study. This modification is to conduct a comprehensive, top-down review of the Defense program timed to mesh with the first PPBS cycle of an incoming Administration. The findings which suggested this modification were:

- Changes in Administration are second only to wars as a source of topline budget turbulence.
- Annual reprioritization of Defense programs as occurs in the current PPBS system contributes to both planning and budget turbulence.

The objectives of the Quadrennial FYDP update would be to:

- Provide the incoming administration with a current, well-staffed assessment of the DOD program
- Provide more stability to the annual PPBS process by creating a periodic (4-year), well-studied baseline.

The following actions would be required:

- Services start comprehensive top-down reviews during election year, examining optimum programs for, and consequences of, a number of long-term funding projections

- OSD prepares an assessment of a range of Defense strategies and funding levels, and their consequences, timed for the first PPBS cycle of the new Administration

- Secretary of Defense attempts to achieve internal Administration agreement on a true multiyear plan so that less reprioritizing would be needed in subsequent PPBS cycles.

The services would have a natural motivation to conduct such a review since it would provide a forum for them to argue for their priorities early in a new Administration. The new Secretary of Defense should want to have the best possible analysis available when setting his course.

7.1.3.4 Budget Category Turbulence Analysis. Our next suggested improvement is to require turbulence analyses of key budget categories with each PPBS cycle. This concept evolved from our observation that there is much more turbulence in procurement appropriations such as shipbuilding, weapons, and combat vehicles than in overall procurement (45% mean percentage turbulence compared to 17%). Further, as we noted in Section 5.6, substantial changes in relative priorities within the procurement appropriation have occurred over short periods. These may have been a desirable or an unavoidable consequence of other factors, but they should be the result of conscious decisions.

One way to focus attention on internally generated turbulence and possibly to motivate top-level action to reduce it would be to require "Turbulence Analyses" for selected appropriation categories as part of each POM. These analyses should include an explanation and assessment of the impact of significant changes in the relative priorities of the various appropriation categories (and other categories designated by SECDEF). They should also analyze individual development and acquisition programs that are being perturbed. All analyses should address both near-term (budget submission) and long-term (planning) turbulence.

7.1.4 Coping with TLPT/TLBT at the Program Level

Three additional mechanisms designed to motivate individual acquisition program managers and their contractors to plan for turbulence in such a way as to minimize its negative impacts include:

- Turbulence Budgets - explict indications to individual acquisition programs of the amount of turbulence to which they should be ready to respond in future years

- Turbulence Provisions - Multiyear Contracts - explicit provisions in multiyear contracts for both increased and decreased procurement rates in the outyears of the contracts

- Turbulence Contractual Incentives - explicit provision for contractual incentives (e.g., incentive fees) for measures which would reduce the negative impact on program costs of absorbing turbulence.

7.1.4.1 Turbulence Budgets. The essence of this proposed strategy would be to pass to some, or all, acquisition managers a "turbulence budget." Direction on developing plans for absorbing the given level of turbulence at minimal cost would come with this budget.

The internal prioritization processes of the services described in Chapters 2.0 and 5.0 could yield a wealth of information about the probable range of turbulence any given procurement program might see in the future. The analysis of budget turbulence characteristics in Chapter 3.0 provides additional information that should be used to make judgments about the size of each program's turbulence budget.

We will discuss in the next chapter the political inhibitions to turbulence budgets. If these can be accommodated, turbulence budgets could provide a basis for Government and industry managers to provide for more efficient deliveries under turbulent conditions (e.g., designing production lines and planning resources, such as people, to minimize the negative impacts of turbulence).

7.1.4.2 Multiyear Contract Provisions for Added and Reduced Production. This strategy, partially implemented today, would cause all multiyear contracts to include specific pricing of a number of different production rates as well as termination of the costs. Thus, program managers could respond to any of the strategies in Section 6.2.1.

The multiyear contracts would serve to make the costs explicit. Further, program managers could use contract provisions (e.g., incentive fees) to motivate their contractors to design their facilities and plan their programs for optimal cost/quantity behavior in the vicinity of planned production.

7.1.4.3 Turbulence Contract Incentives. Acquisition managers and contractors of programs near the margin know they are vulnerable to turbulence and attempt to cope with the effects in a variety of ways from lobbying to prevent turbulent changes to their programs to various actions to limit unit cost increases due to turbulence. However, we should look for incentives for acquisition managers and their contractors to plan programs, particularly those not under multiyear contracts, with minimization of the impact of turbulence in mind.

7.2 COMPETITIVE STRATEGIES FOR COPING WITH TLPT/TLBT

In this section we introduce additional competitive (mutually exclusive) strategies for coping with TLPT/TLBT, including:

- Complete Fencing - fencing all but the "lowest priority" programs such that all of the turbulence is absorbed by either stopping marginal programs in a "low" year or by restarting the marginal programs and allocating to them all of the additional funding in a "high" year

- Even Distribution of Turbulence - distributing reductions or additional funding evenly across all programs

- Hybrids - such as fencing the highest priority programs and evenly distributing the turbulence across the unfenced programs.

7.3 REFERENCES

1. Hearings on Defense Procurement Policies and Procedures: Cost Management and Control, Before the Special Panel on Defense Procurement Procedures, Committee on Armed Services, House of Representatives, 97th Congress, 1st Session, July-October 1981.

2. "Acquisition Improvement Task Force," Department of Defense, December 23, 1981.

3. DOD Instruction 5000.2, "Major System Acquisition Procedures," March 8, 1983.

8.0 EVALUATION OF CANDIDATES FOR REDUCTION IN SHORTCOMINGS

This chapter presents an evaluation of the suggested improvements to the current strategies for their efficacy in reducing the perceived shortcomings identified in Chapter 6.0. The three new competitive (mutually exclusive) strategies are also analyzed and compared with the three competitive strategies in the current process.

Our analysis began with an evaluation of candidates for political viability (Step 7 of the Study Flow Diagram, Figure 1-1). We then evaluated viable candidates for their potential in reducing the shortcomings (Step 8 of Figure 1-1). These candidates were evaluated in two groups:

- Candidate improvements to the current process
- Competitive strategies:
  - "Pure" strategies (fencing, even distribution of turbulence, and hybrids)
  - Current strategies (extra protection, stretching-out/speeding-up; stopping/restarting).

Because the candidate improvements do not interfere with each other or other strategies, they needed only to be politically viable and to offer adequate improvement to justify recommending them. The competitive strategies, on the other hand, needed to be analyzed quantitatively and ranked when possible.

8.1 EVALUATION FOR POLITICAL VIABILITY

We evaluated the relative political acceptability of the various strategies for dealing with budget turbulence. A strategy that is best from a technically and economically sound point of view will, nevertheless, be of little worth if there are strong political considerations, either inside or outside DOD, that preclude the strategy from being implemented. We used stakeholders' analysis to assist in evaluating the political viability of candidate strategies for dealing with budget turbulence.

The following is a short description of the stakeholder methodology. This methodology provides a means to determine the stakes of the political factions that can influence the decision and policymaking function. The methodology concentrates on enabling the policymaker/program manager to account more systematically and efficiently for all of the participants whose concerns bear upon the development of a weapon system or the implementation of defense policy. The output of an analysis using the stakeholder's methodology is in the form of a matrix of stakeholders versus strategies.

Table 8-1 is a matrix showing the major players who either impact on or are impacted by budget turbulence and their probable positions with regard to the various strategies. The political viability of the strategies, as described in the matrix, are summarized below.

The politically viable strategies are:

- Integration of P^3I into PPBS and major acquisition process
- Second independent inflation projection
- Wider use of MAA
- Prioritization based on long-term budget trend
- Quadrennial Reviews
- Turbulence analyses
- Turbulence provisions in multiyear contracting
- Turbulence contract incentives
- Extra protection to top priority programs
- Stretching-out/speeding-up programs
- Coping with turbulence at the acquisition program level.

Although these strategies are not supported by all the players shown in the evaluation matrix, they are considered to be viable because the mixed support given these strategies is not sufficiently negative to make them nonviable.

TABLE 8-1
STAKEHOLDERS MATRIX

	INTEGRATE P^3I INTO PPBS AND MAJOR ACQUISITION PROCESS	SECOND INDEPENDENT INFLATION PROJECTION	WIDER USE OF MISSION AREA ANALYSIS	PRIORITIZATION BASED ON LONG-TERM BUDGET TREND	QUADRENNIAL REVIEWS	TURBULENCE BUDGETS	TURBULENCE ANALYSES	TURBULENCE PROVISIONS IN MULTI-YEAR CONTRACTING
CONGRESS	Mixed: Wants new capabilities; in past, need for further improvement has been justification to delay	Mixed: Expect Congress would go on record for this, but may only support the "party" number. Support for DOD market basket	Support: Provides visibility on priorities and allows considerations of priorities	Support: Provides more realistic planning	Support: Want best possible analysis	Mixed: May not agree to fund turbulence coping measures	Support: Such analysis would be useful	Support: This would restore some flexibility for Congress
EXECUTIVE OFFICE	Support: Is included in the DOD acquisition improvement program	Mixed: Will probably support a "political" inflation estimator. Probably support a DOD market basket	Support: Provides better visibility on priorities and allows considerations of priorities	Support: More realistic planning	Support: Provides best possible information for first decision cycle	Support: Due to potential for reduced costs	Support: Such analysis would be useful	Support: Provides future flexibility and makes costs of change explicit
OSD	Support: Is included in the DOD acquisition improvement program	Mixed: Must support "political" estimators but wants best possible estimate	Support: Improves basis for decisions	Support: More realistic planning	Support: Provides best possible information for first decision cycle	Mixed: Concern regarding Congressional action; support if reduces costs	Support: Such analysis would be useful; want to reduce turbulence	Support: Provides future flexibility and makes costs of change explicit
SERVICES	Mixed: Support for benefits but concern about greater cost for each program for P^3I	Mixed: May reduce future loss of buying power, but concern that new system overstates inflation	Mixed: Hard to do. Tendency for analysts to ignore necessary judgments. Support for improvements to planning	Support: More realistic planning	Support: Gives services a good chance to be heard in first decision cycle	Mixed: Concern regarding Congressional reaction; possible support if cost benefit possible	Mixed: Might lead to challenge of Service priorities; support reduction of turbulence	Mixed: Provides future flexibility but concern that Congress or DOD might cut program
PROGRAM MANAGERS	Support: It would mean less turbulence and would improve program efficiency and stability	Support: Would mean a more stable program	Mixed: Might pose threat to program; support if provides stability or enhances program	Mixed: Might pose threat to program; support if provides stability or enhances program	Support: Gives services a good chance to be heard in first decision cycle	Mixed: Authority to take action good, but political impact may be bad	Mixed: Depends on whether program is helped or hurt	Mixed: Provides future flexibility but concern that Congress or DOD might cut program
CONTRACTORS	Support: Enhances program and program stability	Support: Would mean a more stable program	Mixed: Might pose threat to program; support if provides stability or enhances program	Mixed: Might pose threat to program; support if provides stability or enhances program	Support: Gives services a good chance to be heard in first decision cycle	Mixed: Authority to take action good, but political impact may be bad	Mixed: Depends on whether program is helped or hurt	Mixed: Provides future flexibility but concern that Congress or DOD might cut program
OVERALL	Viable	Viable	Viable	Viable	Viable	Further study required	Viable	Viable

	TURBULENCE CONTRACT INCENTIVES	PROVIDING EXTRA PROTECTION TO TOP-PRIORITY PROGRAMS	STRETCHING-OUT/SPEEDING-UP PROGRAMS	STOPPING/RESTARTING PROGRAMS AT THE MARGIN	COMPLETE FENCING	EVEN DISTRIBUTION OF TURBULENCE	HYBRID (PART FENCING, PART EVEN DISTRIBUTION)	COPING AT THE ACQUISITION PROGRAM LEVEL
CONGRESS	Mixed: May not consider worth the cost	Mixed: Congress will not recognize priorities except their own; but they want efficiency	Support: Keeps industrial base in their district alive. Perception of efficiency vice start/stop	Against: Bad for industry in district; perception of bad management	Against: Congress will not accept loss of its flexibility	Against: Too rigid if strictly applied. Perception of violating priority system	Against: Too rigid if strictly applied. Perception of violating priority system	Mixed: Helps industry; increases efficiency of acquisition; but might not want to pay for necessary measures
EXECUTIVE OFFICE	Support: If can be shown to reduce costs	Support: Is included in the DOD Acquisition Improvement Program	Mixed: Keeps industrial base supported and draws less political fire. May create perception of weak management	Against: Perception of bad management	Against: Perception of bad management	Against: Counter to Acquisition Improvement Program stable program initiative	Mixed: If increases efficiency of acquisition, will be for. May be perception of violating priority system	Support: Helps industry and increases efficiency of acquisition
OSD	Support: If can be shown to reduce costs	Support: Is included in the DOD Acquisition Improvement Program	Mixed: Keeps "warm" industrial base at a relative low cost, but may create perception of weak management	Against: Disruption of industrial base; perception of bad management	Against: Disruption of industrial base; perception of bad management	Against: Counter to Acquisition Improvement Program stable program initiative	Mixed: If increases efficiency of acquisition, will be for. May be perception of violating priority system	Support: Increased efficiency of acquisition with little cost in additional DOD work
SERVICES	Support: If can be shown to reduce costs	Mixed: Air Force and Army submitted stable program lists. Navy prefers multi-year contracting	Mixed: Keeps "warm" industrial base at a relative low cost, but may create perception of weak management	Against: Disruption of industrial base plus loss of efficiency	Against: Disruption of industrial base plus loss of efficiency	Against: Violates priority concept and tools for establishing marginal utility are weak	Against: Even distribution decreases their flexibility and judgements about worth of acquisition programs	Support: Retains flexibility while increasing acquisition efficiencies
PROGRAM MANAGERS	Support: If can be shown to reduce costs	Mixed: Support if their program is on list—nonsupport if program not on list and is affected	Mixed: Program turbulence and cost increases; but not as much as stop/restart strategy	Against: Difficult to manage; low productivity	Against: Difficult to manage; low productivity	Mixed: PM's with low-priority programs will be for, those with high-priority programs will be against	Mixed: Depending on relative priority of their program	Support: Allows PM's to better plan and manage their programs
CONTRACTORS	Support: If can be shown to reduce costs	Mixed: Support if their program is on list—nonsupport if program not on list and is affected	Support: Easier to manage than stop/restart; provides better business base	Against: Disruption of production lines, work force and money flow	Against: Disruption of production lines, work force and money flow	Mixed: PM's with low-priority programs will be for, those with high-priority programs will be against	Mixed: Depending on relative priority of their program	Support: Allows contractors to better plan their business and make outlay decisions
OVERALL	Viable	Viable	Viable	Not viable	Not viable	Not viable	Not viable	Viable

The politically nonviable strategies are:

- Stopping/restarting programs at the margin
- Complete fencing
- Even distribution of turbulence
- Hybrid (part fencing, part even distribution).

The major reason these strategies are nonviable is their lack of flexibility.

The turbulence budget strategy is very attractive but requires further study before its political viability can be determined.

8.2 EVALUATION OF VIABLE CANDIDATES FOR REDUCTION IN SHORTCOMINGS

In this section we evaluate the candidate improvements to the current process which were identified in Chapter 7.0.

These improvements affect the following strategies:

- Reducing cost growth
- Acquiring the mix of systems which is appropriate for a less-than-FYDP level of long-term funding
- Coping with turbulence at the program level.

The shortcomings are indicated in Table 8-2, along with the nine candidate improvements designed to address the shortcomings. Table 8-2 also summarizes our assessments of the improvements from the remainder of this section. As noted above, our criterion for each improvement is "will it contribute enough to the reduction of or coping with topline planning and budget turbulence to justify implementing it?"

8.2.1 Reducing Cost Growth

Even though the DOD effort to reduce cost growth is not perfect, further improvements are now difficult to obtain. Our two candidate improvements to the current process are:

- Integration of P^3I into the PPBS and the Major Program Acquisition Process
- Independent inflation estimates.

TABLE 8-2
Evaluation of Candidates for Reducing the Shortcomings of Current Process

CURRENT STRATEGY	SHORT-COMING	CANDIDATE IMPROVEMENT	POLITICALLY VIABLE	EVALUATION
Reducing Cost Growth • Improved Cost Control — Preplanned Product Improvement (P^{3}I)	P^{3}I only partially implemented	Integration of P^{3}I into PPBS and Major Program Acquisition Process	Yes	Can lead to full implementation of P^{3}I
• Realistic Inflation Estimates	Pressures still exist to keep estimates low	Independent inflation projections	Yes	Can partially offset the pressures toward optimism in estimates
Acquiring Mix of Systems appropriate for less-than-FYDP levels of funding • Prioritization	Can be source of turbulence	Wider use of Mission area analyses	Yes	Can strengthen the process; will not be a full "cure"
	Too heavily influenced by near-term issues	Prioritization based on long-term budget trend	Yes	Can reduce turbulence and influence of near-term issues
	Tools weak	Quadrennial Reviews	Yes	Can reduce turbulence and influence of near-term issues
		Budget Category Turbulence Analyses in PPBS	Yes	Can lead to reduced turbulence
Coping at the Program Level	Strategies "ad hoc"	Turbulence Budgets to PMs	Yes	Can guide and motivate planning for turbulence
	No guidance on turbulence for planning	Turbulence provisions in multi-year contracts	Yes	Can make cost of turbulence explicit and motivate steps to reduce that cost
		Turbulence Contract Incentives	Yes	Can motivate action to minimize negative cost impacts

8.2.1.1 Integration of P^3I Into the PPBS and Major Program Acquisition Process. Preplanned Product Improvement (P^3I) was introduced in Section 5.1.2.6. Our candidate improvement provides fuller integration into both the PPBS (where explicit funding for P^3I should be provided for all major acquisitions) and the Major Program Acquisition Process (where we recommended a change to the DOD Instruction 5000.2 to make explicit provision for P^3I for the RDT&E process). We believe that these changes could lead to full implementation of P^3I within DOD in a relatively short time. We know of no major negative effects of such implementation; thus, it could be effected directly.

8.2.1.2 Independent Inflation Projections. The proposed improvement is to develop a second, independent source of inflation projections applicable to major system procurements, with the highest of the two estimates used in the PPBS. This process is not expected to remove all optimism from inflation projections, but it would reduce some of the optimism. There appear to be no disadvantages, so the net effect should be beneficial. More study is needed to identify a good basis for other inflation projections. Section 7.1.2 suggests some promising concepts.

8.2.2 Acquiring a Mix of Systems Appropriate for Less-Than-FYDP Levels of Funding

We identified, in Chapter 6.0, four candidate improvements for this part of the current process for coping with topline planning and budget turbulence:

- Wider use of Mission Area Analysis
- Prioritization based on long-term budget trends
- Quadrennial Reviews
- Budget category turbulence analysis.

8.2.2.1 Wider Use of Mission Area Analysis. As indicated in Section 7.1.3.1, wider use of Mission Area Analysis (MAA) encompasses both greater use by the Services and greater use between the Services and OSD. We do not expect the process to ever be perfect because the problems to be attacked with Mission Area Analysis are generally far too complex for any methodology to be fully satisfying. However, MAA will enable the decisions about program priorities to be made on a much sounder analytic basis, and we are convinced that such wider use of MAA will definitely strengthen the prioritization process. We see no major disadvantages to this improvement; thus, it could be implemented directly.

8.2.2.2 Prioritization Based on Long-Term Budget Trend. As noted in Section 5.2.2, DODI 5000.2 requires affordability tests for new systems to be based on less than expected FYDP funding levels, but this discipline is not yet generally required of the prioritization process in the PPBS. In our estimation it would be healthy to make such a requirement explicit so that the prioritization leading to the decision on what mix of systems to acquire would be based on projection of the long-term trend of future budgets. Doing so can reduce turbulence by making the program mix decisions more realistic and can also serve to counter the current heavy influence of near-term issues on PPBS prioritization decisions. We see no major disadvantages to this concept; thus, it could be implemented directly.

8.2.2.3 Quadrennial Reviews. Quadrennial Reviews of the entire defense program timed to mesh with the first PPBS cycle of each incoming Administration are proposed in order to provide a deeper review of the prioritization decisions once every 4 years than can be accomplished in the annual PPBS cycle.

Quadrennial Reviews would not eliminate annual reprioritization, although we expect that there would be less turbulence in the latter process because of deeper commitment to the decisions based on the last Quadrennial Review. These reviews could also lead to reduced influence of near-term issues on the program prioritization process. The defense arena is too dynamic for complete elimination of annual reprioritization. Indeed, such reprioritization is essential to the flexibility necessary for a healthy defense program. Nonetheless, the process should reduce turbulence. We know of no fundamental negative effects of such reviews; thus, they could be implemented directly.

8.2.2.4 Budget Category Turbulence Analyses. Service turbulence analyses in each POM cycle may show that some of the proposed turbulence is desirable and reflects necessary changes in priorities; they may also indicate areas of turbulence which could be dampened. This sort of explicit visibility can insure that any turbulence introduced during the PPBS cycle is intentional, not inadvertent. Only by attempting it can we ascertain if this visibility would lead to substantially reduced turbulence, either TLPT or TLBT. We know of no disadvantages to such analyses, so implementation appears justified.

8.2.3 Coping at the Program Level

At the program management level we found three improvements to the current process for coping with turbulence:

- Turbulence budgets for project managers
- Turbulence provisions in multi-year contracts
- Turbulence contract incentives.

8.2.3.1 Turbulence Budgets. If project managers were guided in planning for turbulence, and given an indication of the magnitude of the turbulence for which they should plan, then they could expend resources to develop mechanisms for reducing the cost of such turbulence. Such resources could vary from production line changes designed to make the production lines efficient over a wider range of production rates to studies of alternative logistics support profiles which might be applicable in the face of such varying production rates. Because of the potential for negative political impacts (for example, if these were used by Congress as a justification for cancelling programs) and because the positive benefits cannot be clearly identified now, we believe this is an area that should receive further study before implementation.

8.2.3.2 Turbulence Provision in Multi-Year Contracts. With a turbulence budget in hand, a project manager could insure that the range of production rates explicitly priced would be adequate. This would yield invaluable information on the cost impact of absorbing turbulence in the program. Furthermore, such contracts could incentivize action by the contractor which would minimize the negative impact of turbulence. Although we cannot be sure how much benefit could be achieved by this process, there does not appear to be a "down side." Thus, direct implementation should be possible.

8.2.3.3 Turbulence Contract Incentives. For those programs not covered by multi-year contracts, it should still be possible to motivate the development of mechanisms to reduce the negative impacts of budget turbulence through explicit incentives in the annual program contracts. In this case, however, additional study will be needed to identify the sort of measures that could be specified in the contract or included in its incentive structure. We believe that such measures can be developed, and that many will involve relatively little cost.

8.3 COMPETITIVE STRATEGIES FOR COPING WITH TOPLINE BUDGET TURBULENCE

In Chapter 5 we identified the current process for coping with turbulence by using a mix of the following competitive (mutually exclusive) strategies:

- Extra protection for top-priority programs (a form of fencing)

  - Stable programs list
  - Multi-year contracts

- Stretching-out/speeding up programs

- Stopping/starting lowest-priority programs.

The conceptual framework discussed in Section 6.1 presented an "ideal" process to establish the most effective DOD mix of systems that could be acquired and supported at the expected long-term level of future budgets. If this can be done effectively, then all strategies for coping with turbulence around the long-term level of future budgets should attempt to buy that most effective mix of systems. That is, the issue of cancelling programs is not appropriate, although starting and stopping programs might be a viable strategy given that the same mix of systems is eventually acquired. In order to gain further perspective on the issues involved, we analyzed three "pure"* competitive strategies:

- Complete fencing from the top down to the limit of each year's budget (stopping/starting of lowest priority programs)

- Even distribution of turbulence

- Hybrid -- fencing some programs and even distribution of turbulence to the remainder.

From this analysis we derived insights into the utility of the various elements of the current process as well as the utilities of the "pure" strategies. Our analysis consisted of four elements:

- Political viability (done in Section 8.2)
- Economic comparison

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* By "pure" we mean characterized by simplistic, no-exception decisionmaking rules.

- Mission effectiveness
- Industrial mobilization impact.

8.3.1 Economic Comparison of the "Pure" Strategies

Our objective for the economic analysis of the competitive strategies was to select a simplified case that was easy to calculate, yet reflected the principal phenomena, and would bracket most real situations. This simplified case involved three classes of systems with different cost-quantity relationships (weapons, aircraft, and ships), and also involved two types of cost-quantity relationships (exponential and those in the vicinity of the economical production rate). The two types of cost quantity relationships are shown in Figure D-1 of Appendix D. We considered two scenarios over a multiyear period (the length is not significant):

- Level budget - B$ throughout the period
- Turbulent - 20% below B$ for half the period and 20% above B$ for half.

We decided to examine ± 20% turbulence in order to determine effects of the same order of magnitude as the observed topline budget turbulence in procurement.

Our analysis consisted of the following steps:

- Derivation of cost-quantity relationships
- Derivation of relationships between changes in budget and quantity changes
- Quantitative comparison of the strategies for the two cost-quantity relationships.

The computations for these cases are detailed in Appendix D, and the results are summarized in Table 8-3. An "average" expotential cost-quantity case and a hypothetical economical production rate curve were used for this comparison of the three "pure" strategies. For the complete fencing strategy, it was necesesary to consider the costs of stopping and restarting the production lines of the unfenced programs as offset by additional efficiencies deriving from funding stability of the fenced programs. We parameterized this set cost from nothing (Case A) to 30 percent (Case C). The table shows the relative number of units purchased with the same total budget for the three strategies and the two types of cost-quantity relationships for the turbulent conditions compared to the level budget condition.

Table 8-3
The Effect of Alternate Strategies on Total Amount Bought

Strategy	Relative Quantity Bought* — Topline Budget Scenario: Level Budget	Turbulence (20% Cut + 20% Surge): Exponential Cost-Quantity Relationship	Turbulence (20% Cut + 20% Surge): Near Economical Production Rate
Complete Fencing			
A - No Cost to Stop & Start	1.00	1.11	.98
B - Cost to Stop & Start = 15%	1.00	1.05	.96
C - Cost to Stop & Start = 30%	1.00	.97	.93
Even Distribution	1.00	1.03	.99
Hybrid: Fence 50%; 50% Even Distribution	1.00	1.05	.98

*All quantities relative to amount bought with level budget.

NOTE: If the same total quantity of systems were to be purchased under each strategy, then the cost of that same quantity of each would be the following:

	Exponential Cost Quantity	Economical Production Rate
Complete Fencing		
A	.90	1.02
B	.95	1.04
C	1.03	1.07
Even Distribution	.97	1.01
Hybrid	.95	1.02

Our conclusions from this data are:

- It is important to know where each program is on its cost-quantity curve before choosing strategies for coping with turbulence:

  - <u>Exponential portion</u>: Complete fencing may be most efficient if costs of stopping and starting programs are low; otherwise, hybrid (partial fencing) is most efficient and even distribution is next

  - <u>Near economical production rates</u>: Even distribution is most efficient and fencing least efficient.

- In any case, for realistic assumptions about the costs of stopping and starting programs (15-30%), the differences in efficiency are so small (generally 1-2%) that other factors should probably predominate.

Finally, we noted the similarities between the economics of the "pure" strategies and the current competitive strategies:

- Extra protection for top-priority programs

- Stretching-out/speeding-up programs

- Stopping/starting "marginal" programs.

By analogy, the stretching-out/speeding-up strategy is a variant of the "even distribution" strategy, and thus the most economic if production lines are near the economical rate. Extra protection is a facet of the Hybrid strategy -- more economic than Stretching-Out/Speeding-Up if the production rates are such that an exponential approximation is appropriate for the cost quantity relationships. If the program stability from extra-protection results in the significant savings expected by advocates, this strategy will be even more attractive. Stopping/Starting "marginal" programs are an aspect of Complete Fencing, and could be less costly than Stretching-Out/Speeding-Up if the additional costs of stopping and restarting production lines are small (roughly 15% or less of the surge period funding).

8.3.2 Evaluation of Mission Effectiveness Over Time

The several strategies have different effects on mission capability over time. For example, complete fencing will provide the same level of capability for the fenced programs as the level budget, but the operational introduction of the other programs will surge. With even distribution of turbulence, the cut period will see a reduction of a small amount of every program, followed by a small surge of every program. We do not believe it is possible to create a mechanism for explicitly weighing each program by its time-value contribution to mission capability but, with some logical deductions, we were able to calculate several cases which we believe bound the results a rigorous calculation would yield.

We took three key steps in order to bracket the "real world" and to be sure effects were not understated:

- Chose two extreme marginal utility relationships to study:
  - Systems bought have identical marginal utility curves (i.e., the n^{th} system of each type contributes equally to mission effectiveness)
  - Systems bought have large differences in marginal utility.
- Assumed $\pm$50% TLBT (i.e., budget 50% below the long-term average for half the period and 50% above it for the other half).
- Assumed mission effectiveness decreased 10% per year after the second year.

In addition, we made other assumptions in order to simplify the calculations and cause them to reflect only the differences in mission effectiveness directly caused by the different strategies:

- Two-year production period and ten-year system life
- Flat cost-quantity relationships (economic benefits were analyzed separately in the previous section)
- Systems have equal costs.

In Appendix D we show our bracketing computation using arbitrary units of effectiveness over time. (The units are not important.) For the three strategies we obtained the following total effectiveness over time and relative effectiveness (hybrid strategy = 1.00):

- Same Unit Effectiveness -

Complete Fencing	123.9 / 0.997
Even Distribution	124.6 / 1.003
Hybrid	124.2 / 1.00

- Large Difference in Unit Effectiveness -

Complete Fencing	191.6 / 1.002
Even Distribution	191.2 / .998
Hybrid	191.4 / 1.00

We noted that fencing yields slightly poorer results if the marginal effectiveness of the two systems are equal; it yields slightly better results if they differ greatly in marginal effectiveness. However, in either case the effectiveness of the systems produced in any strategy differ from each other by less than 1/2%. Two phenomena dominated this result of nearly equal effectiveness over time:

- There were equal numbers of weapons in both strategies for most of the total life cycle (9 of 11 years), dominating the effectiveness over time.

- During the first year, the even distribution strategy provided most effectiveness ($W_X(1)$ + $W_Y(1)$ compared to $W_X(1)$ + $W_X(2)$), but this is partially cancelled in year 12 by the greater effectiveness of the complete fencing strategy.

Thus, the choice of strategies will have negligible effect on the time value of their contribution to mission effectiveness.

8.3.3 Evaluation of Impact of Strategies on Industrial Mobilization Base

The only marked difference in the impact on readiness for industrial mobilization is between strategies that do not involve stopping and restarting production lines and those that do. During the period that a line is stopped, its readiness for mobilization is substantially lower than when it is running. Only complete fencing causes lines to be stopped. Thus, our relative ranking of the "pure" strategies is:

Strategy	Relative Rank
Even distribution of turbulence	1
Hybrid (part fencing; part even distribution)	1
Complete fencing	2

Similarly, the ranking of the current strategies is:

Stretching-out/Speeding-up	1
Extra protection for top-priority programs	1
Stopping/Starting "marginal" programs	2

8.3.4 Summary Evaluation of Competitive Strategies

Table 8-4 summarizes the analyses developed in the previous sections. As we can see, two strategies are not considered politically viable:

- Complete fencing
- Stopping/restarting marginal programs.

Stopping or starting marginal programs as a strategy to adjust the mix of systems being procured to the optimum mix consistent with the long-term topline budget is not at question here. The issue is using stopping and restarting "marginal" programs as a means of coping with topline turbulence. Although we believe it to be politically non-viable, our calculations indicate under some circumstances (where the extra costs are small) it might offer economic benefits that outweigh its negative impact on readiness for industrial mobilization.

Of the other strategies (even distribution, hybrids, extra protection, and stretching-out/speeding-up), we found little quantitative or subjective bases for choice independent of having detailed, program-specific information. For example, we showed that with exponential program cost-quantity relationships, extra-protection for some programs may be a cost-beneficial strategy. In other cases, it may not be (e.g., for systems being procured at close to their economical production rates). Large variations can be expected between the cost-quantity relationships of different programs. One major unknown is the cost savings which might ensue from the increased program

TABLE 8-4 - **Evaluation of Competitive Strategies For Coping With TLPT/TLBT - Relative Ranking**

Strategy	Politically Viable	Relative Cost of 20% Turbulence[1] (Level Budget - 1.00): Exponential Cost-Quantity	Relative Cost of 20% Turbulence[1] (Level Budget - 1.00): Near Economical Production Rate	Relative Mission Effectiveness Over Time (Hybrid = 1.00)	Impact on Industrial Mobilization Base (rank)
	****************** PURE STRATEGIES ******************				
Complete Fencing	No	.90-1.03[2]	1.02-1.07	1.00	2
Even Distribution of Turbulence	Maybe[3]	.97	1.01	1.00	1
Hybrid: 50% fenced; 50% even distribution	Maybe[3]	.95[4]	1.02[4]	1.00	1
	****************** CURRENT STRATEGIES ******************				
Extra Protection for top Priority Programs	Yes	~ Complete fencing or hybrid		≈ 1	1
Stretching-out/Speeding-up Programs	Yes	~ Even distribution		≈ 1	1
Stopping/Starting Lowest Priority Programs	No	No direct analogy-part of complete fencing		≈ 1	2

(1) Relative cost of same quantity bought in each case. See Note to Table 8-3.
(2) Net cost of stopping and starting marginal programs compared to added savings from stable programs varied between 0 and 30% of marginal program cost.
(3) Too rigid for Congress as a "pure" strategy; possibly viable with exceptions.
(4) Does not include savings from the additional stability in the fenced programs. Such savings would reduce these numbers and make this strategy more attractive.

stability from extra-protection of top-priority programs or the hybrid strategy (part fencing, part even-distribution). This could well tip the scale for these strategies.

In conclusion, we argue that choices between extra-protection of some programs (partial fencing) and distribution of turbulence among most or all programs must be made on a case-by-case basis. Analyses similar to those presented in this chapter, using program-specific cost and effectiveness data, may yield additional insights, but the differences may continue to be so small that judgments about program-specific unquantified factors may be the prevailing bases for decision.

9.0 FINDINGS AND CONCLUSIONS

This chapter presents the findings and conclusions of the study. The discussion is divided among the following elements:

- Significance and impact of turbulence
- Causes of this turbulence
- Current DOD processes for coping with turbulence
- Conceptual framework for analysis of coping with turbulence
- Perceived shortcomings in the current process
- Candidate strategies for coping with turbulence
- Competitive strategies for coping with turbulence.

9.1 SIGNIFICANCE AND IMPACT OF TURBULENCE ON THE EFFICIENCY AND MANAGEMENT OF DOD MATERIEL ACQUISITION

Topline budget turbulence is a significant factor in materiel acquisition. Analysis of budget data from FY 64 to FY 81 reveals that the procurement account is approximately twice as turbulent as the DOD TOA and the next most turbulent account, O&M. The analysis shows the standard deviation of the annual percent change for procurement as approximately 16 percent compared to approximately 8 percent for the total DOD TOA and the O&M account. The standard deviation for the absolute change in the procurement account is approximately $7.5 billion compared to $4.4 billion for O&M. These numbers verify the postulate that procurement is the "discretionary account" and therefore takes the brunt of budget turbulence. The analysis quantifies the degree of turbulence and the relative turbulence in procurement as compared to other accounts.

The analysis also shows the turbulence in specific procurement accounts to be further exacerbated. Although the aircraft and missile accounts generally experience the same turbulence as total procurement, the standard deviation for shipbuilding and conversion and for weapons and combat vehicles is 45.5 percent and 43.5 percent, respectively. These two accounts are approximately three times as turbulent as the total procurement, aircraft, and missiles accounts.

The impact of turbulence on acquisition is summarized in the Secretary of Defense's Annual Report to Congress for FY 84 as follows: "Program instability has undermined both our modernization efforts and the long-range planning conducted by industry."

9.2 MAJOR CAUSES OF TOPLINE BUDGET TURBULENCE

There are two major causes of topline budget turbulence: those related to the normal policy and prioritization process inherent in our form of government and those associated with requirements determination, resource allocation processes, and program execution. Budget turbulence in the first category can be called fact-of-life turbulence as much of it is unavoidable and must be dealt with as efficiently as possible in the planning and execution of acquisition programs. The second category of turbulence is associated with the planning process -- the PPBS.

The major causes of topline budget turbulence in the fact-of-life category were no surprise. Wars cause the greatest turbulence, followed by changes of administration, and then by Congressional actions. On the other hand, the analysis demonstrates that turbulence in the GNP or the total Federal budget is not directly transmitted to the Defense budget or to procurement. It also reveals the unexpected result that, at the macro level, increases in the threat have not led to immediate changes in the budget or in topline budget turbulence.

This study was not able to examine FYDP data to examine planning turbulence directly, but the current literature identifies optimism in the planning process as a major factor. This optimism has two key components: unexpected cost growth and higher-than-realistic out-year funding projections.

9.3 CURRENT DOD PROCESS FOR COPING WITH TURBULENCE

The literature is not clear on the current DOD process for coping with turbulence. However, our analysis indicates that the following strategies are being used to cope with both topline planning turbulence (TLPT) and topline budget turbulence (TLBT):

- Reducing cost growth by improved cost estimates, improved cost control, and more realistic inflation projections

- Acquiring a mix of systems appropriate for less-than-FYDP level of funding via prioritization (principally at the Service level with DOD-wide direction and constraints) and affordability tests for new programs

- Providing extra protection for top-priority programs via stable program lists and multiyear contracting

- Stretching-out/speeding-up programs

- Stopping and restarting programs on the margin

- Taking actions at the program level to minimize negative impacts of turbulence.

9.4 CONCEPTUAL FRAMEWORK FOR THE ANALYSIS OF COPING WITH TURBULENCE

We found it desirable to develop a new conceptual framework for the analysis of strategies for coping with turbulence based on our analysis of historical budget data. The essence of this concept is that the role of the prioritization process in the PPBS should be to establish the mix of systems which is "affordable" -- and optimum -- for a given long-term level of funding, specifically the long-term mean level of future budgets as they will be passed by Congress. This level is generally less than the mean level of the FYDP, but not always. In concept, then, year-to-year variances from this long-term trend - turbulence - should be coped with by mechanisms other than reprioritization. A similar conclusion applies to planning turbulence, the year-to-year fluctuation in FYDP out-year funding levels.

9.5 PERCEIVED SHORTCOMINGS IN THE CURRENT PROCESS FOR COPING WITH TURBULENCE

The study identified perceived shortcomings in the current process for coping with turbulence as:

- Reducing cost growth. Improvement will be achieved but the strategy will not be fully effective; preplanned product improvement (P^3I) is a viable strategy but it is only partially implemented.

- Acquiring a mix of systems appropriate for less-than-FYDP levels of funding. This is an essential step, but the annual cycle will still lead to too much reprioritization; the concept is poorly understood, and the level of funding chosen is often higher than the future budget level.

- Providing extra protection for top-priority programs. This will increase turbulence impacts in nonprotected programs and may not be the most economic strategy.

- Stretching-out/speeding-up programs. The accompanying program instability may be costly.

- Stopping/restarting programs on the margin. This may not be economically justified if the start/stop costs are high.

- Coping at the program level. Project managers have neither the guidance on the amount of turbulence for which to plan nor a well-researched and tested family of strategies and techniques to use.

9.6 CANDIDATE IMPROVEMENTS TO CURRENT STRATEGIES FOR COPING WITH TURBULENCE

Our evaluation of candidate improvements to the present strategy led to nine recommendations that we believe are viable, that offer substantial improvements, and that are mutually supporting and need not be prioritized relative to each other. These improvements are summarized below with additional study indicated where needed:

- Integrate Preplanned Product Improvement (P^3I) into the PPBS and Major System Acquisition Process. This can lead to full implementation of P^3I with its cost control benefits.

- Create a second, independent, inflation projection and use the higher one in the PPBS. This can further reduce the optimism in future inflation projections which historically have been a source of planning and budget turbulence. This improvement was suggested by analogy with current DOD policy on cost estimates, but more study would be required to develop an implementable second basis for inflation projections.

- Make wider use of Mission Area Analyses. This can strengthen and focus the prioritization process better but will not be a full "cure."

- Perform PPBS prioritization based on long-term budget trend. This would complement the present affordability tests and should reduce turbulence and reduce the too-large influence of near-term issues in the prioritization process.

- Conduct Quadrennial Reviews, in-depth, top-down reviews of the defense program timed for the first PPBS cycle of each new administration. These can also reduce turbulence and the influence of near-term issues.

- Include turbulence analyses by the services and OSD staff in the PPBS cycle. This can lead to increased top-management focus on turbulence and should thereby lead to reduced turbulence.

- Provide turbulence budgets to project managers. This has potential political liabilities if Congress were to use large turbulence budgets as a basis to kill or cut back programs. However, if a politically viable mechanism can be developed, such action might lead to effective action at the project level to reduce the negative impacts of turbulence. Additional study is needed.

- Include turbulence provisions in multiyear contracts. These would include, as a minimum, pricing of a range of production rates so that the costs of various strategies for coping with turbulence would be explicit. Contract incentives might also lead to contractor action that would reduce the cost of turbulence.

- Develop turbulence contract incentives. These could motivate or fund action by the contractor to minimize the cost of turbulence. Additional study is needed of specific actions that might be worth funding.

9.7 COMPETITIVE STRATEGIES FOR COPING WITH TURBULENCE

Three competitive strategies (complete fencing, even distribution, and hybrid) were evaluated and compared to the three competitive elements of the current process (extra-protection, stretching-out/speeding-up, and stopping/restarting). The results for political viability, relative cost, relative mission effectiveness, and impact on industrial mobilization base were shown in Figure 8-23.

Complete fencing and stopping/restarting are considered politically nonviable as mechanisms for coping with turbulence; further, they have a negative impact on the industrial mobilization base. However, if the costs of stopping and restarting were low and the economic benefits of greater program stability for fenced programs (not priced out by this study) were high, then some variants involving stopping and restarting programs might be attractive.

Our analysis showed generally small (1-2 percent) differences in the relative costs of the other strategies with the costs favoring strategies with fencing if programs have steep cost-quantity relationships, and favoring even distribution if the programs are near their maximum economical production rates. If the economic benefits of fenced programs are very great, however, the hybrid strategy (some programs fenced) and the extra-protection strategy may be significantly less costly for some cases. We found negligible (less than 1-2 percent) differences in discounted mission effectiveness over time if the same number of systems are ultimately built. This is the case because effectiveness over the long life of today's systems dominates differences in short-term effectiveness during the production period. As a result, we have concluded that these competitive strategies must be evaluated on a case-by-case basis with program-specific cost data.

10.0 RECOMMENDATIONS

Based on our findings and conclusions, we make the following recommendations.

10.1 USE OF CONCEPTUAL FRAMEWORK FOR EVALUATION

The conceptual framework developed in this report (Section 6.1) should be used as the basis for future evaluation of topline planning turbulence and topline budget turbulence. Specifically, the issue of which programs to retain and which to cancel should be based on whether programs fit in the mix of systems which is optimum for the expected long-term levels of future budgets. This mix may change from year-to-year in response to changes in threat, technology, strategy, or similar fundamental factors, but it should not change in response to budget turbulence. Year-to-year turbulence should be handled by strategies which do not change the mix but either reduce the turbulence or minimize its negative impact.

10.2 IMPROVEMENTS FOR COPING WITH TURBULENCE

The following improvements to the current process should be implemented for coping with top level planning and budget turbulence:

- Integration of Preplanned Product Improvement (P^3I) into the PPBS and the Major Program Acquisition Processes

- Wider utilization of Mission Area Analysis

- Prioritization based on long-term budget trend

- Performance of Quadrennial Reviews to provide in-depth reexamination of optimum program mix timed for each new Administration's first PPBS cycle

- Preparation of budget category turbulence analyses by the services and OSD staff as part of the annual PPBS cycle

- Implementation of turbulence provisions in multi-year contracts.

10.3 STUDIES

Studies should be chartered to develop adequate guidelines for the implementation of the following improvements to the current process:

- Creation of a second independent inflation projection, and use of the highest projection in the PPBS and budget process -- this second projection might be program-specific or category-specific (e.g., missiles, aircraft, or ships)

- Preparation of turbulence budgets for program managers

- Provision of turbulence contract incentives.

10.4 MARGINAL PROGRAMS

A marginal program should be stopped or started only if that action is based on long-term affordability and not on reaction to topline turbulence.

10.5 CURRENT STRATEGIES FOR COPING WITH TURBULENCE

The following current strategies should be continued for coping with TLPT and TLBT:

- Provision of extra protection for top priority programs

- Stretching out/speeding up other programs.

The mix of programs to be acquired should be the optimum combination of systems for the expected long-term level of future budgets. The combination of strategies chosen should be based on careful analysis of the costs peculiar to each program, on industrial mobilization requirements, and on other program-specific judgmental factors. The economic gain created by giving extra protection to stable programs should be explicitly estimated and included in the cost analysis.

STRATEGIES FOR COPING WITH TOPLINE BUDGET TURBULENCE

Volume II
APPENDICES
A, B, C, D

Defense Systems
Management College

APPENDIX A

THE BUDGETING SYSTEM FROM THE DOD PERSPECTIVE

A.1 INTRODUCTION

The central distinguishing characteristic of any governmental budgeting system is that choices among alternatives are inherent in the working of the system. One measure of the "rationality" or "reasonableness" of a budgeting system is the degree to which choices, alternatives, and their impacts and implications are made explicit issues for discussion and analysis rather than implicit consequences that remain hidden until well after the budgeting process is completed. The recent history of the U.S. Government's budgeting system (since 1945) can be summarized as an attempt to bring increased "rationality" and "reasonableness" to the institutionalized processes of the budget by increasing the explicit identification of the inherent choices, alternatives, impacts, and implications that reside at the various decision points in the process. Of all the Executive departments, DOD has been the leader in developing an improved budgeting process that permits decision-makers to see and address explicitly their alternatives and the many impacts and implications of their budget decisions. This appendix outlines the broad character of the DOD budgeting system within the context of the federal budgeting system and focuses on the detailed characteristics of the DOD system that are most directly involved in either the creation or the dampening of topline DOD budget turbulence.

This discussion of the budgeting system is important to a sound understanding of the budget turbulence problem because it establishes the peculiar characteristics of the environment within which turbulence is created and thrives. In short, turbulence is a phenomenon born of, and nurtured in, the budget process. This is not to say that budget turbulence is solely "caused" by the workings of the budget process, although there are clearly elements of the budget process that themselves do cause budget turbulence. Instead, the perception to be drawn from understanding the budget process context within which turbulence resides is that the budget system is the "real world" tangible mechanism through which all causes of budget turbulence, both budget process causes and nonbudget process causes, work their impacts on the defense establishment. If we are to understand the nature of turbulence and recommend measures to diminish its frequency and amplitude, then we must understand the key phases and decision points of the budget process where the causes of turbulence work their impacts on decision-makers.

To establish properly the budgeting system context for understanding budget turbulence, it is necessary to focus on the broader federal budgeting system within which DOD participates and on the specifics of the DOD budgeting system known as the Planning, Programming, and Budgeting System (PPBS).

A.1.1 The U.S. Government's Budgeting System as Related to Topline Budget Turbulence

In broad historical perspective, the central focal point for budget decision-making is Congress. This fact is embodied in the U.S. Constitution. However, the progression of the budget process since 1789 has been for Congress to "share" some of its budgeting powers with the Executive branch; over time, the scope of Executive participation in the budget process has broadened. It is still correct to affirm that ultimate decision authority for the budget for any given fiscal year lies with the Congress, but it is also correct to qualify this with the following characteristics of the budgeting process:

- In a fundamental sense, the federal budget is not under the full control of either Congress or the Executive.

- The masses of details in the budget are so large that Congress can only address selected specific programs or broad policy issues. As a result, most of the details of the budget are developed, formulated, understood, adjusted, and executed by the Executive departments.

- There are multiple, overlapping, inconsistent budget "languages" and categories used by different participants in the various stages of the budget process. In the grossest example, it is not possible to trace systematically or assess analytically a single budget from formulation through final execution. In the simplest terms, this means that no single central audit trail exists of whether budgeted resources (dollars, personnel) are totally expended for the purposes and justifications for which they were formally funded. This problem of execution traceability is well known and is so far insoluble.

The characteristic of the budget's being not under full control of either the Congress or the Executive refers to the lack of synchronization between budget authority and budget outlays. Budget authority is the authority provided to Executive agencies to enter into obligations that will result in immediate or future outlays. The authority is provided by Congress in three forms:

- Appropriations: authority that permits federal agencies to incur obligations and make payments
- Authority to borrow: authority that permits federal agencies to incur obligations and borrow money to make payments
- Contract authority: authority that permits federal agencies to enter into contracts or incur other obligations in advance of an appropriation.

The synchronization problem between this authority and outlays (checks issued and cash disbursed) is that not all of the new budget authority approved by Congress in a given fiscal year will be obligated or spent in that fiscal year. For instance, in the FY 83 budget, the new budget authority was $801.9 billion. Of this total, $169.9 billion is to be spent in future years. This is added to still unspent budget authority from prior fiscal years of $699.6 billion that will not be spent in FY 83, for a total of $869.5 billion that will be spent in FY 84 and beyond even if Congress passed $0 of budget authority in FY 84 .(1) Regardless of priorities and preferences or changes in circumstances and situations, nearly a trillion dollars of unspent budget authority is already on the books after FY 83, and Congress and the Executive branch cannot make changes or adjustments. It is in this sense that critics note that the budget process is "out of control." What is meant is that the nearly trillion dollars of budget authority after FY 83 represents firm priorities and resource commitments; any adjustments or changes in priorities and commitments must be taken from the programs that are requesting new budget authority in the FY 84 budget. Because nearly a trillion dollars of resource commitments are already locked up beyond FY 83, this may mean that changes to proposed FY 84 programs will have to be larger than they would have been if Congress still had been able to make changes in the resource commitments embodied in the beyond FY 83 budget authority.

The masses of details with which the budget process must deal are unavoidable characteristics of the system. Because of the detailed nature of the programs that are passed from the Executive departments to Congress, Congress can only deal with selected programs of special political or personal interest. For example, Congressmen are in the position of being able to examine, and possibly give more attention to, the budget proposal for a new $2-million flood control project in their home district than to those broad strategic weapons priorities involving hundreds of billions of dollars. Budget details are examined on a "by-exception" basis. As a result in many cases, real knowledge of where the government is actually spending its money is held at relatively low levels of bureaucratic authority in the Executive agencies. As a result, when Congress mandates changes and adjustments in budget dollars and personnel slots, they can only do so, in general, at relatively high levels of aggregation. It is up to relatively low-level bureaucratic decision-makers to choose which programs and activities absorb reductions or receive increases because there is no unified system for giving answers to Congress about which programs will be cut or enhanced as a result of their decisions. Naturally, if Congress reduces funding for a specific program, say the F-16 aircraft, that reduction will impact the F-16 program. Indeed, it is possible for Congress to become so specific in its budget directions that all discretion is taken away from lower level decision-makers; this is generally the process used to achieve reductions in the RDT&E and procurement accounts. For many other appropriation accounts, however, this degree of control is not as easily attained.

The masses of detail insulating Congressional intent from program impacts discussed above are related to the third characteristic of the budgeting process, the one that modifies the fact of Congressional primacy in budget decision-making, i.e., the multiple, overlapping, inconsistent budget "languages" and categories used by different participants in the various stages of the budget process. A recent General Accounting Office (GAO) report highlighted this characteristic when it noted that, "Too often, the budget's appropriation account structure for an agency divides agency activities that are related to a common authorized policy into widely separated accounts, reflecting organizational divisions that cut across legislated policy areas." The GAO conclusion about the impact of this fact was that, "This makes it difficult or practically impossible to assess how well the Government is accomplishing basic policy objectives."(2) As long ago as the 1949 Hoover Commission, there was a recommendation to implement a solution to this problem. Currently, the solution is called "mission budgeting" and, although it is contained in the Budget and Information Control Act of

1974 (Public Law 93-344), it has not been functionally implemented by the Congress and Executive agencies. Regardless of the requirements of Public Law 93-344, the Congressional budget process is organized around appropriation categories; these are complex enough without attempting to extract mission-oriented perspectives from the data. For example, for DOD alone, there are more than 100 separate appropriations. For most identified mission areas, significant funding is required in many of these separate appropriations. For example, the Anti-Submarine Warfare (ASW) mission is supported by major expenditures in the following appropriations:

- Aircraft Procurement, Navy
- Ship Procurement, Navy
- Other Procurement, Navy
- Weapons Procurement, Navy
- Research Development, Test & Evaluation, Navy
- Operations and Maintenance, Navy
- Operations and Maintenance, Reserve, Navy
- Manpower and Personnel, Navy
- Military Construction and Maintenance, Navy.

Reductions in any of these appropriations could affect the Navy's ability to conduct ASW in ways that are not understood at high levels in the government. No single means of dividing a budget as complex as that of DOD could ever satisfy all needs, and some form of matrix display and control with mission-related focus is necessary.

If we understand the three characteristics discussed above and the central budget fact of Congressional prerogative, we can briefly examine the evolution of the current budgeting system for the Federal Government. The first major statutory modification to Congressional control of the budget process came in 1921 with the Budget and Accounting Act of 1921. This act established the concept of the Executive Budget. Under this concept, the President presents an explicit administrative and fiscal program to be acted upon by Congress, and Congress returns a definite enactment to be carried out by the Executive branch. To support the President, this act also created the Bureau of the Budget, which grew to become today's Office of Management and Budget (OMB). This 1921 act also created the GAO. The current budgeting process has been built upon the foundation of the 1921 Budget and Accounting Act.

The next major modification to the budgeting system came 53 years later with the Congressional Budget and Impoundment Control Act of 1974 (PL 93-344). The Act was adopted for the following reasons stated in the law:

- To ensure effective Congressional control over the budgetary process

- To provide a system of impoundment control

- To provide for Congressional determination of the appropriate level of Federal revenues and expenditures each year

- To establish national budget priorities

- To provide for the furnishing of information by the Executive branch in a manner that would assist the Congress in discharging its duties.

Given these reasons for the 1974 act, it is instructive to address whether the goals have been achieved. It is clear that the law does provide a system of impoundment control, that it permits Congress to formally establish national budget priorities although these do not have to be adhered to, and that it permits Congress to determine an appropriate level of Federal revenues and expenditures. However, the following items were largely administrative and housekeeping actions:

- Changing the fiscal year from July 1-June 30 to October 1-September 30

- Establishing a Congressional Budget Office (CBO) to be the Congressional OMB

- Requiring a 5-year projection in the President's budget

- Others, including the impoundment control authority.

Yet, the one most substantive goal of the 1974 act remains elusive: to ensure effective Congressional control over the budgetary process. The FY 83 budget has operated under continuing resolutions without enacting a final appropriation act into law. It is clear that Congress still lacks considerable "control" over the budgeting process. Nonetheless, Congressional actions, including failure to produce an appropriation act, drive changes in appropriations accounts compared to what Executive agencies submit to Congress in the President's January budget. The changes in appropriations accounts compared to what the agencies request require changes in proposed programs and projects; this is an important element of budget turbulence. As shown in our Figure 2-1 (Volume I, page 2-4), Fundamental Money Flow: Opportunities for Turbulence Introduction and Priority Setting, Federal spending policy decisions feed defense spending decisions and the latter drive changes and adjustments to programs and projects. Given all the qualifications and modifications to the basic tenet that Congress is the primary voice in the budgeting system and all the problems with achieving the substantive goal of the 1974 budget control act, the Congress is still a powerful force for introducing changes in programs and projects and, as such, is a central source of topline budget turbulence.

While changes to priorities and resource commitments are statutory roles of Congress, implying that topline turbulence is a fact of life, there are areas in the present working of the budget system that can improve the degree of "rationality" and reasonableness. A budgeting system that integrates into a common language all the varying budget categories and languages used at all levels of the budgeting process would go a long way toward improving the visibility of choices, alternatives, and their impacts and implications. Today, Congress cannot fully and easily assess the ripple impacts and implications of actions that produce topline turbulence because it cannot always see below the top line in a systematic structure that relates Congressional decisions (or lack of decisions) to program and project impacts. Instead, Congress must often rely on the Executive agencies to "spread" appropriation increases and decreases to programs and projects. If the allocations of appropriation increases and decreases were visible to Congress before the fact of their decisions, then the alternative courses of action available at the point of decision could be better assessed with the implications and impacts of each alternative more fully considered. Such is not the case today. As a result, the Federal budgeting system can be expected to remain an engine of topline turbulence. The best that Executive agencies such as DOD can hope for in the short run is to take defensive actions within their own agencies to insulate selected programs from the ravages of turbulence induced through the Federal budgeting process. Undoubtedly, the struggle to improve the Federal budgeting process will continue. There are areas of the 1974 act that still lack for implementation, such as the mission budgeting approach, that can improve the rationality of the Federal budgeting process and, in the long run, some degree of reduction in topline turbulence may be obtained from improved rationality.

A.1.2 The DOD Planning, Programming, and Budgeting System (PPBS)

DOD has been the leading Executive agency of the Federal Government in the development of an internal budgeting system that seeks to improve substantially the visibility of budgeting alternatives and their associated impacts and implications. The Planning, Programming, and Budgeting System (PPBS) is the institutional means to accomplish this improvement.

The Defense Reorganization Act of 1958 gave the Secretary of Defense two distinct lines of authority, albeit under the policy guidance and direction of the President and the National Security Council: one is a direct line of command through the Joint Chiefs of Staff to the Unified and Specified Commands; the other is for administrative control of the military departments and for management of the support of military forces through the Secretaries of the military departments. Through the command line of authority, the secretary issues decisions concerning threat appraisal, strategy, and forces. Through the administrative and management line of authority, he manages program goals to support the forces and the budgeting of annual funds to support the programs. The PPBS is the system through which threat appraisal, strategy, and force decisions are translated into programs and budgets.

A central distinctive feature of the PPBS in DOD in contrast to "traditional" budgeting is that budget guidance flows from the top down. In the "traditional" budgeting approach, top-down planning is not the central feature of budget development. Instead, each lowest level activity develops its budget and sends it to the next higher level for review, adjustment, and approval. Budget battles are fought at each approval stage in the traditional system. To an extent, the same is true of the PPBS as it actually operates. Incremental budgeting working from an established base that was changed slightly from year to year is what the PPBS was designed to eliminate. The PPBS is designed to focus on objectives and purposes and long-term planning and seeks to assess all programs and projects in a given budget in terms of priorities. Prioritization of programs and projects within the constraints set by the Secretary of Defense (SECDEF) is supposed to characterize the development of programs and budgets through the PPBS. Given such prioritizations, budget "decisions" at alternatively higher and higher levels of authority in DOD should be relatively easy to assess in terms of impacts and implications. Whether the system operates as designed is another issue to be addressed in the next section.

Figure 2-2, Simplified Budget Process/Turbulence Introduction, shows the place of the PPBS in relation to the budget turbulence issue. Those familiar with the PPBS process explain that there is no single point in the process that can be called the "beginning" or start of the process because the PPBS requires data to be gathered, decisions to be made, and actions to be taken concerning the past budget year, the current budget year (the current fiscal year), the upcoming budget year which will become the President's budget submission to Congress in January, and four fiscal years beyond the upcoming budget year at any single point in time during the PPBS process. While acknowledging the necessity of considering seven different fiscal years at any single point in the PPBS, it is still possible to focus on the key decision documents and actions and identify a starting point for these documents and actions. In Figure 2-2 (Volume I, page 2-6), the initial decision actions and documents in the PPBS are shown to be Presidential preferences and broad policy guidelines, the Joint Strategic Planning Document (JSPD), and the existing FYDP baseline. These initial documents and decisions are shown as accepted by the Office of Secretary of Defense and used to produce the DOD Defense Guidance (DG) document, which includes tentative fiscal guidance. The initial actions and documents leading to the Defense Guidance are discussed below.

Presidential preferences are established through the SECDEF with regard to basic national defense goals and broad threat and strategy appraisals. These preferences are combined with the advice contained in the Joint Chiefs of Staff (JCS) JSPD. Through the JSPD, the JCS provides broadly fiscally constrained advice concerning military strategy and a reasonable "risk" factor force structure required to achieve the President's national security objectives. The SECDEF synthesizes the JCS advice, accepting or rejecting it within his understanding of the President's preferences. An example is the recent MX closely spaced basing deployment mode, where the JCS advised against it but the SECDEF affirmed the President's confidence in the dense-pack option. In addition to the President's preferences and the JCS JSPD, the SECDEF has the existing FYDP as a funding baseline for developing or formulating the budget of the next fiscal year and the "out years." With all of this information to base his promulgation of topline guidance on, the SECDEF issues the DG document.

The DG contains both classified and unclassified sections. It serves as ". . . the authoritative statement of DOD policy, strategy, force planning, resource planning, and fiscal guidance for program development within all DOD components."[3] The calendar year 1982 DG covered the FY 84-FY 88 mid-term planning period plus a 10-year long-term extended planning period. As one of the primary institutionalized instruments of the top-down planning and budgeting process in DOD, the DG accomplishes the following:

- Ensures that DOD programs are based on, and are consistent with, a set of clearly defined objectives, policies, and strategies
- Identifies major problems and resource constraints
- Identifies significant mid- and long-range threats, vulnerabilities, and opportunities
- Ensures a framework that will promote close integration of the plans and programs of DOD components
- Provides guidance to the Military Departments and Defense Agencies for Program Objectives Memorandum (POM) preparation
- Identifies and assigns major unresolved problems for study prior to the next mid-term planning phase for the FY 85-FY 89 period that will be covered by the next calendar year's DG.

The 22 March 1982 DG (covering FY 84-FY 88) was divided into seven major sections, including:

- Threat assessment and opportunities: provides a brief appraisal of the world environment, the threats to U.S. interests, vulnerabilities, and opportunities in the mid- and long-range periods.
- Policy guidance: establishes the national security objectives and policies that the SECDEF, acting for the President, intends as guidance for all defense planning.
- Strategy guidance: presents peacetime, crisis, and wartime strategies to guide planning for force development and future uses.
- Force planning guidance: provides criteria and assumptions against which forces and necessary support for the long-term and the FYDP period are to be sized and structured; also includes a force table showing the major force structure expected for support of the policy, strategy, and force planning guidance.

- Resource planning guidance: contains planning criteria, assumptions, and priorities for the commitment of defense resources to modernization, readiness, sustainability, manpower, other logistics, and responsiveness to crises.

- Tentative fiscal guidance: presents projections of Total Obligational Authority (TOA) for DOD components. These projections are based on the existing FYDP for each fiscal year. Ranges of deviations from the existing FYDP numbers may be identified to bound the limits within which the DOD components may develop tentative budget numbers. For example, the tentative fiscal guidance could direct that the current FYDP TOA for the coming fiscal year plus 10 percent be considered the upward bound for each DOD component. For the years beyond the next fiscal year, the current FYDP TOA plus 5 percent in each year is the upper bound. These are examples and do not reflect actual percentages for the current tentative guidance.

- Major issues: contains statements of problems, especially those related to mid-term resource constraints, that require further study or top management attention.

Within these seven sections, the topline guidance of the SECDEF is promulgated to the DOD components. As described above, this serves as the fiscal guidance baseline for program and budget development as well as the official statement of the assumptions and constraints on the next run-through of the PPBS process culminating in a Presidential budget submission in January of the calendar year following the publication of the DG. The DG is also the first major instance where topline turbulence may be introduced into the DOD PPBS. Given the differences between the current FYDP numbers and the tentative fiscal guidance in the DG, changes in TOA that are spread to programs and projects may be required as the DOD components take the DG and begin to develop their POM and budget. A major increase in TOA or a major reduction would ripple through defense programs causing program instability in the planning and budgeting of programs.

In addition to the broad TOA tentative fiscal guidance, the DG can contain specific guidance that can introduce program instability through turbulent budget numbers. For example, the DG could direct a specific Service, say the Air Force, to curtail development of a low-altitude "stealth" penetration bomber and redirect the resources to develop and acquire a squadron of militarized space shuttle craft that would form the basis of an air/space force for the late 1980s. Such guidance would likely be highly classified and cause considerable program instability. Given such specific guidance, perhaps even specifying the redirection of $1 billion of Air Force research and development appropriations and $500 million of aircraft procurement appropriations to the space shuttle force, a topline TOA constraint directing the next fiscal year's TOA to be 8 percent less than the current FYDP amount would send shock waves of topline turbulence throughout the Air Force planning and budgeting process and, perhaps, through the planning and budgeting processes of other DOD components as well. The essential feature to recognize concerning the DG is that this is a baseline set of assumptions and fiscal guidance upon which the DOD program and budget will be developed each year; as such, it is the first key means through which topline budget turbulence is introduced into the DOD PPBS.

Figure 2-2 shows the next step in the process, i.e., the Services' POM preparation. The POM preparation process is where the Services and other DOD components take the information, assumptions, and constraints in the DG and prepare an update to the FYDP known as the POM. At the DOD topline the POM contains TOA for programs and projects for 7 fiscal years: the prior fiscal year, the current fiscal year, the coming budget submission year, and four years beyond the coming budget year. The POM will reflect the impact of topline budget turbulence introduced through the DG and acted upon by the Services and other DOD components. In acting upon the DG, the Services are free to adjust programs and projects and change priorities in response to the priorities in the DG and with regard to their own priorities and interpretations of the DG to the extent that they are granted latitude in the DG. A program or project that was funded at a given level and activity rate in this year's current budget may have to be curtailed drastically as a result of the Services' reacting to the DG and readjusting priorities as reflected in the POM. Given access to DGs for the last several years and to the POMs that followed, it would be possible to quantify the topline turbulence and the impact it has on programs and projects year by year. It would be possible to establish the historical quantitative record of budget turbulence between the DG and POM and to look for patterns and regularities or the lack thereof. However, historical records of DGs and POMs were unavailable for this study. The quantitative magnitudes and patterns of turbulence and program instability between the DG and the POM were therefore not determined.

POMs are submitted to OSD in May of each year. Following the POM submissions, they are divided into areas of functional responsibility and detailed to various OSD staff offices for analysis and evaluation. This is the POM issue paper cycle. OSD staff offices responsible for sections of the POM are free to challenge the structure and contents of the POMs by writing issue papers that require decision by higher authority. An issue paper will contain alternatives that can be selected by higher authority such as the Defense Resources Board (DRB) or the SECDEF. One alternative is always to retain the TOA and the program or project as submitted in the POM by the Service or DOD component. Other alternatives can be to eliminate TOA for the program or project altogether, to increase or decrease the TOA, or to change the program or project as well as the TOA. The decisions that are made concerning the issues raised in the issue paper cycle are eagerly awaited by the Services and DOD components. These decisions, recorded in the SECDEF Program Decision Memorandum (PDM), are instruments of topline turbulence and program instability. Entire programs can be deleted through PDM decisions. TOA can be slashed or increased for specific programs or projects, mission areas, specific appropriations, and specific Services.

Following issuance of the PDM, the Services and DOD components submit their October budgets to OSD. These are the budgets that will form the basis for the President's budget submission to Congress the following January. The budget submissions coincide with an update to the FYDP, and the budget numbers contained in the budget submissions are reflected in the FYDP. It should be noted that the PDM decisions concerning TOA and program and projects must be incorporated into the Service budgets as submitted to OSD. Given access to these budget submissions and to the October FYDP updates for the past several years, it would be possible to quantify the scope and pattern of budget turbulence and program instability introduced by the PDM decisions.

Following the Service budget submissions to OSD in October, the budgets are analyzed by the OSD staff under the direction of the OSD comptroller. He is responsible for assessing the pricing and executability of the budgets as submitted. In addition to the OSD staff, OMB participates in the "budget scrub" process. Changes to topline TOA and specific programs and projects can be introduced during this budget scrub exercise, and usually are. This introduces additional budget turbulence and program instability. At the end of the budget scrub, the SECDEF makes final budget decisions and passes the DOD budget to OMB and the President for their subsequent presentation of the budget to Congress in January. The President and OMB can make final "changes" to the DOD budget after the SECDEF has made his "final" decisions. These changes may be to topline TOA or to specific appropriations or programs or projects. The Services and OSD are charged with spreading last-minute changes and adjustments down through the details of the budget. In this last-round series of changes and adjustments, additional budget turbulence and program instability are introduced into the process.

Finally, the DOD budget is submitted to Congress as part of the President's January budget. Once in Congress, the budget becomes the creature of the Congress, and additional changes and adjustments can be introduced that bring topline turbulence and program instability.

A.2 BUDGET FORMULATION AND JUSTIFICATION

This section of our study addresses the processes of budget formulation and justification. It takes those data capabilities of the Services and indicates the intricate details of the budget formulation (inside DOD) and justification (to Congress) process which is a key aspect of the overall moneyflow described in our introductory section to this chapter. As we shall demonstrate, programs are ranked and priorities established and assessed during budget formulation and justification. In a later chapter, our study addresses how the ranking of priorities can form the basis of a strategy for dealing with topline budget turbulence.

A brief overview of the processes of DOD budget formulation, justification, and execution is described herein. Particular interest is focused on formulation and justification.

The budget process represents the terminal phase of a lengthy and continuous system to optimize the national defense effort. The system of which the budget process is a part is the DOD PPBS. This system is an economic process to allocate scarce resources to the various segments of the national defense effort. In operation, this system includes numerous subsystems and countless decision points. The system is highly structured and strongly formal procedure oriented. The zero-based budgeting (ZBB) concepts introduced by the Carter administration have not been a replacement of PPBS; ZBB represented a new feature for consideration in programming and budgeting and has, in fact, been absorbed within the PPBS. The ZBB feature retained the prioritization of programs with a "base" and "bands" or "levels" above the base that are options.

In this section we will discuss Service budget formulation, justification and execution within the framework of the total PPBS.

There is considerable uniformity in concepts and procedures used by the Services in conducting the budget process. This uniformity results from the emphasis upon formal procedures from OSD, mutuality of the basic problems that must be addressed by all of the Services, and the fairly long period of time that the PPBS has been in operation. Since the PPBS has existed in DOD for almost 20 years, there has undoubtedly been a consistent movement among the Services to refine their systems, adopting ideas from each other and from OSD, leading to the adoption of fairly standard procedures.

Since the Services employ similar procedures, there is no attempt to discuss each Service in turn; rather, the Army, Navy, and Air Force will be treated together describing the basic approaches used and pointing out exceptions to the common procedures, where applicable.

A.2.1 Budget Formulation Overview

The publication of the Consolidated Guidance (CG) in February or March technically initiates the programming and budgeting process leading to the submission of Service budgets to OSD in the latter part of September. However, the CG is merely one element of a total system that is operating continuously. Furthermore, the Services have already been involved in activities associated directly with budget formulation.

The Services already have a "target" TOA figure for the total Service budget for the budget year in the January FYDP. This TOA is associated with programs and force levels that represent an extension of the budget being considered by the Congress at that time for the coming fiscal year. Through the JCS, the Services have been participating in planning studies under the Joint Strategic Planning System (JSPS). Internally the Services have been conducting force structure studies beginning in the fall time period prior to the issuance of the CG. Products of these studies in the JCS and the Services influence the CG and affect the programming and budgeting activities relating to the coming budget cycle as well as the out-years. Furthermore, the Services have requested, or are requesting, budgets from their subordinate organizations to provide information for their overall Service budgets by the time the CG is published. These processes were discussed earlier in our introduction to this chapter.

The three Services maintain relatively large staffs to perform their planning studies. The staff chiefs of these activities are Deputy Chiefs of Staff who are designated as chiefs of plans and operations. These staffs interact continuously with the staff of the JCS, especially with the J-5 (Plans & Policy) Division.

As operated in the Services, the PPBS ensures that most of the Service planning that directly impacts on resource requirements to be shown in the following October budget has been accomplished by early spring. Translation of plans into programs to determine specific time phasing of these requirements and resource levels by activities and subactivities is underway. Budgets from subordinate organizations are being analyzed not only for the content of the priced-out programs but also for the appropriateness of the prices used.

In the Navy, the programming phase of the PPBS process is under the cognizance of the Director of the Program Planning Office, an integral part of the Office of the Chief of Naval Operations; however, the operational direction of the programming process is performed by the Chief of the General Planning and Programming Division. The Directorate of Program Analysis and Evaluation leads the programming effort in the Army. This is a special staff office reporting to the Director of the Army staff who is in the Office of the Army Chief of Staff. In the Air Force, the Directorate of Programs is a major component of the office of the Deputy Chief of Staff, Programs and Evaluation.

In the three Services the program offices headed by officers at the two-star level are responsible for providing program guidance, direction, and instructions during the programming phase. These offices put together the Service POMs, develop Service positions on OSD issue papers, develop responses to PDMs, and generally lead the Service programming processes until final APDMs are received and the emphasis shifts to budget preparation. When this shift occurs, the leadership of the overall program/budget effort goes to the head of the Service budget office--the Navy Director of Budget and Reports, the Director of the Army Budget and the Air Force Director of Budget. All of these offices are in the offices of the comptrollers of the respective Services, although the Navy Director of Budget and Reports and his staff are also identified as the Fiscal Management Division in the Office of the Director of Program Planning.

The Services maintain staff committees that play important roles in the formulation and review of programs and budgets. As shown in Figure A-1, the structure and levels of these committees are similar in all three Services. The workhorse committees of the program/budget process are the Army Program and Budget Committee (PBC), the Navy Program Development Review Committee (PDRC) plus the informal Navy Budget Review Group, and the Air Force Program Review Committee (PRC). These committees review in depth all program and budget submissions and issues, including responses to special OSD requirements. They present the results of their reviews with their recommendations, on an exception basis, to the senior committees.

In the Army the operational chairmanship of the PBC shifts from the Director of Program Analysis and Evaluation to the Director of the Army Budget when the programming phase is completed. In the Navy and Air Force, the directors of the program offices continue to chair the PDRC and the PRC, respectively, but operationally, the directors of the budget offices lead the review processes, conduct the necessary staff work with senior Service officials, and represent the Service in the OSD reviews. During the OSD budget review phase the Service justification and review process must be accelerated, because most Service actions must be completed in a very few days and often in a matter of hours. At these times the directors of the budget activities normally have the leadership responsibility. Time does not permit the normal functioning of official, formal review committees, so Service responses are handled as accelerated staff actions with staff coordination and high-level approval on an exceptional, as-required basis.

A.2.2 Budget Justification Overview

All of the Services have reasonably uniform procedures requiring budget justification by their subordinate activities. Leadership in conducting reviews is a budget function but programmers play an active role in these reviews to ensure that budgets have been prepared consistent with program guidance.

A similar concept is followed in the OSD review of the Service budgets. As stated earlier, the Service budget officers have the leadership responsibility in justifying their budgets. The OASD/Comptroller has the responsibility to verify that the Services have complied with SECDEF program and budget guidance, including the directions contained in the PDM and APDM, and that resource pricing is appropriate. OSD reviews are conducted in coordination with OSD functional staff program analysts.

FIGURE A-1
Military Service Committee Structures for Implementing Service Planning, Programming and Budgeting Systems

ARMY

Select Committee (SECOM)
- Chaired by Vice Chief of Staff
- Members are heads of the General Staff offices[1]
- Determines Army policy on major resource allocations

Strategy & Planning Committee (SPC)
- Chaired by Assistant Deputy Chief of Staff, Operations
- Members are at Director level on Army staff[2]
- Develops guidance and analysis on major strategy and planning matters

Program and Budget Committee (PBC)
- Co-chaired by Director, Program Analysis and Evaluation and Director of the Army Budget
- Members are at Director level on Army staff
- Considers program and budget matters

NAVY

Chief of Naval Operations Executive Board (CEB)
- Chaired by Vice Chief of Naval Operations
- Vice Chairman is Director, Navy Program Planning
- Permanent members are Deputy Chiefs of Naval Operations, Major Staff Directors and the Chief of Naval Material
- Determines Navy policy on major resource allocations

Program Development Review Committee (PDRC)
- Chaired by Director, General Planning & Programming Division, Program Planning Office[3]
- Members are Assistant Deputy Chiefs of Naval Operations and comparable level officers
- Reviews Navy programs during the POM preparation phase; also as a Steering Group reviews and coordinates Navy position on Issue Papers and Program Decision Memoranda

Informal Navy Budget Review Group
- Co-chaired by Director, General Planning and Programming Division and Director, Office of Budget and Reports
- Membership depends on budget area under consideration
- Reviews budgets and determines or recommends to higher authority, Navy position on budget issues

AIR FORCE

Air Force Council (AFC)
- Chaired by Vice Chief of Staff
- Members are Deputy Chiefs of Staff, the Comptroller and the Inspector General
- Determines Air Force policy on major resource allocations

Air Staff Board (ASB)
- Chaired by Director of Programs
- Members are at Director level on Air Force staff
- Serves as a junior Air Force Council in determining policy on resource allocations. Makes recommendations to Air Force Council on major policy issues

Force Structure Committee (FSC)
- Chaired by General Officer from DCS/Operations, Plans and Readiness
- Members are designated by key Air Staff Directorates
- Reviews and evaluates all plans and programs that affect force structure and force capabilities
- Recommends POM and EPA[4] forces to ASB

Program Review Committee (PRC)
- Chaired by General Officer selected by DCS/Programs and Evaluation
- Reviews proposed programs and budgets and makes recommendations to the ASB
- Conducts continuing reviews of programs to ensure program balance within fiscal limits

[1] Heads of General Staff offices are at the Lt. General level as are the Navy Deputy Chiefs of Naval Operations and Air Force Deputy Chiefs of Staff

[2] Directors in the Army and Air Force are generally filling Major General positions. In the Navy, there is considerable variation in the grades of directors, depending on the nature of responsibilities of the offices.

[3] A Rear Admiral billet.

[4] The Extended Planning Annex

Justification of Service budgets to the Congress is primarily a responsibility of the Services although there is extensive OSD participation. Leadership during the Congressional reviews definitely resides with the OSD Comptroller, but staff officials who have program responsibility for functional areas are actively involved in justifying their programs.

A.2.3 Budget Execution Overview

Budget execution processes are also consistent among the Services. After funds have been made available through Congressional appropriations, they are apportioned to the Services by the Office of Management and Budget. The Services, in turn, allocate them to their subordinate activities through their operating budgets. Accounting offices establish the necessary records of fund authorizations, and the Services may obligate and spend the appropriated funds made available to them.

Very detailed records of expenditures are maintained at the lowest levels of command but more summary-level information is provided on a monthly basis to the higher levels of command within the Services. Nevertheless, the level of detail, particularly in the logistic support areas, is sufficient to permit higher functional area managers to understand in depth how program execution is proceeding. For example, the Naval Air Systems Command has comprehensive data available on a regular, recurring basis to understand the progress of programs such as airframe reworks, engine overhauls and depot-level component repair whether performed in the Naval Air Rework Facilities or on contract.

A.3 REFERENCES

1. Office of Management and Budget, The United States Budget in Brief, Fiscal Year 1983, p. 74.

2. General Accounting Office, Federal Budget Concepts and Procedures Can Be Further Strengthened, March 3, 1981, PAD-81-36.

3. Secretary of Defense Caspar Weinberger, FY 1984-1988 Defense Guidance, 22 March 1982, p. 1 (Unclassified).

APPENDIX B

TURBULENCE CHARACTERISTICS

B.1 INTRODUCTION

The budget structure and budget formulation process described in Chapter 2.0 and in Appendix A provide a qualitative description and characterization of budget turbulence. It also provides a framework for the quantitative characterization of budget turbulence delineated in this appendix. The money flow process given in Chapter 2.0, provides a basis for describing and quantifying budget turbulence at the various steps of the money flow process.

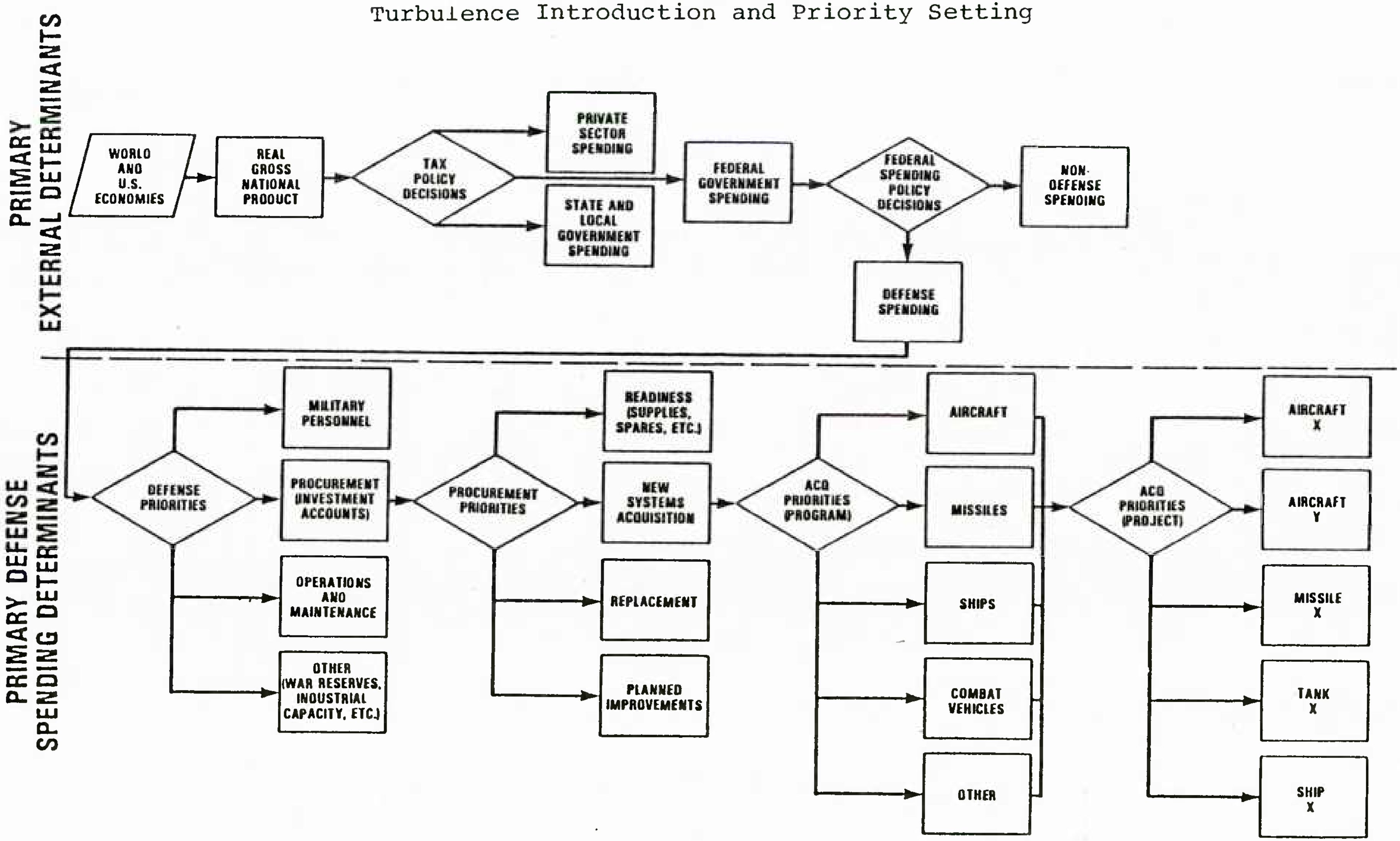
The topline budget turbulence quantitative analysis is based on an evaluation of historical budget and economic data extending back to 1950. This period of time was selected because it provides a reasonable data base for statistical analysis, and it contains two wars with different characteristics. In addition, the budget data are reasonably consistent during this time period.

As used in this study, budget turbulence refers to the changes in the DOD budget that have an impact on the DOD and Service appropriations categories and acquisition programs. A number of measures are used herein to characterize turbulence. One measure is the absolute year-to-year budget changes. Another is the relative change from year to year expressed in percent. These basic measures are used to derive statistical measures such as standard deviations, averages, and ranges of the variables.

The quantitative characterization of budget turbulence provides a basis for understanding the factors that cause fluctuations in the DOD budget. Furthermore, understanding the historical trends and behavior patterns characteristic of the DOD budget serves to support development of strategies for dealing with topline budget turbulence and evaluating these strategies.

Turbulence is characterized at each level of the fundamental money flow process shown in Figure B-1. Section B.2 treats the primary external determinates of turbulence including the national economy, state and local government spending, and the relationship between Federal Government defense and nondefense spending. This treatment describes spending considerations associated with blocks 1, 2, 3, and 5 in Figure B-1. Section B.3

FIGURE B-1
Fundamental Money Flow: Opportunities for Turbulence Introduction and Priority Setting



defines the budget terms used in DOD and further describes the DOD budget and spending associated with block 5 in the fundamental money flow chart.

Section B.4 describes the turbulence statistics for DOD TOA and the principal appropriations accounts at the block 6 level in the money flowchart. The specific principal appropriations accounts used in the analysis are Military Personnel, Procurement, Operations and Maintenance, RDT&E, and Retired Pay.

The remaining sections go below the broad appropriations categories and trace through the linkages in the transmission mechanism for turbulence. Section B.5 describes turbulence in the procurement appropriations which are shown in blocks 7, 8, 9, 10, and 11 in the money flowchart. Section B.6 describes turbulence in specific acquisition programs, such as the F-15, TRIDENT submarine, and DIVAD gun. Only representative acquisition programs were investigated because of the scope of the study efforts. These acquisition programs are at the block 12 level in the money flowchart. Finally, section B.7 describes how turbulence is transmitted from one level in the budget to successive lower levels. The transmission of turbulence provides a basis for determining which levels and what types of turbulence should be considered in devising and analyzing strategies.

B.2 TURBULENCE HISTORY

This section chronicles budget turbulence, in absolute amounts, as it has occurred at the various levels of the money flow process outlined in Chapter 2.0. Turbulence can be traced as changes in the Gross National Product (GNP) impact on the major components of GNP: government, (Federal state, and local), personal consumption and private investment. From that point, turbulence is traced to changes in total defense expenditures and then to the various functional appropriation components that make up defense expenditures (RDT&E, O&M, etc.). Subsequently, changes in subcategories are discussed within each of these appropriation categories. For example, under the appropriation category of Procurement, turbulence among the various components of Procurement, i.e., missiles, ships, etc., is examined and quantified.

B.2.1 Macroeconomic turbulence

Changing economic conditions, both domestic and worldwide, induce changes in our macroeconomic situation. The best measure or yardstick of macroeconomic activity is the GNP. The GNP is defined as the market value of new final goods and services produced by the nation during some period of time, usually a year or a fraction of a year. The three major components of the GNP are personal consumption, gross private domestic investment, and government. This relationship is usually expressed as GNP = C + I + G, which stands for the three major components. A fourth component, net exports of goods and services, is also counted. However, this component historically has been so small as to be ignored.

Figure B-2 pictures the growth of "real" GNP from 1950 through 1981, expressed in constant dollars using the Implicit Price Deflator GNP price index of the U.S. Department of Commerce. Although the real growth rate has been relatively constant upward, there have been fluctuations over the last three decades. These fluctuations, termed "business cycles" by economists, stem from the fact that business conditions rarely stand still. Economic expansion gives way to recession which, in turn, bottoms out and recovery begins. Business cycles generally have four phases: recession, trough, expansion, and peak. Figure B-3 illustrates these successive phases of the business cycle. Each phase passes into the next and is characterized by different economic conditions. During the 1950-1981 period the United States experienced seven business cycle expansion and contractions. The dates of these business cycles peaks and troughs from 1949 through 1981 are listed in the Table B-1.

FIGURE B-2
GNP (CONSTANT FY72 DOLLARS)

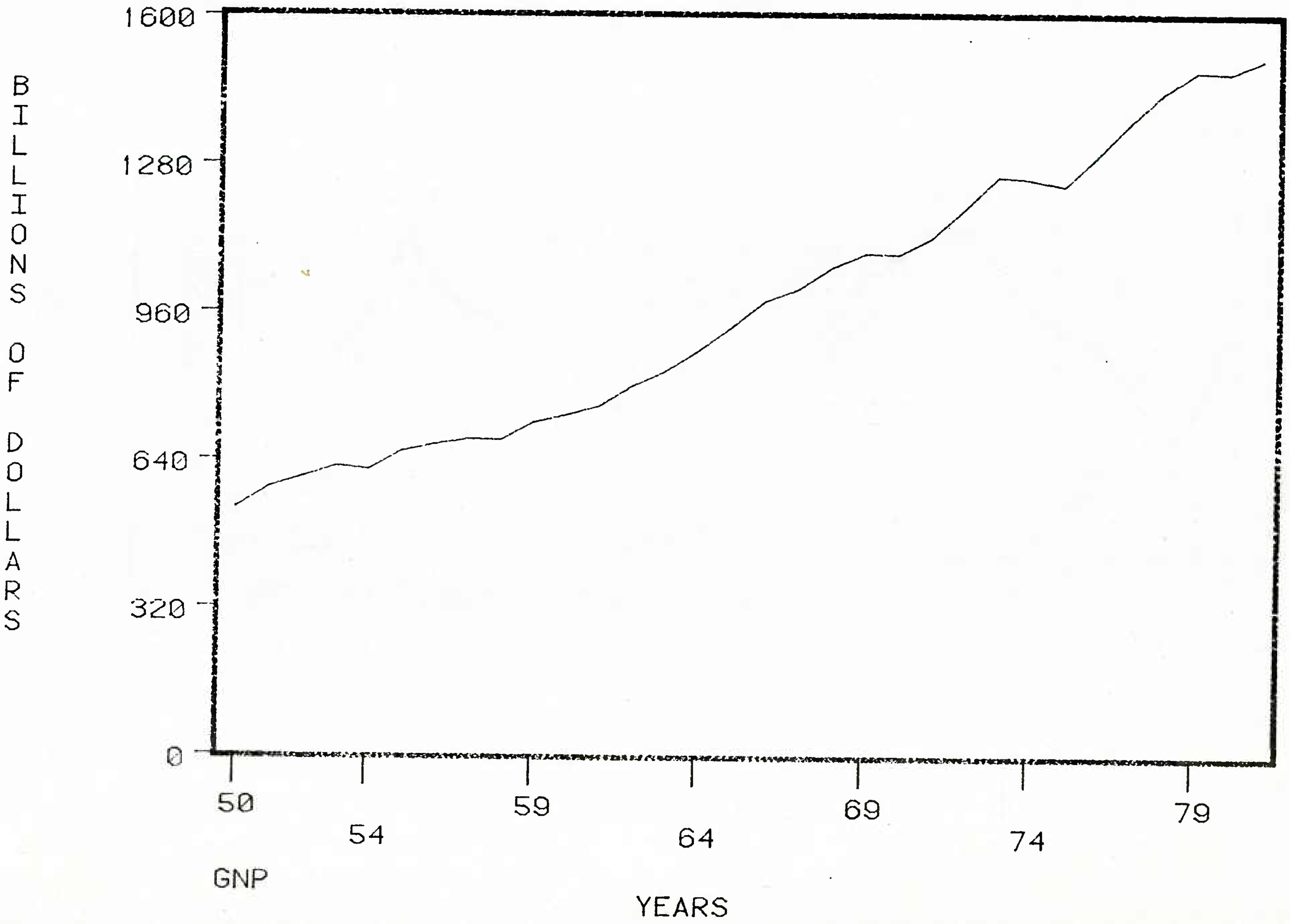


FIGURE B-3
Phases of Business Cycle

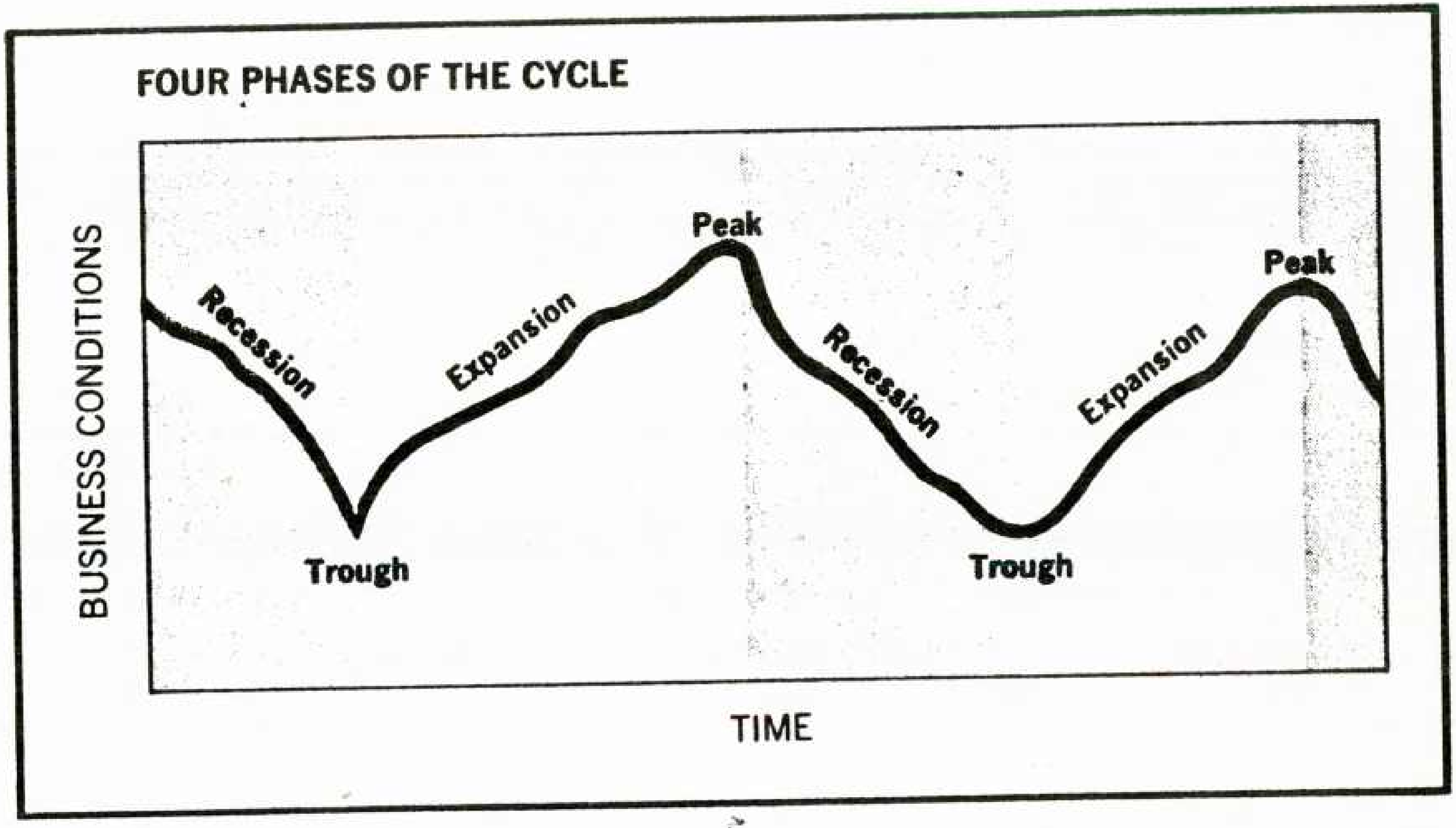


TABLE B-1

Business Cycle Dates

Trough	Peak
October 1949	July 1953
May 1954	August 1957
April 1958	April 1960
February 1961	December 1969
November 1970	November 1973
March 1975	January 1980
July 1980	July 1981

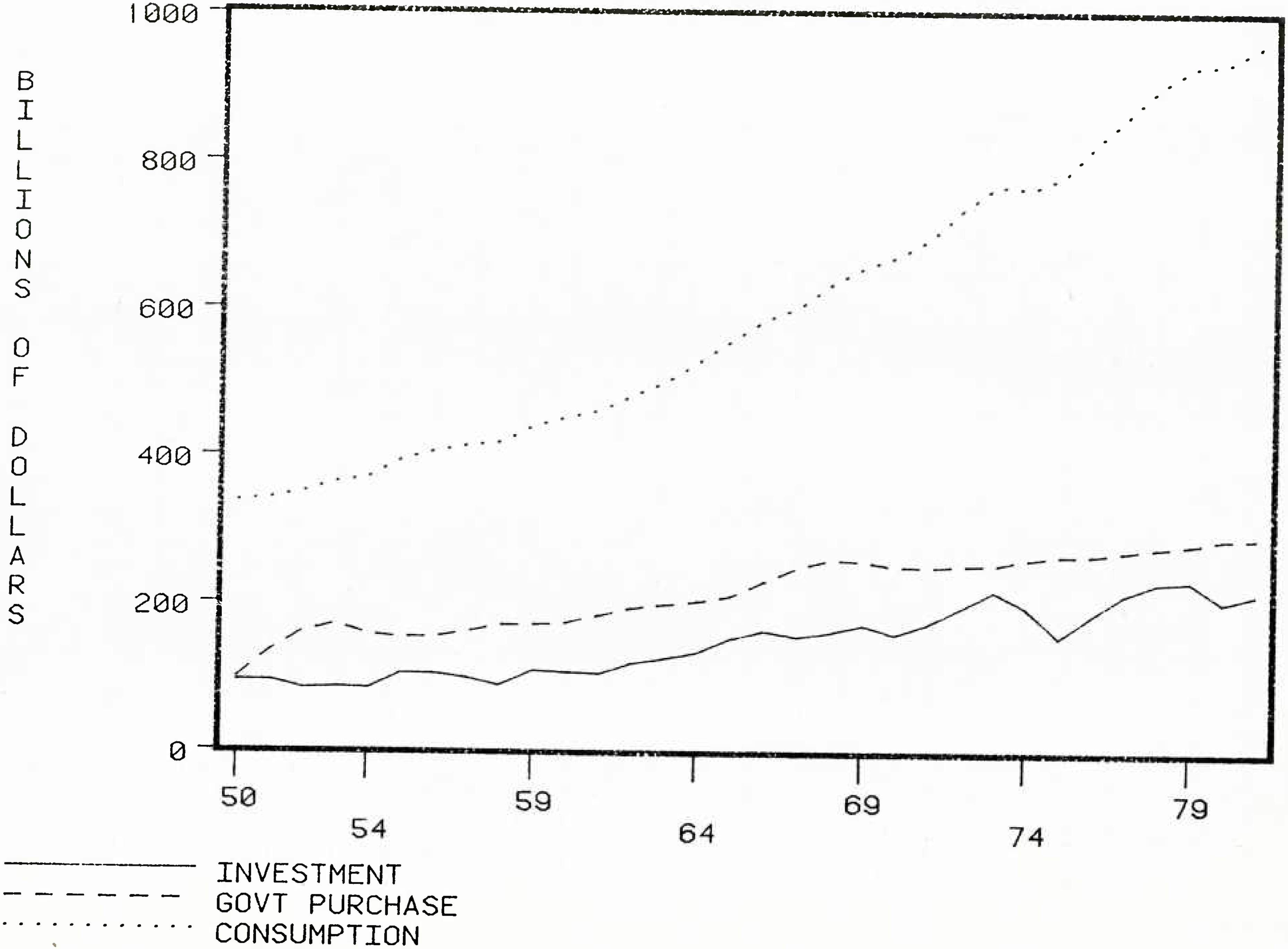
Source: National Bureau of Economic Research Inc.

These business cycles have characterized the industrialized nations of the world for the last century and a half, that is, ever since an elaborate, interdependent money economy began to replace a relatively self-sufficient precommercial society. In the past it was thought that ups and downs in economic activity were inevitable and that they occurred with a fair degree of regularity. Economists have delineated waves of activity of different duration. There are long swings of 25-40 year duration known as "Kondratieff waves," 8-10 year swings known as "Juglar cycles," and short fluctuations of four years known as "Kitchin cycles." The idea that these cycles were caused by "natural forces" has lost favor among economists today due to a lack of empirical evidence, especially in light of the rather unpredictable behavior illustrated in Table B-1. Conventional wisdom views cycles as induced by incorrect fiscal and monetary policies pursued by the Federal Government and by changes in the structural relationships within the economy among agriculture, manufacturing, and service industries. Leaving aside the causes of these cycles, let us examine the impact of these cycles on the three major components of GNP, consumption, investment, and government spending.

Figure B-4 illustrates the three major components of GNP from 1950 to 1981. Though consumption still dominates

FIGURE B-4

GNP BY MAJOR COMPONENTS

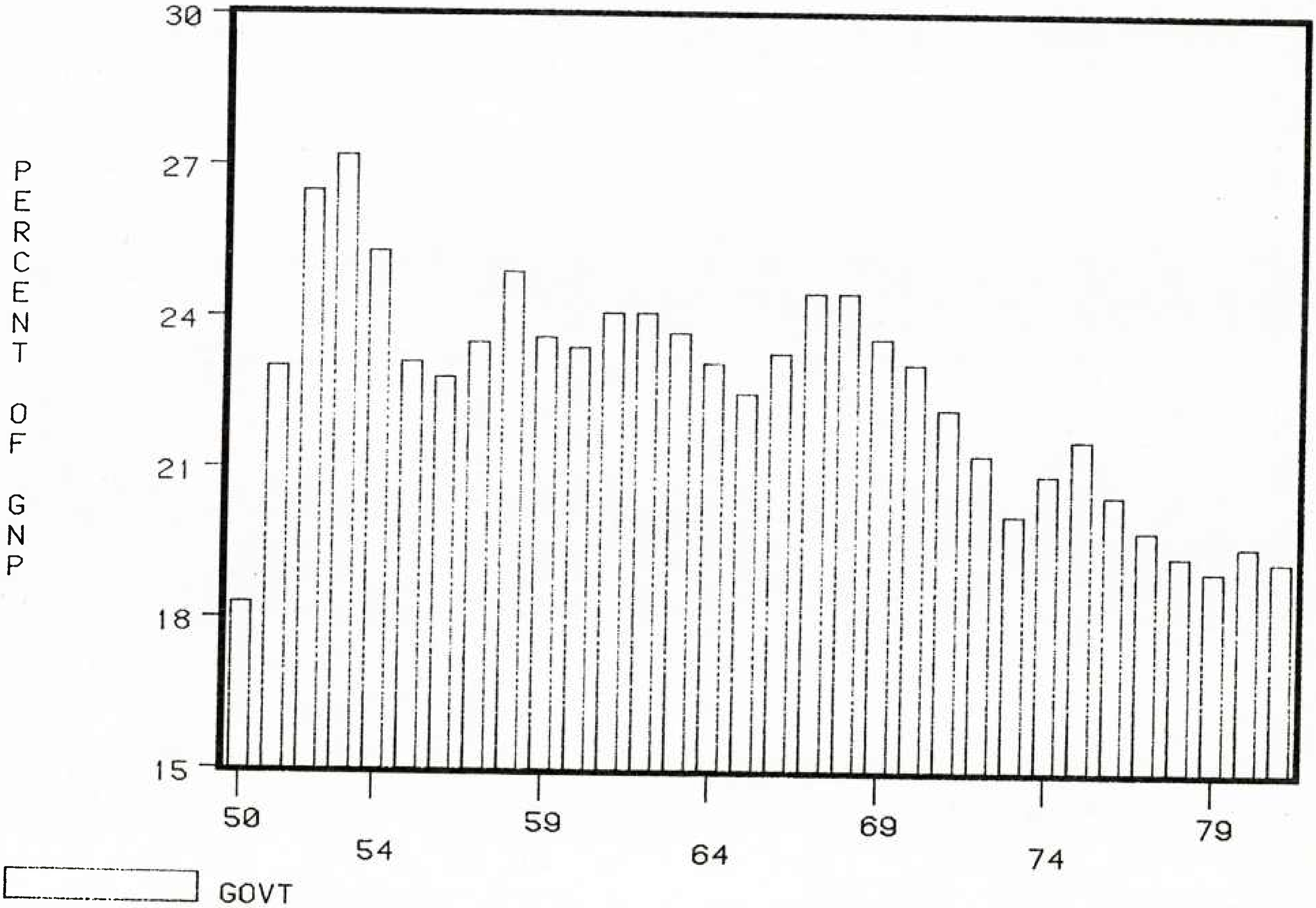


GNP, note the postwar growth in government expenditure and in investment. In terms of fluctuations, consumption has remained relatively stable and, to a lesser degree, so has government expenditures. The investment component is the most volatile. This is understandable if we realize that investment depends largely on the dynamic and relatively unpredictable elements of growth within the system, and, importantly, on elements that introduce shocks to the economic system itself: technology, politics, optimistic and pessimistic expectations, governmental tax and expenditure, changes in the supply of money, legislative policies, and more.

As Figure B-5 illustrates, the portion of GNP produced for Federal, state, and local government goods and services has declined in the three decades since World War II. It is important to recognize that the "government" component of GNP represents spending for goods and services purchased by the government from the private sector. Government "transfer payments," such as social security, welfare, unemployment insurance, and other government programs that do not represent goods and services produced and sold to the government, are not included in the "government" component of GNP. Thus, while government spending for goods and services as a percent of GNP has declined in recent years, government

FIGURE B-5

GOVERNMENT AS A PERCENT OF GNP



"budgets" as a percent of GNP have increased. This is because the total Federal, state, and local government budgets include both spending for new goods and services and transfer payments. It is the growth of transfer payment programs at all levels of government since World War II that has stimulated the growth in the size of government.

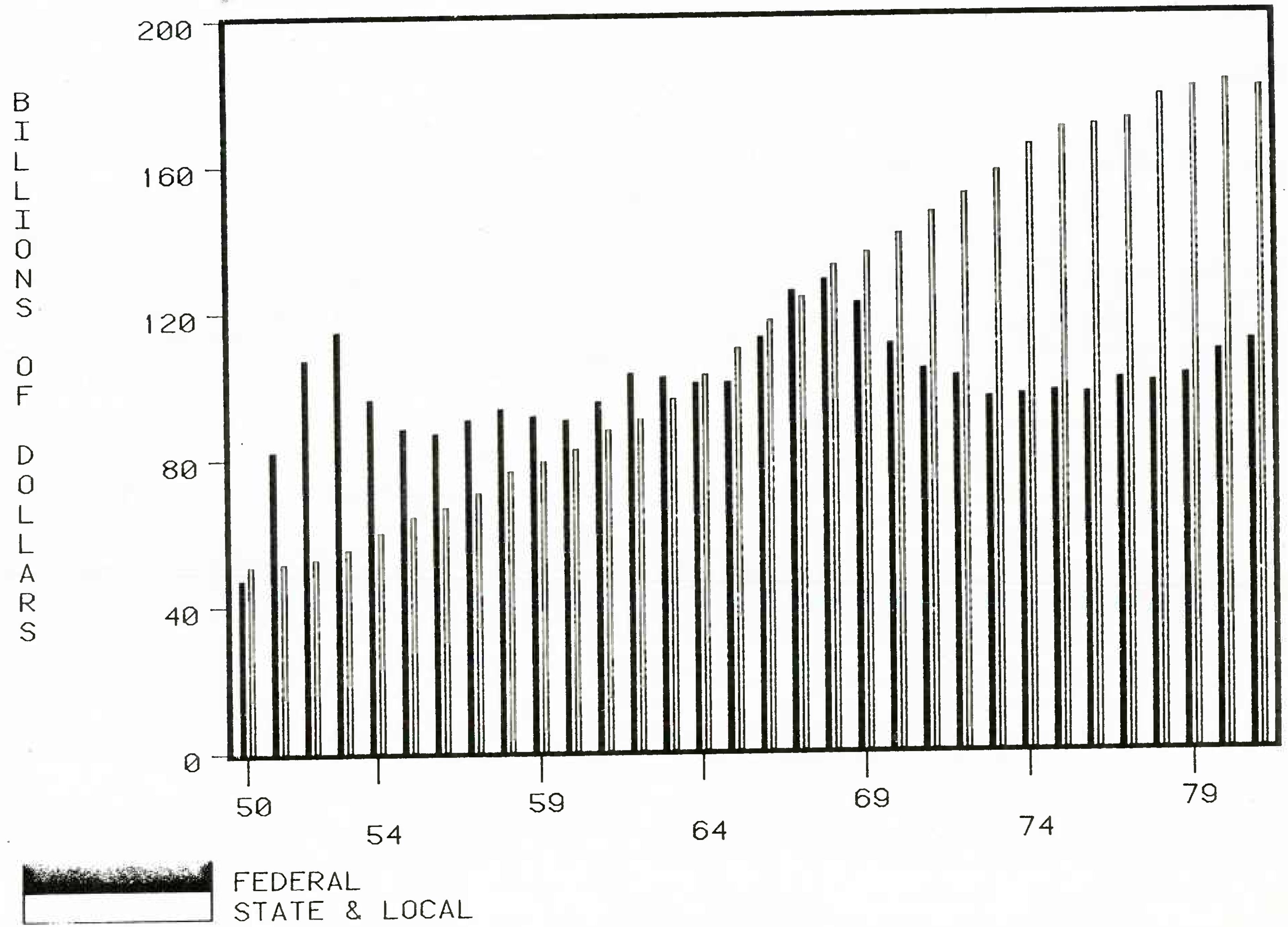
Before World War I, Federal, state, and local government expenditures for goods and services amounted to little more than one-twelfth of our whole national income. However, during World War II, it became necessary for the government to consume about half of the nation's greatly expanded output. Government purchases of goods and services receded from its World War II peak but did not drop to the prewar levels. One trend that is apparent from Figure B-5 is the significant drop in government goods and services purchases as a percent of GNP during the 1970s. Part of this can be attributed to the winding down of the Vietnamese Conflict. It may also reflect dissatisfaction with some human need expenditures. The next section will examaine the three components which make up the government sector: Federal, state, and local.

B.2.2. Government Sector Turbulence

Prior to the 1930s, local government was by far the most important of the three components of government. The Federal government did little more than pay for national defense, meet payments and interest on past wars, and finance a few public works. However, Federal expenditure rose sharply in the Great Depression, and even more during World War II. Since the war, Federal expenditures have generally continued to rise. However, the most significant growth since World War II in government has come from the state and local sectors. The compounded annual rate of growth from 1950-1981 for the Federal sector was 2.8 percent. The growth for the state and local sector for the same time period was 4.1 percent. Figure B-6 illustrates the trend of government expenditures for goods and services, broken out by Federal, and state and local sectors, from 1950 through 1981 in constant FY 72 dollars.

In addition to examining the government component of GNP which only addresses purchases of goods and services, we can shift our focus to the total Federal budget and examine the relative proportion of defense to nondefense expenditures. This comparison includes all Federal budget dollars, both those spent for transfer payments and those that are excluded from GNP.

FIGURE B-6
Trend of Government Expenditures
1950-1981
(Constant FY 82 Dollars)



If we break out Federal expenditures between defense and nondefense expenditures, we get an interesting picture of trends of government expenditures in the past three decades. Figure B-7 illustrates how the portion of the Federal expenditures allocated to defense has shrunk relative to the nondefense sector. Dr. Jack Borsting, former Assistant Secretary of Defense (Comptroller), further disaggregated the total Federal budget into three categories as follows: defense, human resources, and all other functions of government.[1] During the decade of the 1940s and 1950s, over 50 percent of the Federal budget went for defense with the remaining portion about evenly split between human resources and all other activities. In the decade of the 1970s and the remainder of this decade, defense will average about 30 percent of the Federal budget.

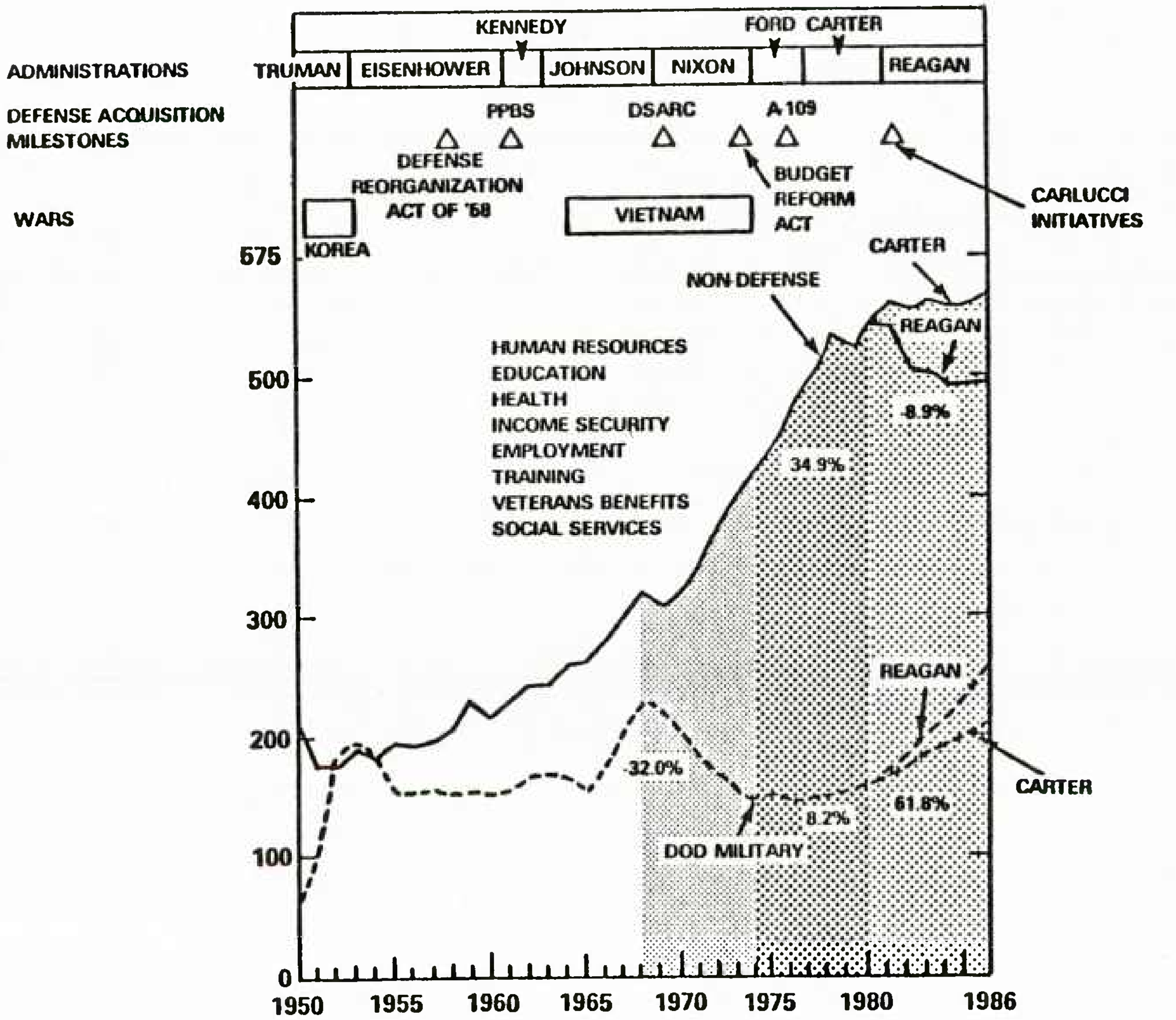
We have now followed the money flow process down to the defense expenditure level. The next section will examine trends in defense expenditures over the past three decades.

B.3 QUANTITATIVE ANALYSIS OF DOD TOPLINE BUDGET TURBULENCE

As previously discussed, the topline budget turbulence refers to the changes in the DOD budget that impact on the

FIGURE B-7

Defense vs. Nondefense Programs
(Federal Outlays)
$ Billions
Constant FY 82 Dollars



SOURCE: BORSTING, J.R., "DECISION MAKING AT THE TOP", MANAGEMENT SCIENCE, VOL. 28, NO. 4, APRIL 1982.
QUALITATIVE INFORMATION ADDED BY AUTHORS.

DOD and service appropriations categories and acquisition programs. The program turbulence and interactions among service budget accounts are not the results of a simple cause-and-effect relationship. Nevertheless, budget turbulence necessarily causes turbulence below the topline DOD budget requiring attention to turbulence in terms of various budget accounts, activities, and program levels (i.e., Program element numbers (PENS)/line-item numbers (LINS)).

The quantitative analysis of budget turbulence addresses trends in defense spending and evaluates the turbulence in the DOD budget from fiscal year to fiscal year since 1950. The examination includes data analysis of TOA data but does not include FYDP projected estimates or actual data. Three categories of budgetary data have been defined as the basis for this quantitative analysis: (1) topline DOD TOA trends from FY 50 through FY 81, (2) selected major appropriation accounts from FY 64 through FY 81, and (3) selected service weapons systems procurement data (i.e., program line-item data) from FY 80 through FY 83.

Prior to discussing each of these categories in greater detail, definitions of budget terms are described in the following paragraphs.

B.3.1 Definitions of DOD Budget Terms

The following budget definitions describe the terms TOA, Budget Authority, and Outlays:

- Total Obligational Authority (TOA). TOA refers to the value of the direct defense program for each year. The direct program for a particular year is financed in part from prior year balances of Budget Authority. TOA does not reflect certain transactions, such as trust fund sales, but does include the proceeds of off-the-shelf sales to other nations which are used to acquire new items (inventory replacement). Thus, the TOA for DOD, a service, or a program for any particular year may vary from that year's Budget Authority.

- Budget Authority (BA). Budget Authority (BA) represents the legal authority to incur obligations. That is, it is the authority to hire personnel or enter into contracts involving expenditures of funds from the Treasury within a specified period of time.

Various accounts (i.e., R&D, aircraft, or ship appropriations) have associated periods of time (1, 3, or 5 years, respectively) within which the funds must be obligated (i.e., liability is incurred). In most cases, Budget Authority is provided by the appropriation process. The most significant exceptions involve the transactions of the trust fund for foreign military sales and sales from stockpile.

- <u>Outlays</u>. Outlays represent expenditures or net checks issued. On the average, about three-fourths of the outlays for a fiscal year result from the fiscal year's <u>Budget Authority</u>. The remainder will result from the Budget Authority provided in previous years. There is a constant pressure exerted to incur <u>Obligations</u> and <u>Outlays</u> in the same year as the Budget Authority. The funds are carried in the appropriate account for a specific segment of time beyond the period for obligation. After that period, small outlays are authorized from special service accounts established for that purpose. Significant tardy outlays require passage of a special bill by Congress.

These definitions were developed based on information contained in DOD budget references. Three categories of budget data are described in greater detail in the following paragraphs.

B.3.2 Topline DOD TOA History From FY 50 Through FY 81

The analysis of TOA history from FY 50 through FY 81 examines long-term trends in defense spending and the variability of the DOD budget over the last three decades. The graphic portrayal of this information provides a comparative analysis of the behavior pattern of the DOD budget and an historical perspective of this behavior pattern as influenced by wars, changes in administrations, geopolitical milestones, and defense acquisition milestones.

Extensive commentary and analysis have been published on the trends in DOD spending and the historic impact of the DOD budget on the nation's economy. The following discussion of budgetary trends is not intended to merely repeat what has been examined before, but to provide a means of reference and insight into those historic factors contributing to topline budget turbulence.

Measured in constant fiscal year 1983 dollars, TOA for defense followed a generally rising trend in the 1950s and 1960s, peaking during the Vietnam War period. TOA then declined sharply in real terms until 1975, after which it began to increase modestly. TOA continued to rise through the remainder of the decade and today approximates the level of the early 1960s. Figure B-8 illustrates these trends. Another way of looking at defense expenditure trends is as a percent of GNP. Figure B-9 shows that defense spending as a percent of GNP has fluctuated within a relatively narrow band, typically ranging from 8 to 10 percent of the GNP. After the Vietnam War, however, defense spending fell quickly to about 5 percent of GNP. The last several years have seen defense spending as a percentage of GNP begin to rise.

B.4 DOD TOA AND PRINCIPAL APPROPRIATION TURBULENCE

This section provides a detailed analysis of the turbulence inherent in the DOD budget from FY 64 through FY 81 by TOA and principal appropriations accounts (i.e.,

FIGURE B-8
Total Obligational Authority for Defense
Since 1950
(FY 83$)

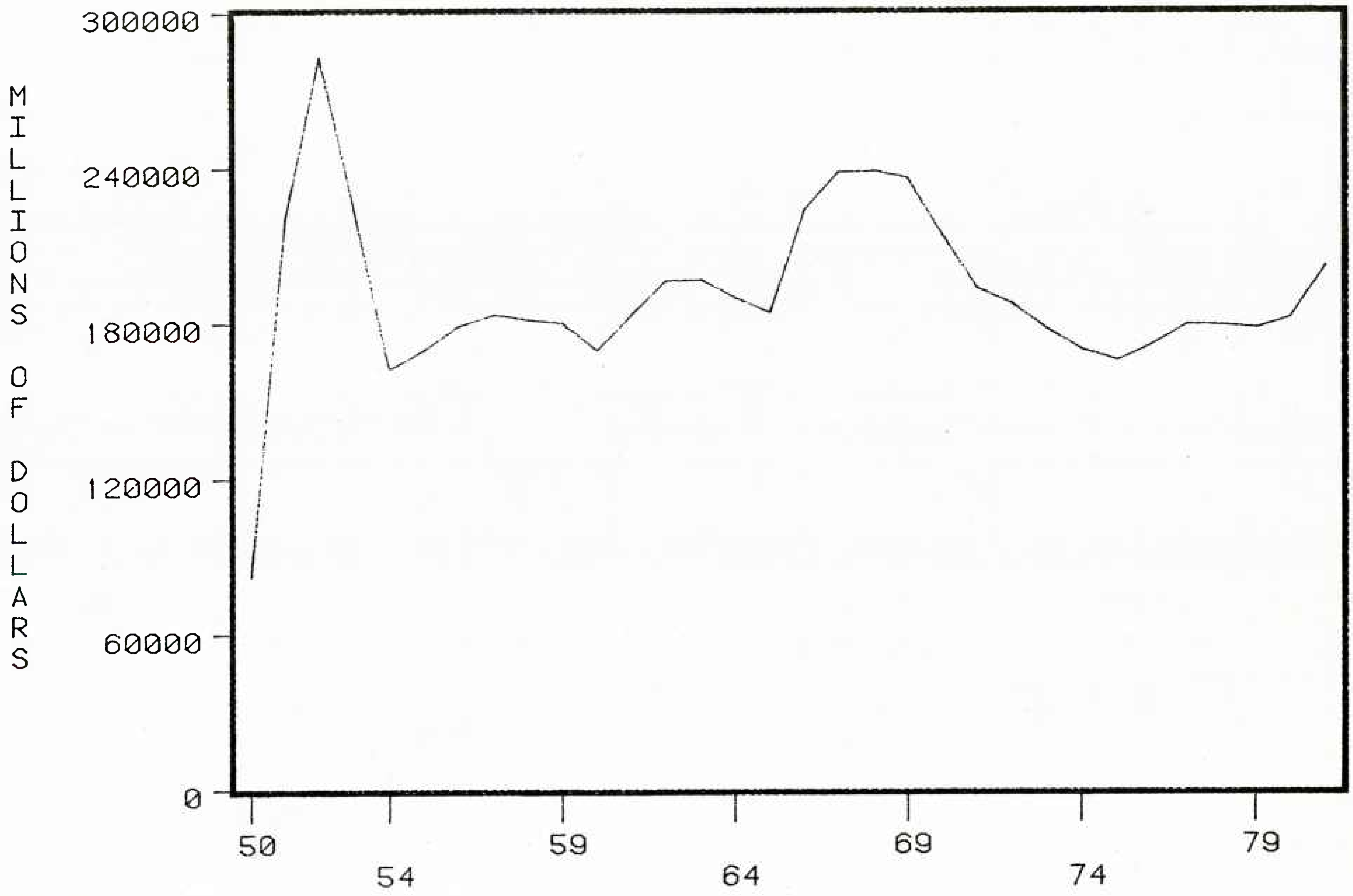
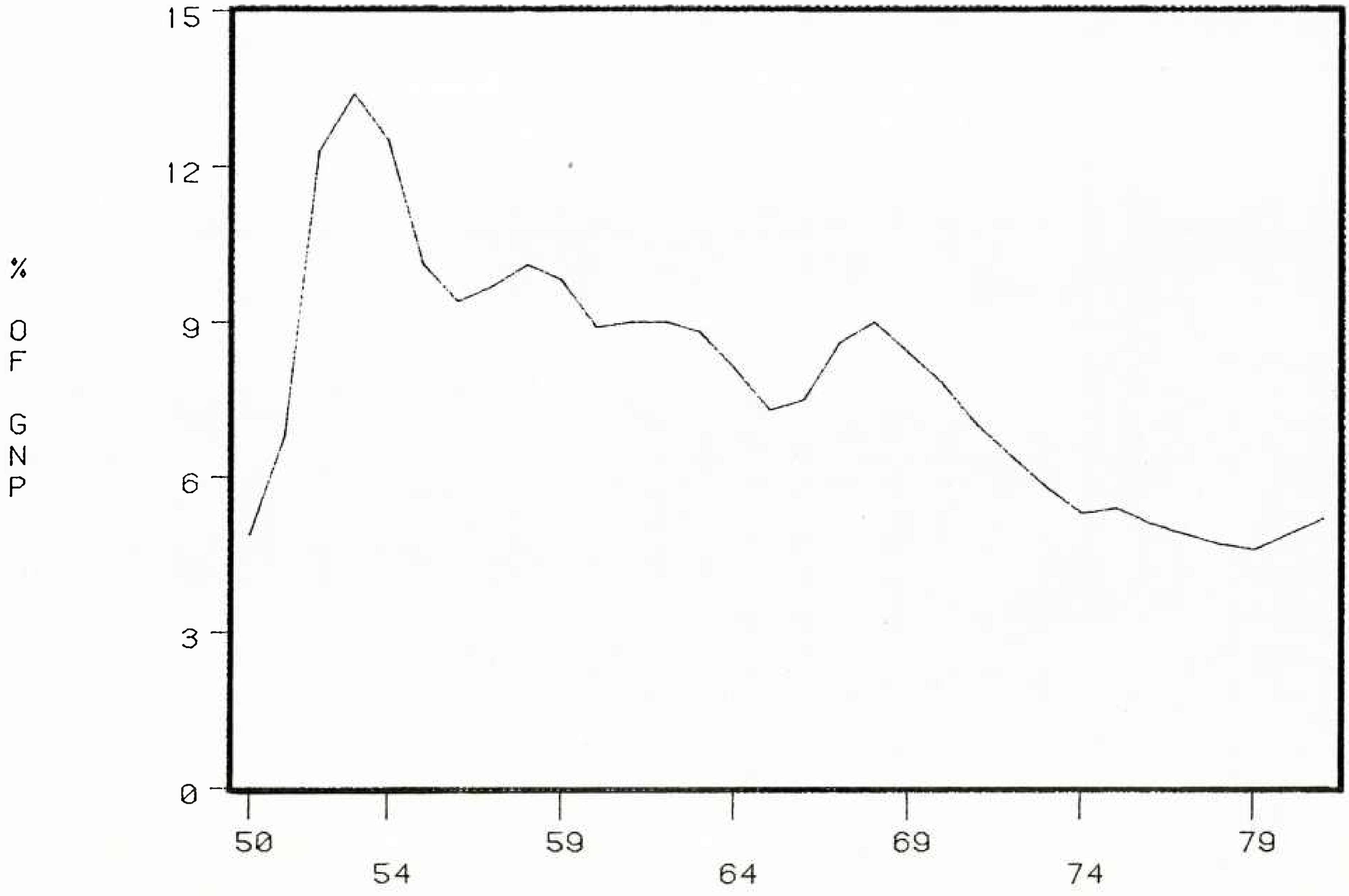


FIGURE B-9

DEFENSE AS A PERCENT OF
GNP SINCE 1950

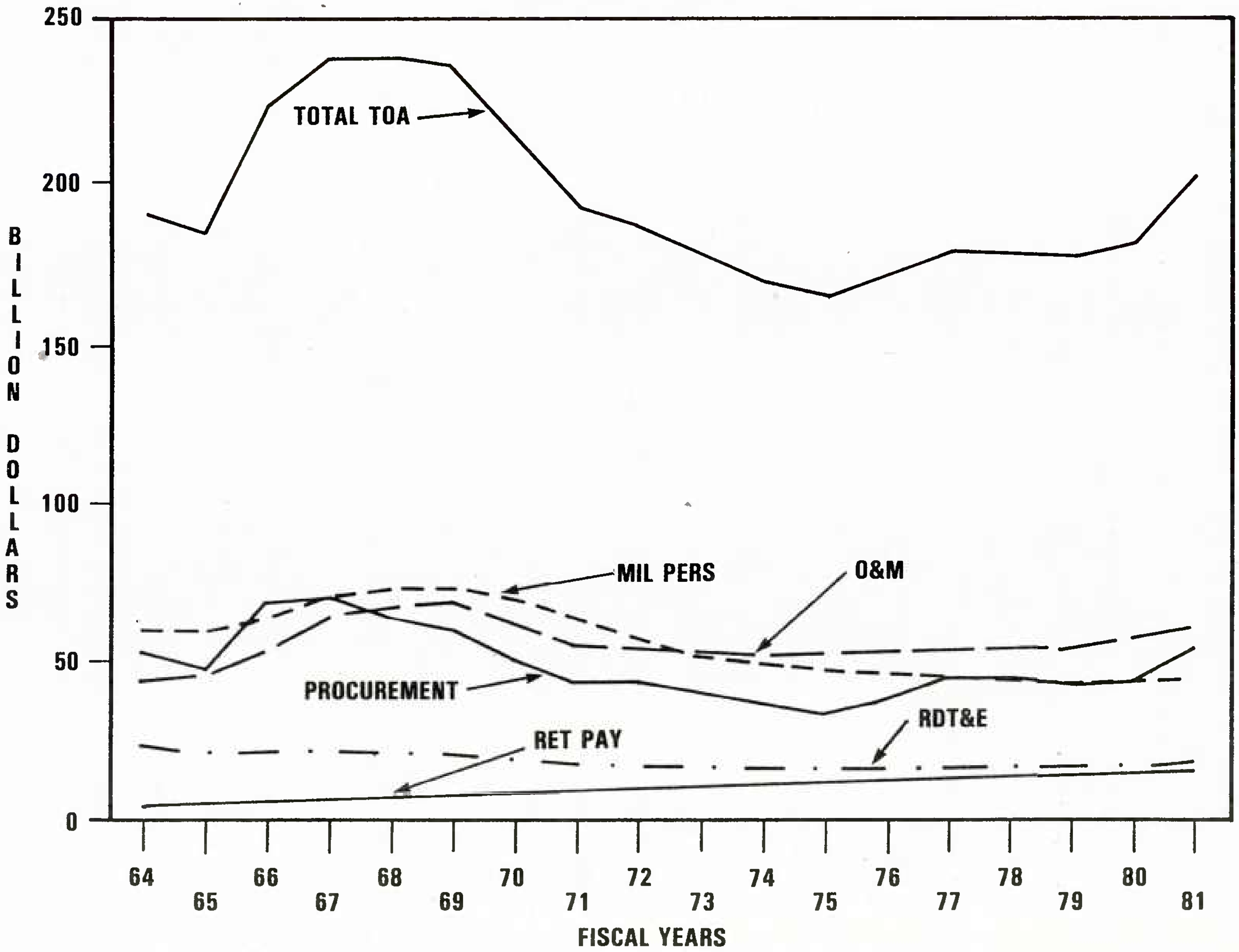


Military Personnel, Operations and Maintenance (O&M), Procurement, RDT&E, and Retired Pay). The FY 64-FY 81 time frame was selected to establish a period for maintaining consistency in budget definitions and data orientation as well as appropriations account line-item data. Prior to FY 64 procurement account line-item data entries were not similar to the current procurement line-item data. A similar situation existed in the Navy procurement account from 1964 through 1974. Prior to 1974 the Navy procurement appropriation financed the procurement of aircraft, missiles, associated support equipment, spares, and modifications for Navy and Marine Corps Air Wings. Beginning in 1974 these programs were financed in two new appropriations: Aircraft Procurement and Weapons Procurement, Navy. In order to maintain a consistent audit of appropriations in service procurement accounts, the Total Direct Obligations dollar amounts were used. These amounts were listed in current year dollars and converted to FY 83 constant dollars.

The historical summary of topline TOA from FY 64-FY 81, by appropriation account, in both current and constant FY 83 dollars, was obtained from the OSD Comptroller (March 1982) National Defense Budget Estimates for FY 83. This historical summary is shown in Figure B-10 for constant FY 83 dollars.

FIGURE B-10

TOA BY DOD AND PROGRAM ACCOUNT
($ BILLIONS, FY 83 $)



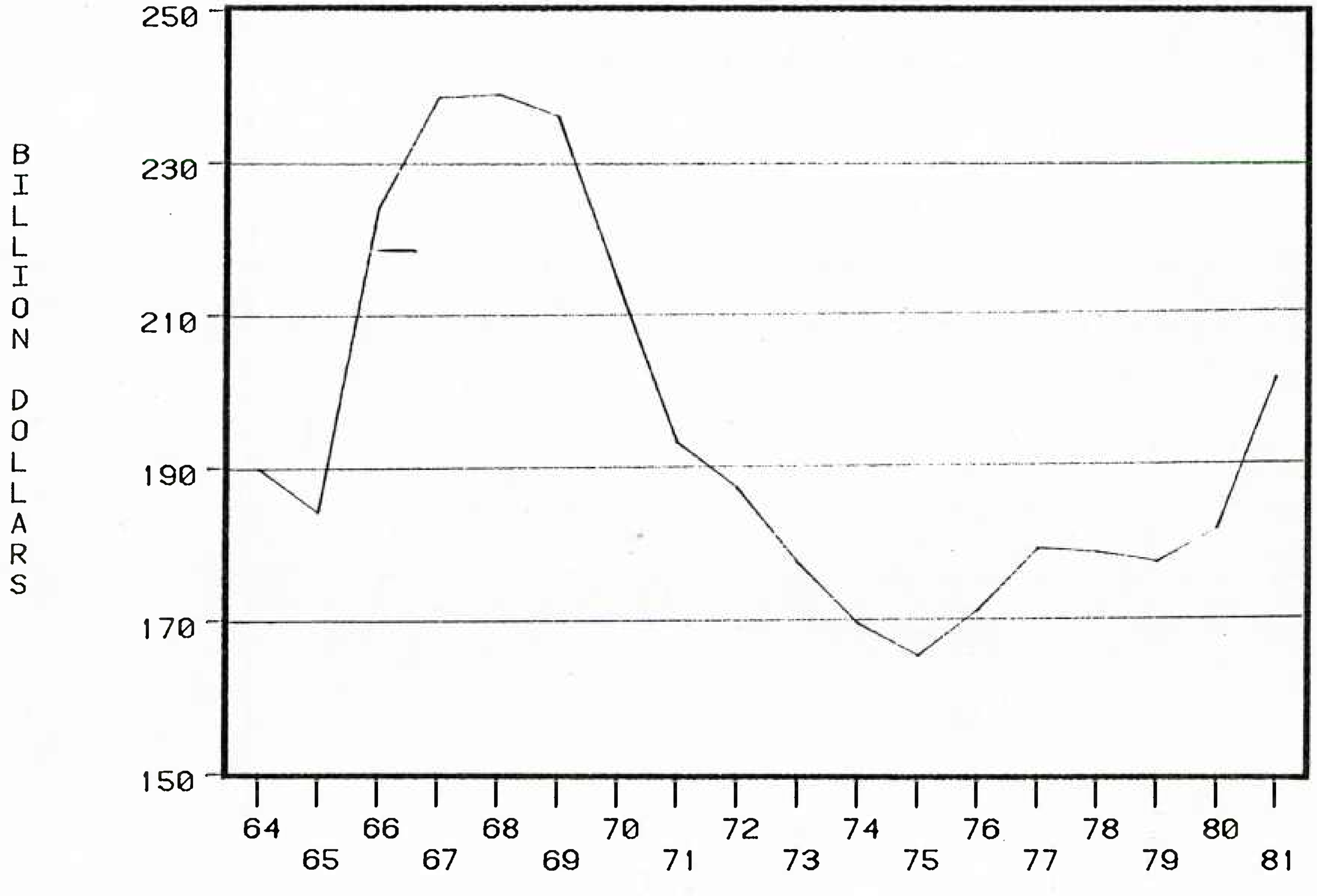
SOURCE: NATIONAL DEFENSE BUDGET ESTIMATES FY 83, OSD COMPTROLLER

The total DOD TOA and the five principal appropriations accounts shown in Figure B-10 were analyzed statistically to determine turbulence. As described in the introduction to this chapter, both the absolute amount of change and the relative change are two dimensions of turbulence that are of interest. Both the absolute and the relative changes were analyzed for total TOA and the princpal appropriation accounts. The analysis derived the following statistical measures: range, arithmetic mean, and the standard deviation for both the absolute and relative changes in TOA and all the principal appropriation accounts. These statistical measures are relatively sensitive for small samples and are affected by extreme variations within the data. However, the range and standard deviation do provide a straightforward means of numerically rank-ordering the turbulence among appropriation accounts.

Figure B-11 shows the total DOD TOA for the FY 64-FY 81 period. The DOD TOA annual absolute changes for this time period are shown in Figure B-12. Also given in this figure are the maximum range ($61.6 billion), the peak from the average ($39.9 billion), the low (-$21.7 billion), and the standard deviation ($14.73 billion). Figure B-13 shows the statistics for the relative changes in DOD TOA.

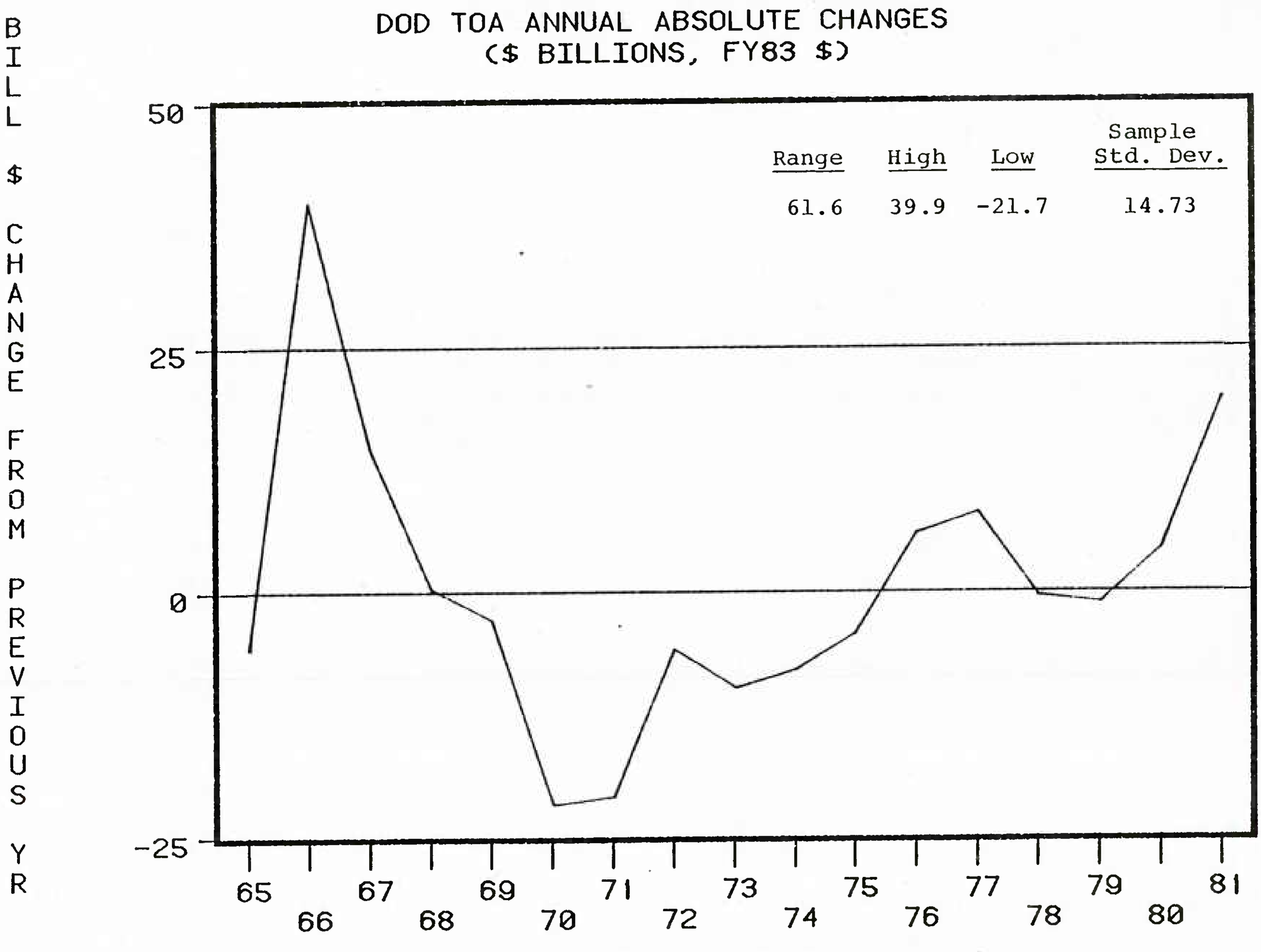
FIGURE B-11

DOD TOA (TOTAL)
($ BILLIONS, FY83 $)



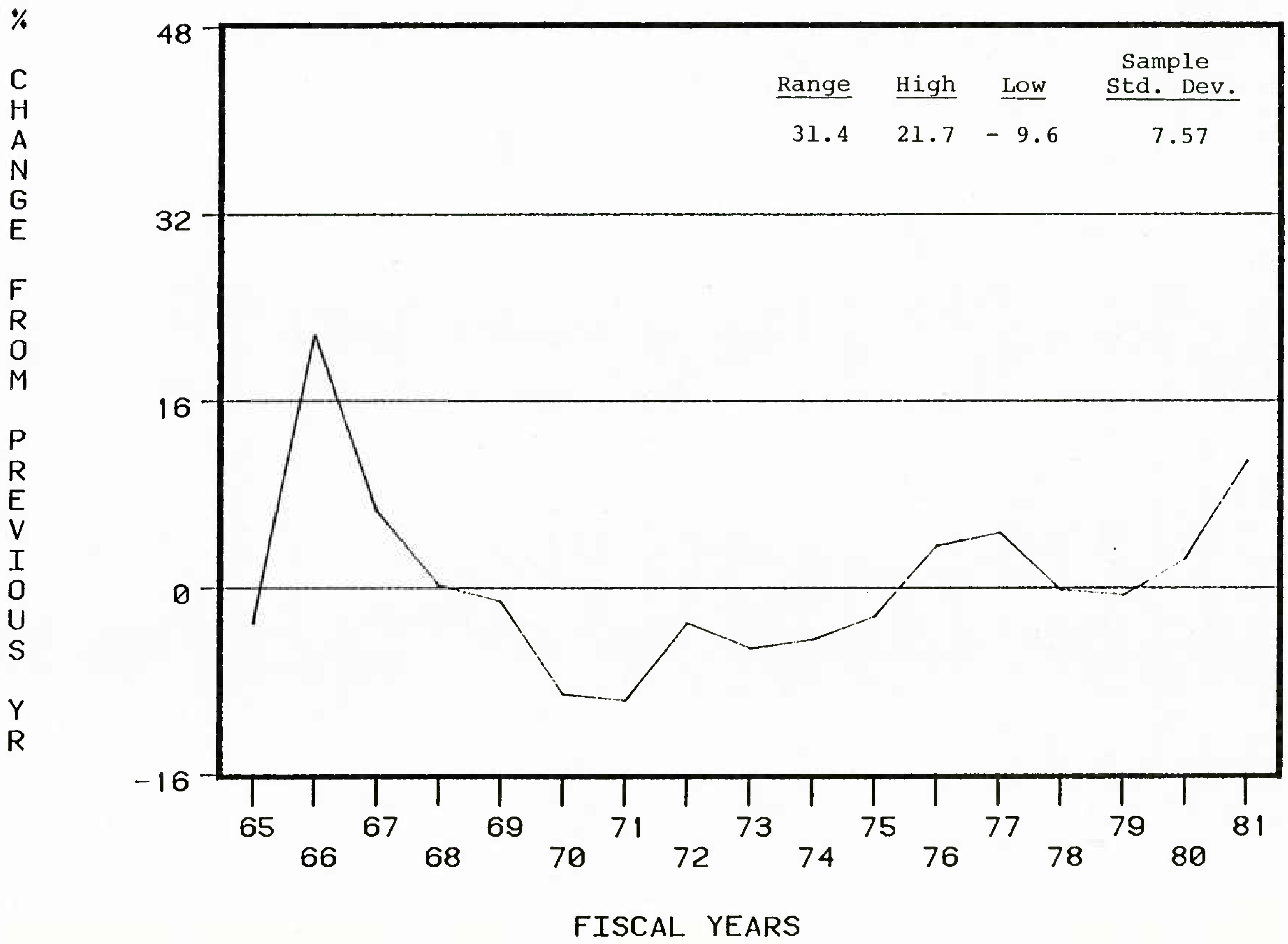
SOURCE: NATIONAL DEFENSE BUDGET ESTIMATES FY83, OSD COMPTROLLER

FIGURE B-12



SOURCE: NATIONAL DEFENSE BUDGET ESTIMATES FY83, OSD COMPTROLLER

FIGURE B-13
DOD TOA
Relative Annual Change



SOURCE: NATIONAL DEFENSE BUDGET ESTIMATES FY83, OSD COMPTROLLER

The plots and the statistics for the principal appropriation accounts are given in the following figures.

- Figure B-14: Procurement - TOA
- Figure B-15: Procurement - Absolute Change
- Figure B-16: Procurement - Relative Change
- Figure B-17: O&M - TOA
- Figure B-18: O&M - Absolute Change
- Figure B-19: O&M - Relative Change
- Figure B-20: Military Personnel - TOA
- Figure B-21: Military Personnel - Absolute Change
- Figure B-22: Military Personnel - Relative Change
- Figure B-23: RDT&E - TOA
- Figure B-24: RDT&E - Absolute Change
- Figure B-25: RDT&E - Relative Change
- Figure B-26: Retired Pay - TOA
- Figure B-27: Retired Pay - Absolute Change
- Figure B-28: Retired Pay - Relative Change.

For convenience, these figures are located at the end of this appendix starting on page B-58. The statistics from these figures are aggregated in Table B-2 so comparison among the accounts may be made.

TABLE B-2

Annual Change

Absolute Dollar Changes (FY 83 $B)

Budget Account	Range	Max	Min	Standard Deviation
TOA (For comparison only)	61.6	39.9	-21.7	14.73
1. Procurement	30.5	21.1	-9.4	7.48
2. O&M	18.1	11.0	-7.1	4.39
3. Military Personnel	13.8	7.2	-6.6	3.52
4. RDT&E	4.5	2.0	-2.5	1.10
5. Retired Pay	0.4	0.8	0.4	0.10

Percentage Change

TOA (For comparison only)	31.4	21.7	-9.6	7.57
1. Procurement	59.9	44.3	-15.6	15.74
2. O&M	32.1	20.6	-11.4	7.97
3. Military Personnel	21.8	11.4	-10.4	5.64
4. RDT&E	22.7	11.8	-10.9	5.66
5. Retired Pay	9.9	12.8	2.8	3.01

The following observations can be made following an analysis of Figures B-14 through B-28 and the statistics in Table B-2:

- The Procurement account, generally running between $30 billion to $70 billion annually, undergoes more fluctuations (i.e., annual changes and absolute changes) than any other appropriations account used in this comparison. After experiencing a long-term decline since the mid-60s, this account has increased most significantly (in absolute terms) since the mid-70s.

- The O&M account ranges between $44 billion and $69 billion annually and undergoes less fluctuation annually than procurement, but more than the remaining accounts. However, the rate of increase in this account has been more moderate than procurement since FY 75.

- The Military Personnel and RDT&E accounts undergo similar annual changes, though the personnel account ranges from $43 billion to $73 billion annually, and the RDT&E account ranges from $16 billion to $23 billion annually. Though the

RDT&E account is small in comparison to the Procurement and Operations accounts, and quite stable (in absolute terms), it has significant influence on the modernization of the force structure, particularly in the technology development, innovative modifications, and dollar costs that are passed on to the equipment and O&M accounts.

The Retired Pay Account has increased steadily with time (supporting a larger retirement base) and the annual changes have steadily decreased since 1964.

B.5 PROCUREMENT TURBULENCE

Although the other principal appropriations are of some interest, it is turbulence in the procurement appropriations that is of central concern in this study. Turbulence measurements for the procurement account and the principal equipment accounts, i.e., aircraft, missiles/weapons, ships, combat vehicles, and other procurement, were derived during this study. A discussion of these efforts follows.

The analytical process for determining the turbulence at this level is the same as that used for the DOD TOA and the principal appropriation categories. The data used for the analysis are from the budgets of the U.S. Government FY 64-FY 83 published through OMB; the data are given in total obligational authority. Plots are shown for the relative (annual percent) change only as follows:

- Figure B-29: Total Procurement
- Figure B-30: Total Aircraft
- Figure B-31: Total Missile
- Figure B-32: Shipbuilding and Conversion
- Figure B-33: Total Weapons and Combat Vehicles
- Figure B-34: Total Other.

These figures are at the end of this appendix starting at page B-68. The turbulence statistics for both the absolute and the relative changes were computed and are shown in Tables B-3 and B-4, on pages B-66 and B-67.

B.6 ACQUISITION PROGRAM TURBULENCE

The purpose of this section is to identify and discuss a method of analyzing budget turbulence in selected key acquisition programs. The budget level associated with specific acquisition programs is shown as Block 12 in Figure B-1. Examples of specific acquisition programs are the F/A-18, the Pershing II Missile, and the AEGIS Cruiser CG-47.

Table B-5 depicts the budget categories and major decision points for evaluating short-term topline budget turbulence within the Procurement Account. This structure provides the means for tracing changes in the budget from topline procurement TOA to selected weapon system programs within each Service. Included within this structure is the Congressional Authorization and Appropriations process which encompasses tracing a selected program through each major decision point in the authorization and appropriation process (FY 80 through FY 83) from the Presidential request through Congressional committees and conferences until it is enacted into public law.

Specific programs (a total of 42) within each of the Service procurement categories were selected to provide a means of measuring budget turbulence within specific program element numbers (PENs). These programs are shown in Table B-5. Program selection criteria were based on those PENs identified as stable programs within DOD and on those reported to Congress in the Selected Acquisition Reports. In addition, several of these programs have been the subject of numerous studies and Congressional hearings on weapon systems cost growth, system acquisition management, program stretchout, and efficiency of weapon acquisition policies and procedures.

The analysis is based on budgetary data obtained from the OSD Comptroller, National Defense Budget Estimates for

TABLE B-5
Structure Model for DOD Topline Budget Turbulence Analysis

Structure Model for DOD Topline Budget Turbulence Analysis
(Budget data for each row and column entry in this matrix are included in Appendix D)

FY 80	FY 81			FY 82			FY 83	
TOA Actual	Carter Revised Estimates	Reagan Amendment (incl. Supplemental Request)	TOA Approved	Carter Revised Estimates	Reagan Budget Amendment	TOA Approved	Reagan Initial Request	TOA Approved

- DOD TOA (Topline)
- DOD Procurement (TOA)
- Service Procurement (TOA)
  - U.S. Army
    - Aircraft
    - Missiles
    - Weapons/Combat Vehicles
  - U.S. Navy
    - Aircraft
    - Missiles (Weapons)
    - Shipbuilding and Conversion
    - Marine Corps Procurement
  - U.S. Air Force
    - Aircraft
    - Missiles

(Annual Congressional Authorizations and Appropriations Processes)

Authorizations Process					Appropriations Process				
House Armed Services (HASC)	HOUSE	Senate Armed Services (SASC)	SENATE	CONFERENCE	House Appro-priations (HAC)	HOUSE	Senate Appro-priations (SAC)	SENATE	CONFERENCE

TABLE B-5 (cont'd)
Structure Model for DOD Topline
Budget Turbulence Analysis

<u>Structure Model for DOD Topline Budget Turbulence Analysis</u>
(Budget data for each row and column entry in this
matrix are included in Appendix D)

FY 80	FY 81			FY 82			FY 83	
TOA Actual	Carter Revised Estimates	Reagan Amendment (incl. Supple-mental Request)	TOA Approved	Carter Revised Estimates	Reagan Budget Amendment	TOA Approved	Reagan Initial Request	TOA Approved

<u>Selected Weapons Systems Acquisition Programs by Service and Procurement Account (N = 42)</u>

.. U.S. Army (N = 11)

- Aircraft (N = 2)
  - -- Blackhawk UH-60A
  - -- Apache AH-64
- Missiles (N = 5)
  - -- Hellfire
  - -- MLRS
  - -- Patriot
  - -- Stinger
  - -- Pershing II
- Weapons/Combat Vehicles (N = 4)
  - -- Fighting Vehicle System
  - -- M60A3 Tank
  - -- M1 Tank
  - -- DIVAD

(Annual Congressional Authorizations and
Appropriations Processes)

<u>Authorization Process</u>

House Armed Services (HASC)	HOUSE	Senate Armed Services (SASC)	SENATE	CONFERENCE

<u>Appropriations Process</u>

House Appro-priations (HAC)	HOUSE	Senate Appro-priations (SAC)	SENATE	CONFERENCE

TABLE B-5 (cont'd)
Structure Model for DOD Topline
Budget Turbulence Analysis

Structure Model for DOD Topline Budget Turbulence Analysis
(Budget data for each row and column entry in this matrix are included in Appendix D)

FY 80	FY 81			FY 82			FY 83	
TOA Actual	Carter Revised Estimates	Reagan Amendment (incl. Supplemental Request)	TOA Approved	Carter Revised Estimates	Reagan Budget Amendment	TOA Approved	Reagan Initial Request	TOA Approved

Selected Weapons Systems Acquisition Programs by Service and Procurement Account (cont'd)

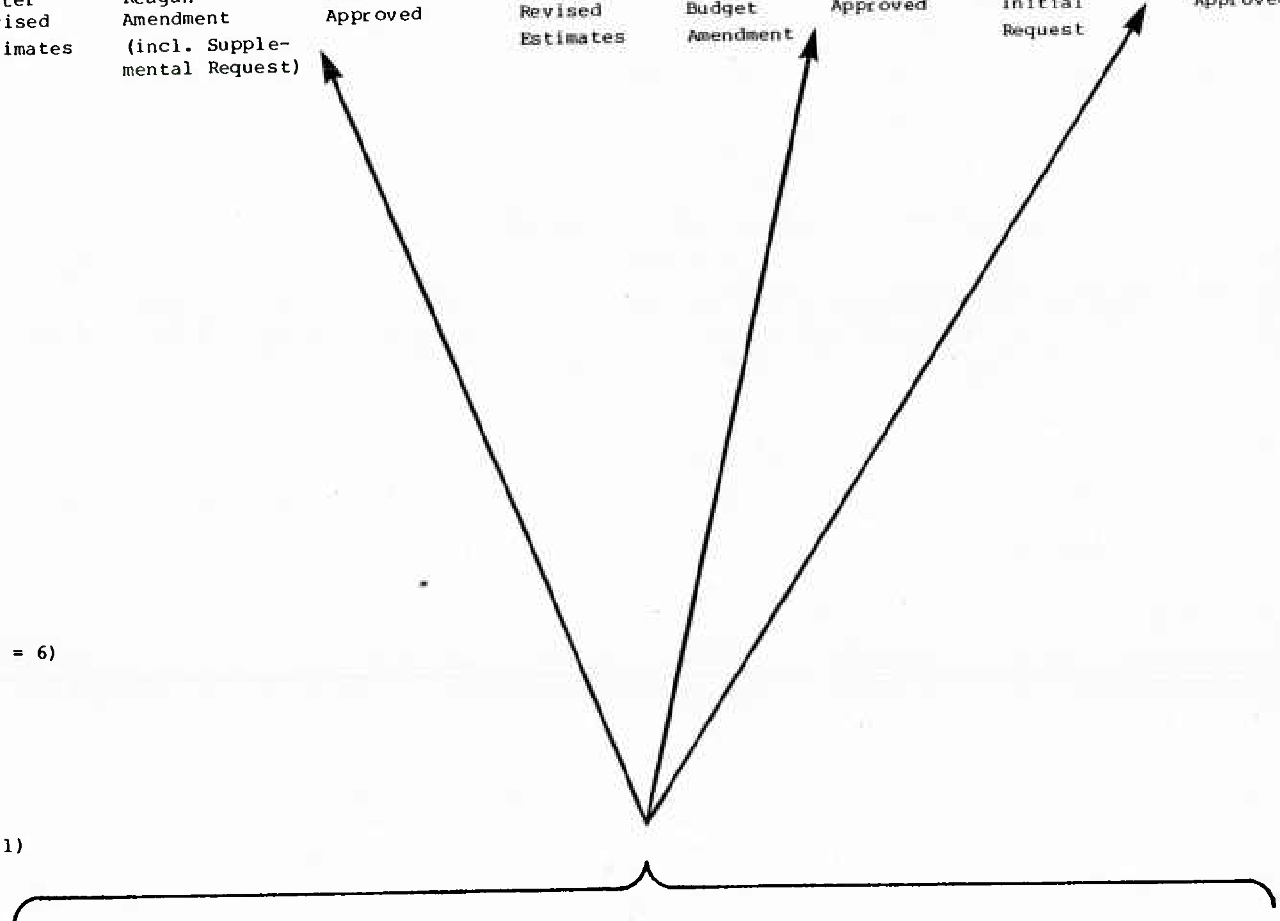
.. U.S. Navy (N = 18)

- Aircraft (N = 7)
  -- A-6E Intruder
  -- F-14A Tomcat
  -- F/A-18 Hornet
  -- AV-8B Harrier
  -- CH-53A Super Stallion
  -- P-3C Orion
  -- SH-60B Seahawk

- Missiles (N = 4)
  -- Tomahawk
  -- Sidewinder
  -- Phoenix
  -- HARM

- Shipbuilding and Conversion (N = 6)
  -- TRIDENT Submarine (SSBN)
  -- NIMITZ Carrier (CVN)
  -- SSN-688 Attack Submarine
  -- LSD-41
  -- FFG-7
  -- CG-47

- Marine Corps Procurement (N = 1)
  -- LVT 7A1



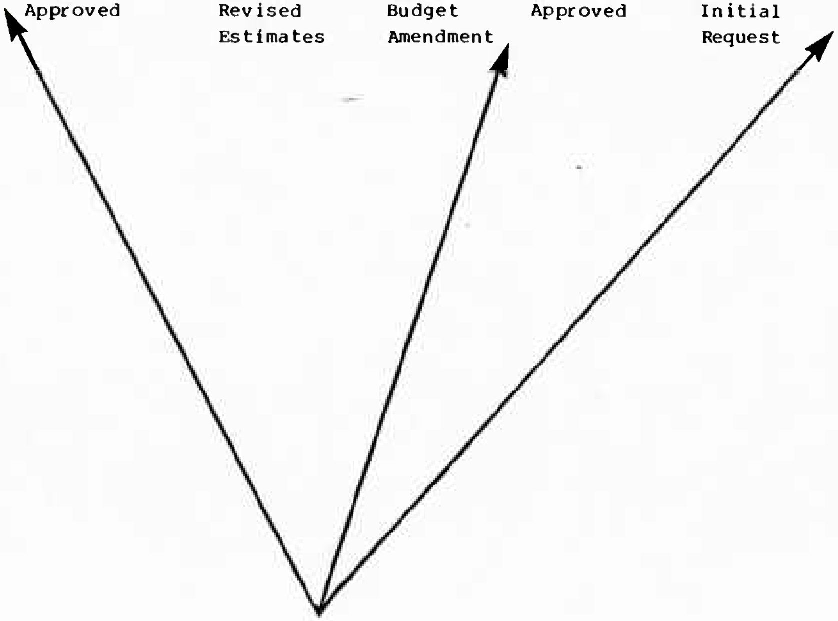
(Annual Congressional Authorizations and Appropriations Processes)

Authorizations Process					Appropriations Process				
House Armed Services (HASC)	HOUSE	Senate Armed Services (SASC)	SENATE	CONFERENCE	House Appro-priations (HAC)	HOUSE	Senate Appro-priations (SAC)	SENATE	CONFERENCE

TABLE B-5 (cont'd)
Structure Model for DOD Topline Budget Turbulence Analysis

<u>Structure Model for DOD Topline Budget Turbulence Analysis</u>
(Budget data for each row and column entry in this matrix are included in Appendix D)

FY 80	FY 81			FY 82			FY 83	
TOA Actual	Carter Revised Estimates	Reagan Amendment (incl. Supplemental Request)	TOA Approved	Carter Revised Estimates	Reagan Budget Amendment	TOA Approved	Reagan Initial Request	TOA Approved



<u>Selected Weapons Systems Acquisition Programs by Service and Procurement Account (cont'd)</u>

.. U.S. Air Force (N = 13)

- Aircraft (N = 5)
  - -- F-15 Eagle
  - -- F-16 Falcon
  - -- A-10 Thunderbolt II
  - -- E-3A Sentry
  - -- B-1B
- Missiles (N = 8)
  - -- ALCM
  - -- GLCM
  - -- Sidewinder
  - -- Sparrow
  - -- IR Maverick
  - -- Minuteman II/III ICBM
  - -- Mobile ICBM-MX
  - -- DSCS III

(Annual Congressional Authorizations and Appropriations Processes)

<u>Authorizations Process</u>

House Armed Services (HASC)	HOUSE	Senate Armed Services (SASC)	SENATE	CONFERENCE

<u>Appropriations Process</u>

House Appro-priations (HAC)	HOUSE	Senate Appro-priations (SAC)	SENATE	CONFERENCE

FY 83, Congressional Military Posture, DOD Authorizations and Appropriations testimony (FY 81, FY 82, and FY 83) and the Data Resources, Inc., (DRI BUDGETRACK data base.[2][3][4][5] BUDGETRACK is a data base containing the history of programs as they are acted upon by Congress.

Procurement data (dollar amounts and equipment quantities) are for the Carter and Reagan administrations and include the following:

- The approved Procurement TOA for FY 80
- The revised Carter request for FY 81
- The Reagan supplemental amendment to the Carter FY 81 request and the Reagan FY 82 budget amendment
- The initial Reagan FY 83 request.

The following procurement categories were selected:

- U.S. Army: Aircraft, Missile, Weapons/Combat Vehicle Procurement
- U.S. Navy: Aircraft, Shipbuilding and Conversion, Weapons, Marine Corps Procurement

- U.S. Air Force: Aircraft and Missile Procurement.

The BUDGETRACK data base was accessed to provide Congressional budget history of selected weapons systems from FY 80 through FY 83. In addition, footnotes on each selected system have been edited and included in the output to provide an explanation of the significant actions associated with the fluctuations in the procurement item quantities and dollar amounts as these programs passed through the Congressional approval processes.

The selected program procurement data, documentation, and assumptions are included in Appendix E, Volume III These data have been structured to serve two functions: first, to graphically portray the DOD procurement budget turbulence generated by changing administrations and Presidential requests, and by the changes generated by internal Congressional authorization and appropriations processes. Second, this methodology provides a framework for quantitatively analyzing the absolute changes and net percent changes at different procurement activity levels. The differences between the requested funds for a particular procurement and the funds resulting from various congressional actions are shown in Appendix E for the selected procurement.

A detailed statistical analysis of the procurement data contained in Appendix E, was outside the scope of work. However, the raw data have been incorporated into the report to provide additional insight into the behavior pattern of topline turbulence and to illustrate how changes in specific PENs impact on service procurement appropriations.

B.7 TRANSMISSION OF TURBULENCE

In the previous section we measured budget turbulence as it occurs throughout the money flow process. There is a more fundamental question that remains to be answered: Does the turbulence at one level of the money flow process induce turbulence at another level of the money flow process? One method of determining an answer to this question involves the statistical measurement of turbulence at one level and the corresponding turbulence at another level. For example, are large changes at one level associated with large changes at another level over a given time period? Or are large changes at one level associated with seemingly random changes at another level? In the former case we may conclude that there is some degree of correlation or relationship. In the latter, we may conclude that there is little relationship between the two.

In statistics, the degree of the relationship can be quantified by use of the correlation coefficient. The correlation coefficient provides a measure of the degree of linear dependence between two variables. If the variables are independent, then the correlation coefficient is zero. The correlation coefficient is positive if there is linear dependence with large values of one variable being associated with large values of the other. If large values of one variable tend to be associated with small values of the other, the correlation coefficient is small. When one variable is perfectly predictable from the other on the basis of a linear function, the correlation coefficient is +1 or -1. The larger the correlation coefficient (in absolute value), the greater the degree of linear dependence between the variables. The correlation coefficient between x and y (r_{xy}) can be expressed as:

$$r_{xy} = \frac{\Sigma(X - \bar{X}) \quad (Y - \bar{Y})}{\sqrt{\Sigma(X - \bar{X})^2} \quad \sqrt{\Sigma(Y - \bar{Y})^2}}$$

It should be noted that variables having no causal relationship can be highly correlated, that is, high r does not necessarily establish the existence of a causal connection.

The correlation between the turbulence at one budget level and the next lower level can be visualized by graphing the two levels in the same figure. Figure B-35 shows the year-to-year dollar changes for both the GNP and the Federal budget for the 1950 to 1980 time frame. Visual inspection of this figure reveals very little similarity between the GNP and the Federal budget plots. The correlation coefficient for these two time series is 0.06, which indicates no statistically significant correlation between the turbulence in the dollar changes in the GNP and the Federal budget.

Plots of the percent changes in the GNP and the Federal budget for the 1950 to 1980 time frame are given in Figure B-36. The lack of similarity between these two plots is readily observed. This lack of correlation is borne out by a correlation coefficient of 0.11, which indicates no statistically significant correlation. Turbulence data for the 1950 to 1980 period were also plotted comparing changes in: (1) the Federal and the defense budgets and (2) the defense and the procurement budgets. These comparisons are shown in the following figures:

Figure B-37: Correlation Between Changes in Federal and Defense Budgets (absolute)

FIGURE B-35

CORRELATION BETWEEN CHANGES IN GNP & FEDERAL BUDGET
(BILLIONS OF FY83 $)

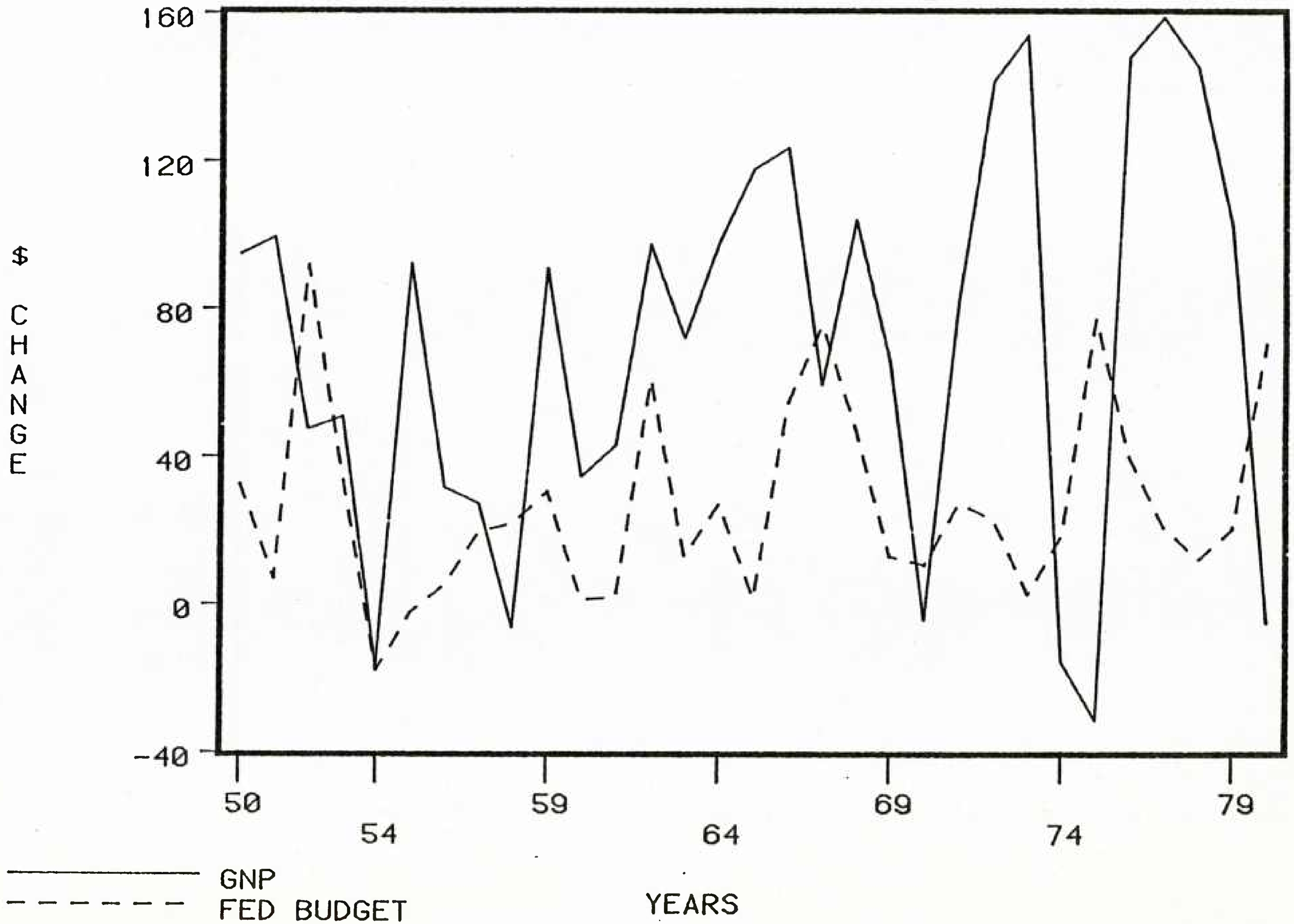
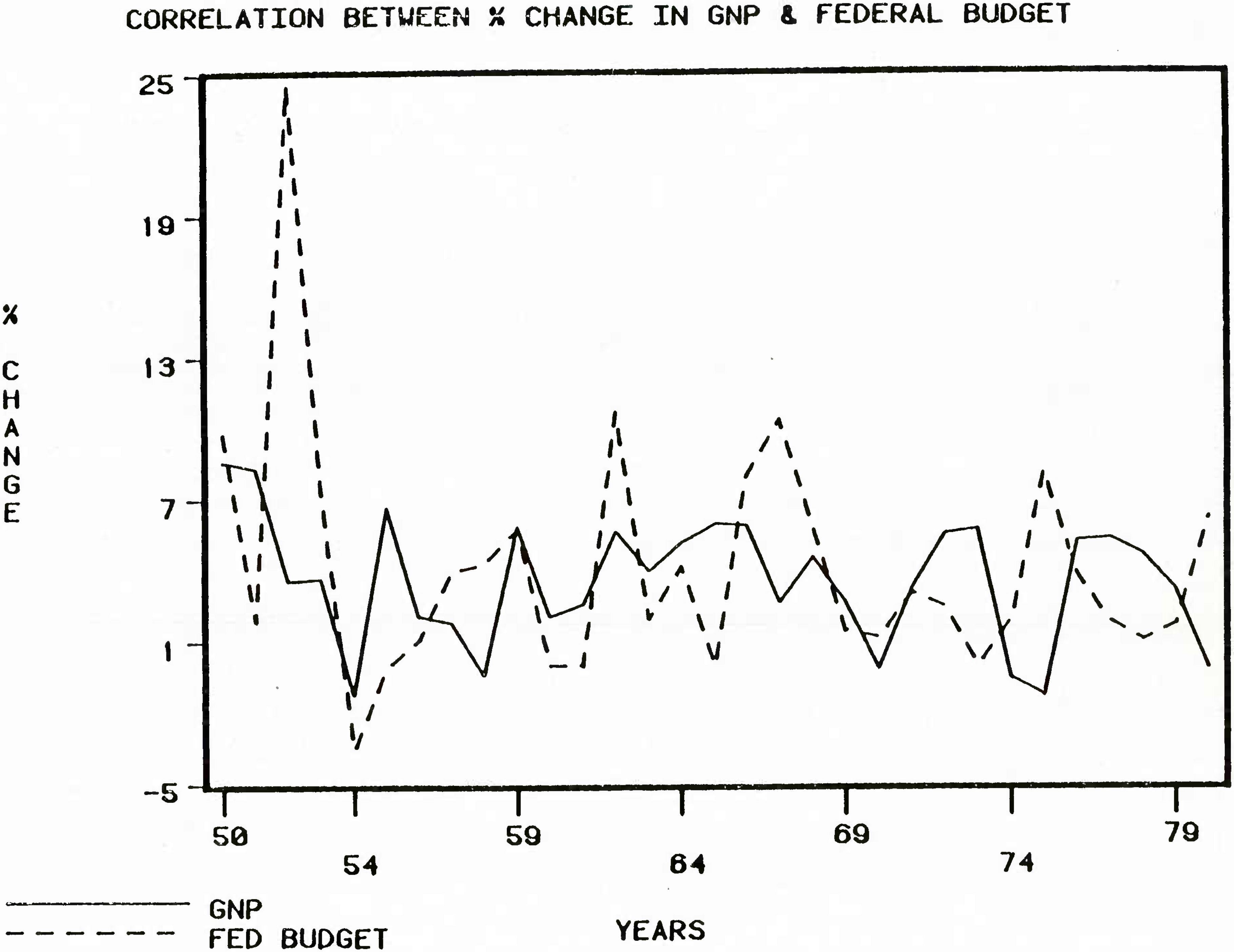
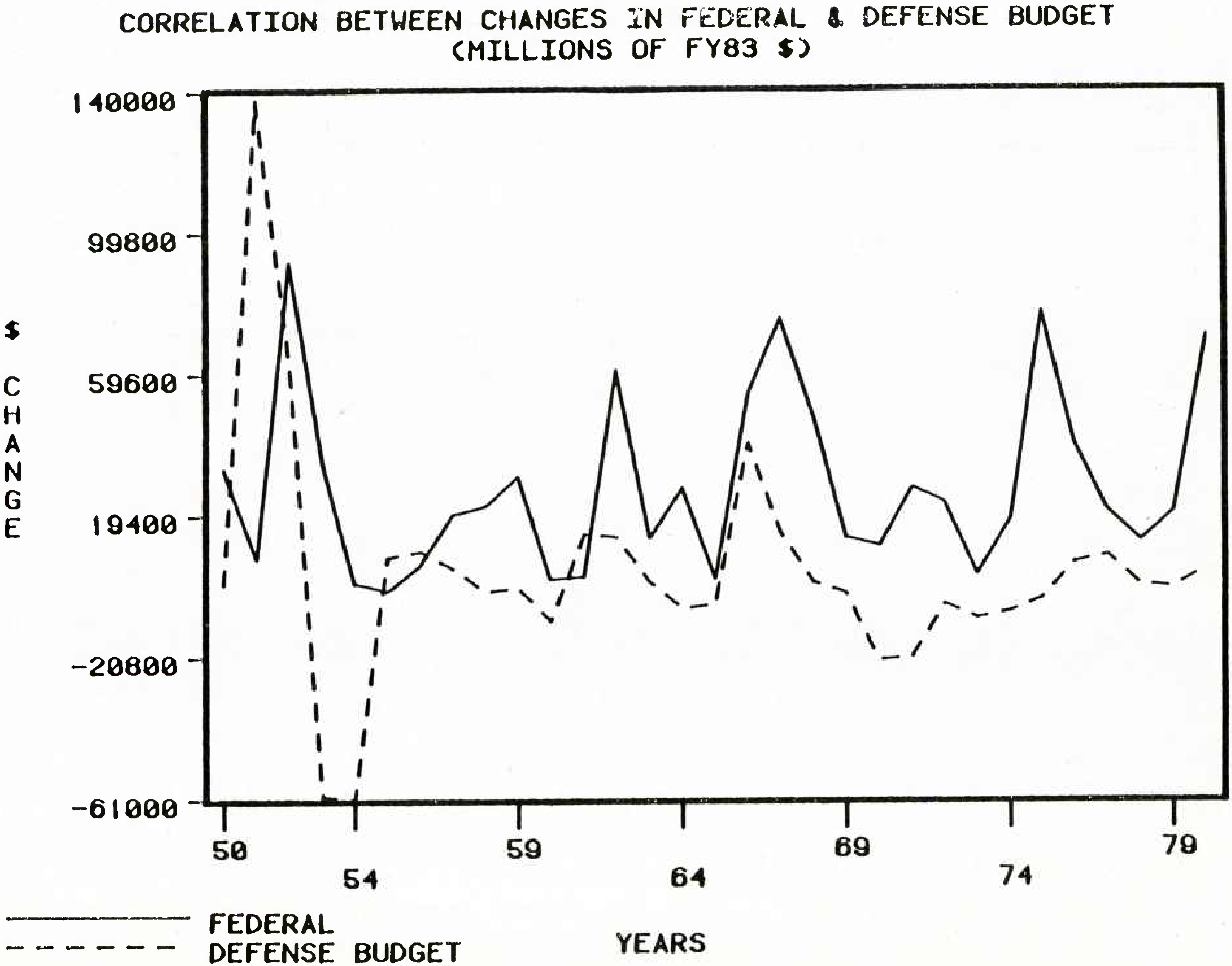


FIGURE B-36



CORRELATION BETWEEN % CHANGE IN GNP & FEDERAL BUDGET
25
19
13
7
1
-5
% CHANGE
50
54
59
64
69
74
79
GNP
FED BUDGET
YEARS

FIGURE B-37


CORRELATION BETWEEN CHANGES IN FEDERAL & DEFENSE BUDGET
(MILLIONS OF FY83 $)
$ CHANGE
140000
99800
59600
19400
-20800
-61000
50
54
59
64
69
74
79
YEARS
FEDERAL
DEFENSE BUDGET

- Figure B-38: Correlation Between Percent Change in Federal and Defense Budgets

- Figure B-39: Correlation Between Changes in Defenses Budgets and Procurement (absolute)

- Figure B-40: Correlation Between Percent Change in Defense Budget and Procurement.

The correlation coefficients for the data in these figures are:

• Federal and Defense (absolute)	0.24
• Federal and Defense (percent change)	0.11
• Defense and Procurement (absolute)	0.90
• Defense and Procurement (percent change)	0.97

Correlation coefficients were calculated in order to measure the turbulence transmission through the moneyflow process into several major elements of the procurement budgets. For consistency the 1964-1981 budget data discussed in the preceeding section were used in this analysis. The results of these calculations are presented in two tables. Table B-6 presents a correlation coefficient matrix that reflects the relationship of

FIGURE B-38

CORRELATION BETWEEN % CHANGE IN FEDERAL & DEFENSE BUDGET

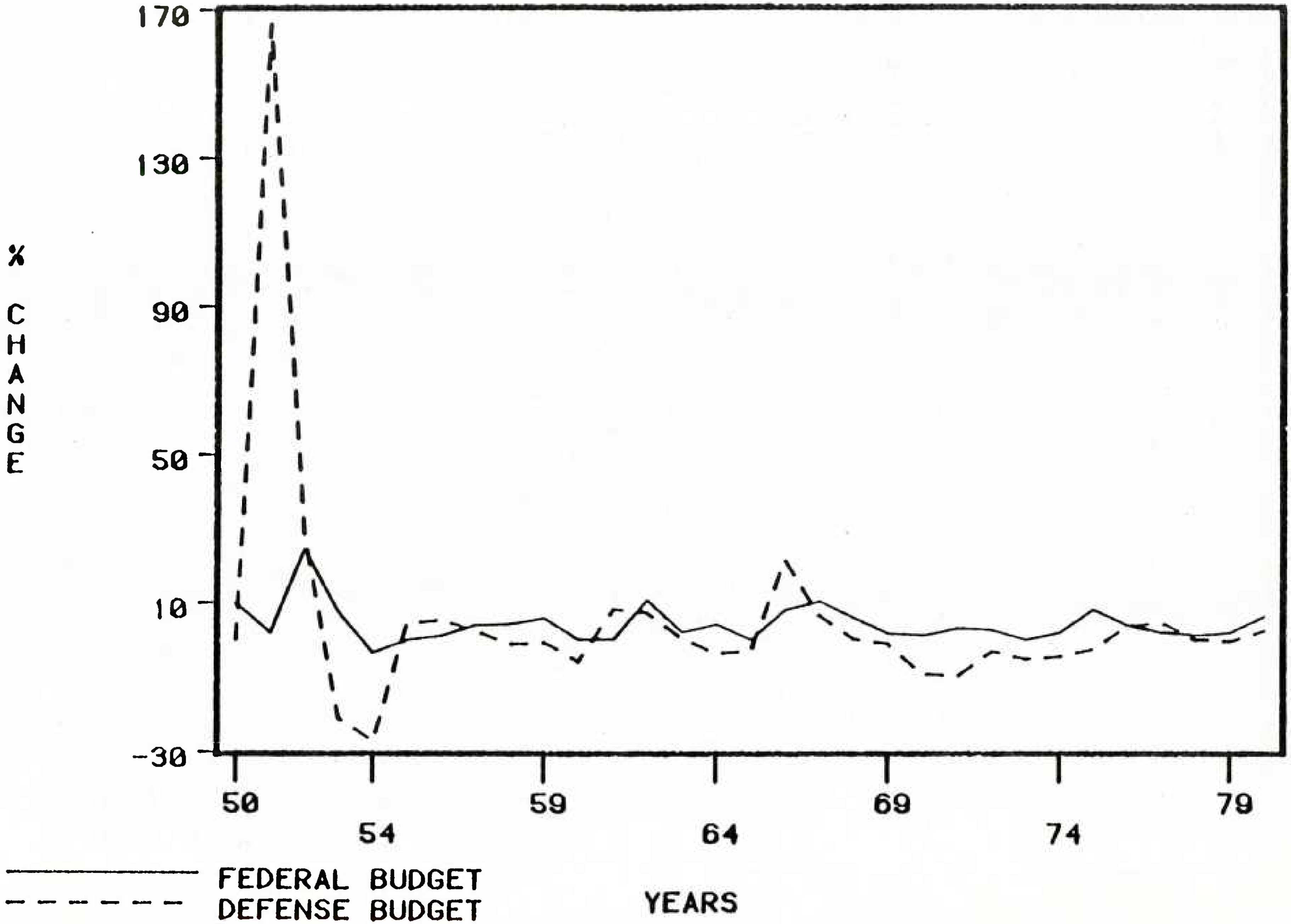


FIGURE B-39

CORRELATION BETWEEN CHANGES IN DEFENSE BUDGETS & PROCUREMENT
(MILLIONS OF FY83 $)

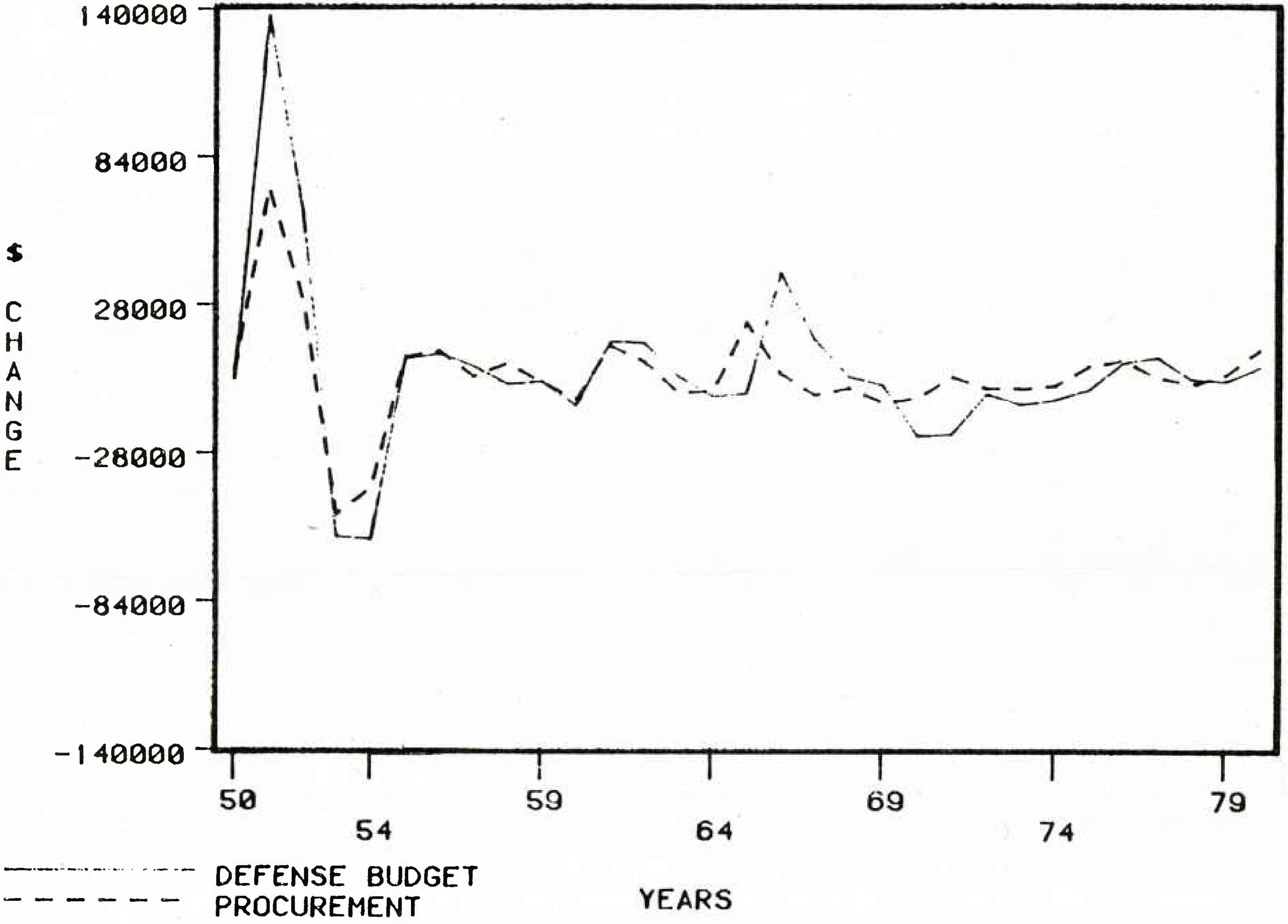


FIGURE B-40

CORRELATION BETWEEN % CHANGE IN DEFENSE BUDGET & PROCUREMENT

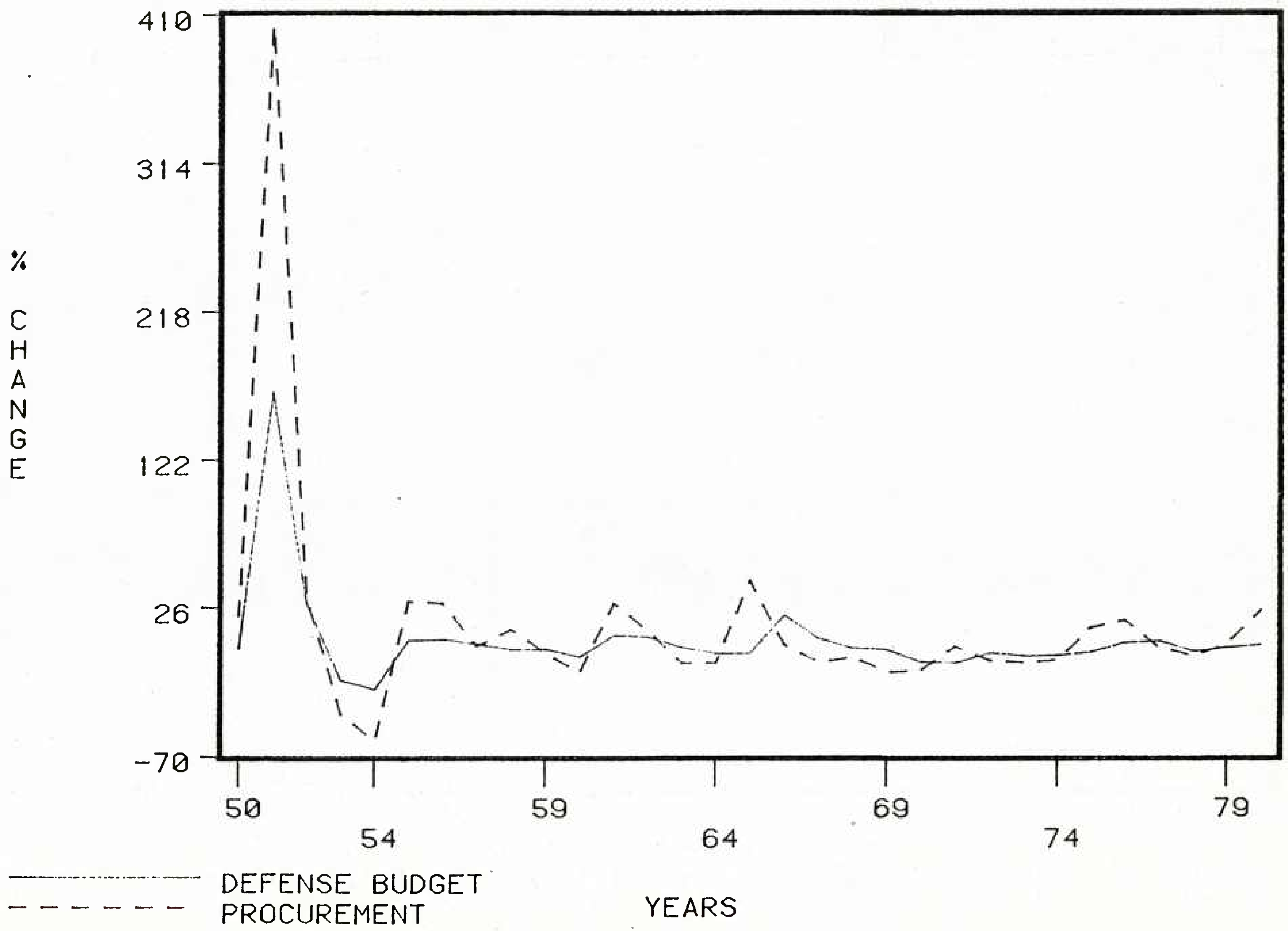


TABLE B-6
Correlation Matrix - Absolute Change
(1964-1981)

	GNP	FED	DOD	PROC	A/C	MSLE	SHIPS	W/COMB	OTHER
GNP	1.0								
FED	-.26	1.0							
DOD	.21	.52	1.0						
PROC	.26	.36	.92	1.0					
A/C	.06	.35	.63	.73	1.0				
MSLE	-.15	.25	.18	.22	.17	1.0			
SHIPS	.22	.07	.59	.64	.20	-.25	1.0		
W/COMB	.17	.27	.75	.81	.39	.30	.58	1.0	
OTHER	.39	.37	.85	.85	.48	-.10	.79	.62	1.0

TABLE B-7
Correlation Matrix - Percentage Change
(1964-1981)

	GNP	FED	DOD	PROC	A/C	MSLE	SHIPS	W/COMB	OTHER
GNP	1.0								
FED	-.15	1.0							
DOD	.26	.54	1.0						
PROC	.31	.39	.94	1.0					
A/C	.09	.49	.69	.71	1.0				
MSLE	-.20	.07	.22	.28	.27	1.0			
SHIPS	.32	.03	.53	.52	.33	-.22	1.0		
W/COMB	.24	.17	.76	.78	.41	.05	.67	1.0	
OTHER	.53	.26	.78	.78	.51	-.08	.83	.69	1.0

absolute year-to-year dollar changes from one money flow level to another. Table B-7 presents a correlation coefficient matrix that reflects the relationship of the year-to-year percent dollar change from one money flow level to another. Both tables present similar information. First, budget turbulence does not seem to be transmitted from the macroeconomic level of the total national economy down to the topline DOD level or below. This is shown by reading down the first column in both tables. For example, the first number in Table B-6 column number 1 and row number 1, is 1.0. This represents the correlation between GNP and GNP which is obviously perfect or 1.0. The number -0.15 reflects the correlation between GNP and Federal, 0.26 reflects the correlation between GNP and DOD, etc. The relatively low r values suggest no significant statistical relationship between GNP and lower levels of the money flow process. Similarly, the impact of Federal budget turbulence on the lower levels of the money flow process is seen by reading down column 2. Here again the results presented in both tables suggest no significant statistical relationship between changes (both absolute and percent) in Federal budget and changes in lower level budgets.

The data in both tables do suggest that turbulence is transmitted from the DOD level to Procurement appropriation level. Note the very high correlation between changes in DOD budget and the Procurement budget. For absolute change the correlation coefficient is 0.92 and for percentage change the correlation coefficient is 0.94.

Similarly note how the budget turbulence is transmitted to the components of Procurement. Aircraft, Ships, Weapons/Combat Vehicles, and Other all exhibit significant turbulence related to turbulence in the Procurement budget. Missiles is the only budget category that seems to be independent of changes in the Procurement budget.

B.8 REFERENCES

1. Borsting, Jack, "The Impact of Future Defense Budgets," in Defense In the 1980's: Politics and Economics, sponsored by Business Week, Data Resources, Inc., and Aviation Week & Space Technology, Washington, D.C., 13-14 Sept., 1982.

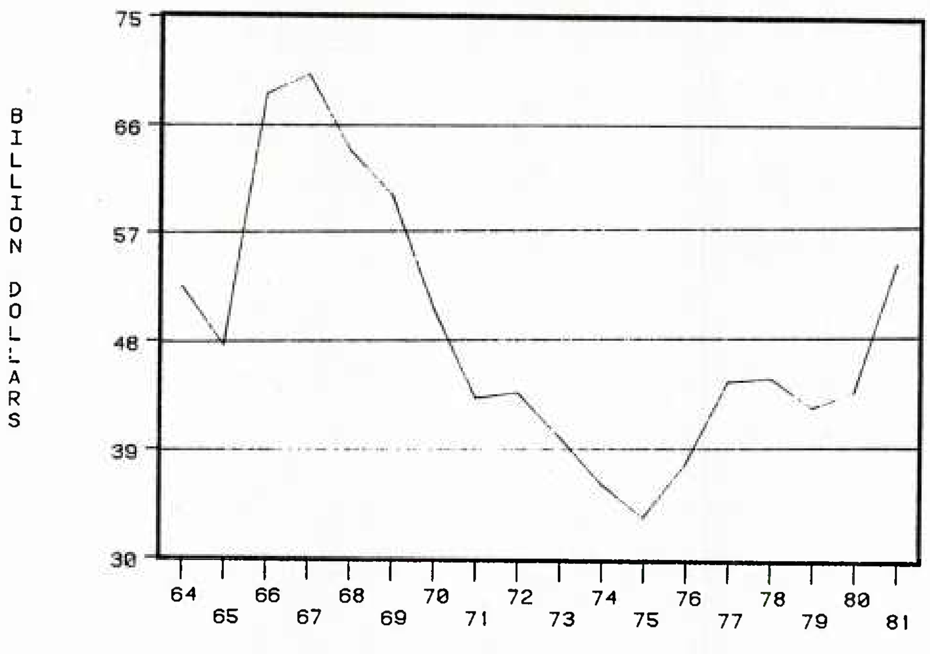
2. Hearings on Military Posture and H.R. 2164 (DOD Supplemental Authorization for FY 81 Appropriations), and H.R. 2970 (H.R. 3519) (DOD Authorization for Appropriations FY 82), before the Committee on Armed Services, House of Representatives, 97th Congress, 1st Session, May 1981.

3. Hearings on Military Posture and H.R. 2970, (H.R. 3519), Department of Defense Authorization for Appropriations for Fiscal Year 1982 and H.R. 745 Armed Services Procurement Policy Act of 1981 before the Committee on Armed Services, House of Representatives, 97th Congress, 1st Session, March 1981.

4. Hearings on Military Posture and H.R. 5968 (H.R. 6030), DOD Authorization for Appropriations for Fiscal Year 1983, before the Committee on Armed Services House of Representatives, 97th Congress, 2nd Session, Parts 1 through 7, H.A.S.C. No. 97-33, 1982.

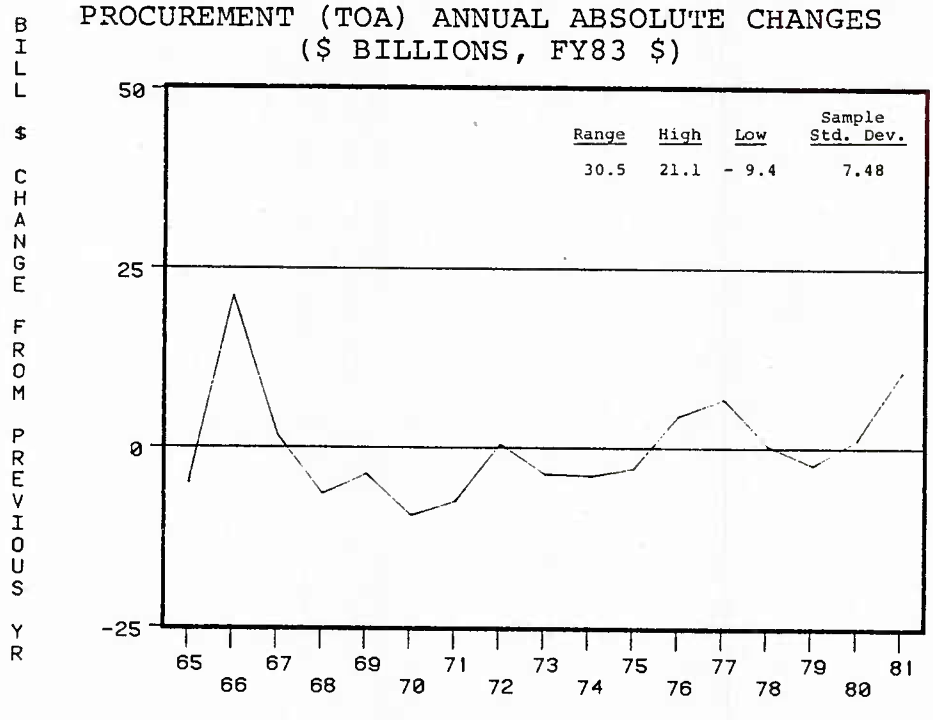
5. National Defense Budget Estimates for FY 83, Office of the Assistant Secretary of Defense (Comptroller), March 1982.

FIGURE B-14
PROCUREMENT (TOA)
($ BILLIONS, FY83 $)



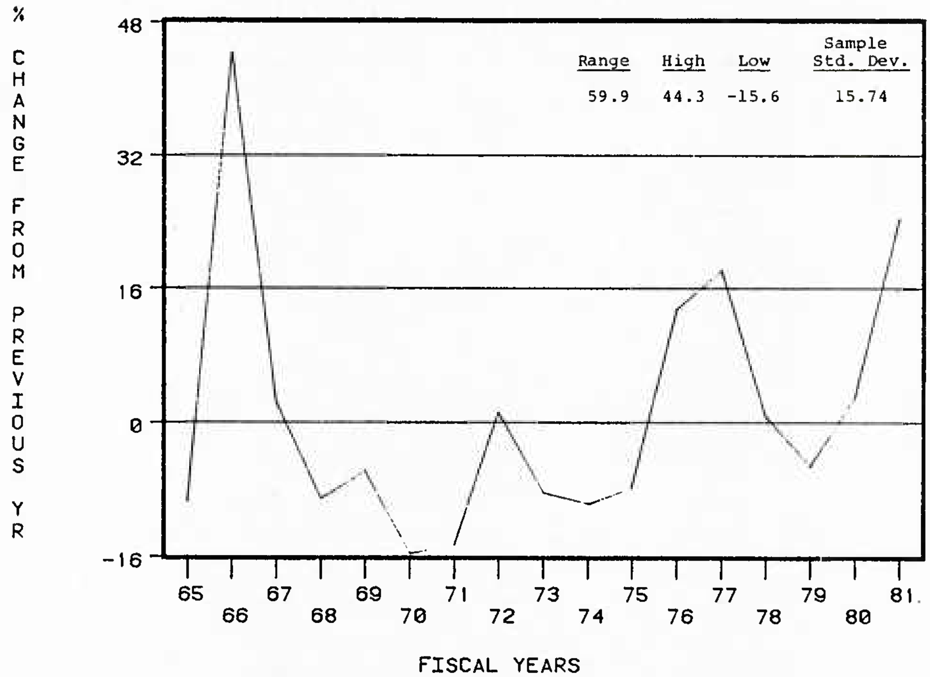
SOURCE: NATIONAL DEFENSE BUDGET ESTIMATES FY83, OSD COMPTROLLER

FIGURE B-15
PROCUREMENT (TOA) ANNUAL ABSOLUTE CHANGES
($ BILLIONS, FY83 $)



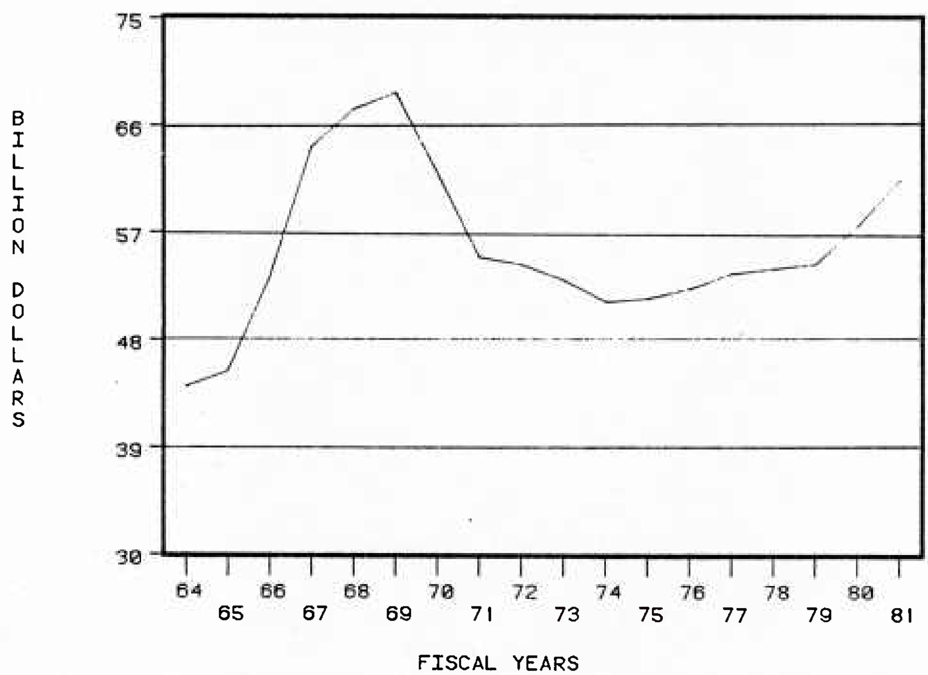
SOURCE: NATIONAL DEFENSE BUDGET ESTIMATES FY83, OSD COMPTROLLER

FIGURE B-16
PROCUREMENT (TOA)
RELATIVE CHANGE



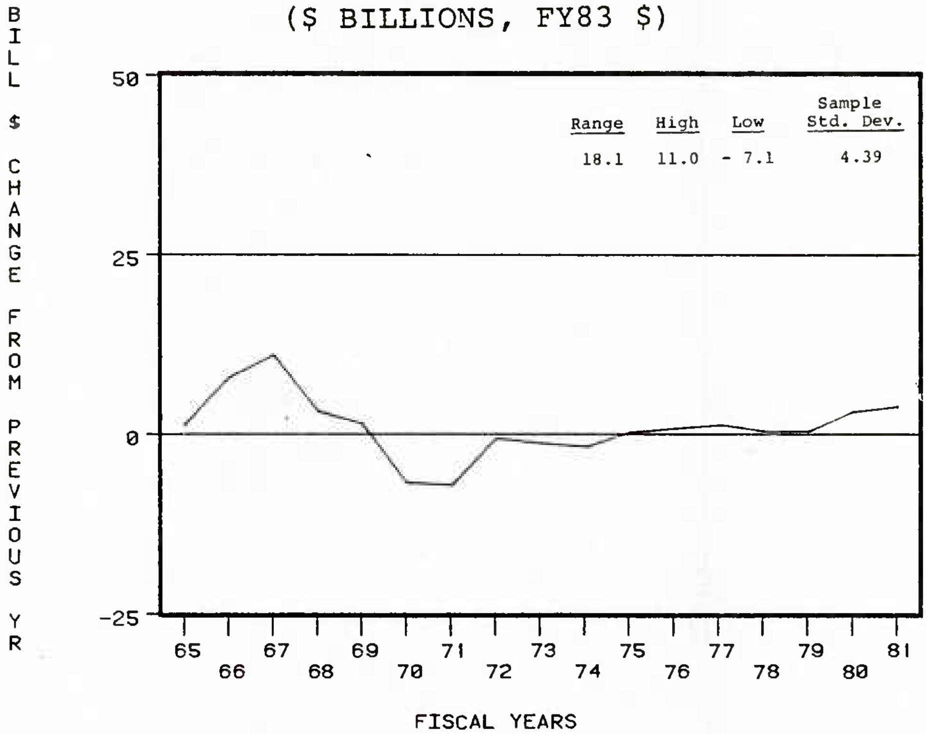
SOURCE: NATIONAL DEFENSE BUDGET ESTIMATES FY83, OSD COMPTROLLER

FIGURE B-17
O & M (TOA)
($ BILLIONS, FY83 $)



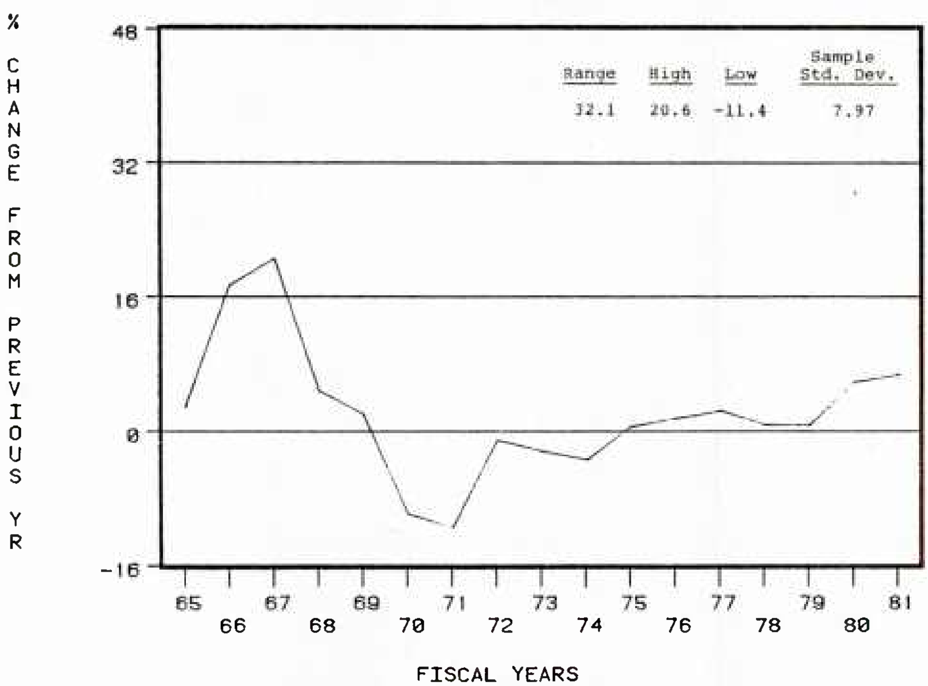
SOURCE: NATIONAL DEFENSE BUDGET ESTIMATES FY83, OSD COMPTROLLER

FIGURE B-18
O & M (TOA) ANNUAL ABSOLUTE CHANGES
($ BILLIONS, FY83 $)



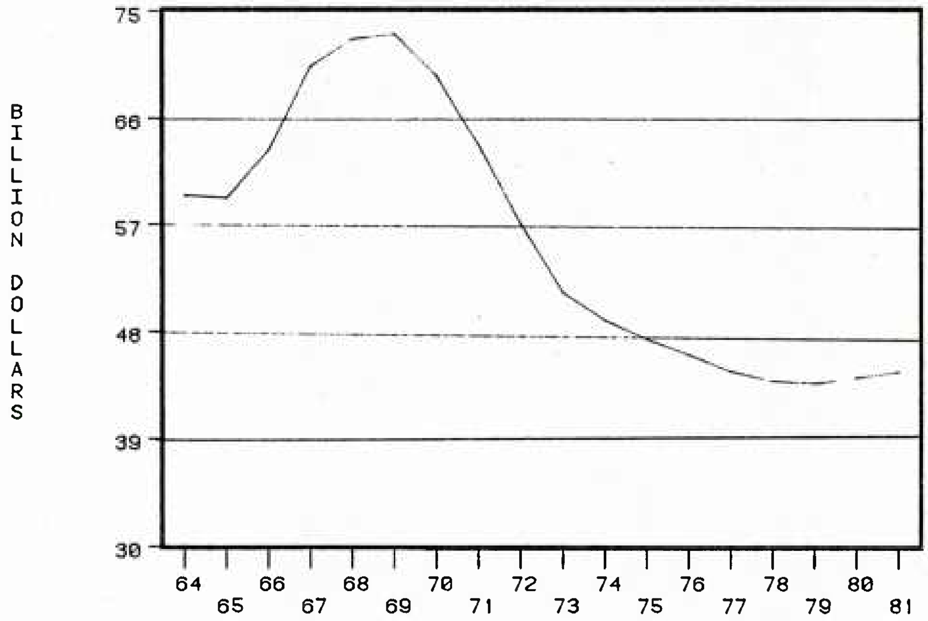
SOURCE: NATIONAL DEFENSE BUDGET ESTIMATES FY83, OSD COMPTROLLER

FIGURE B-19
O & M (TOA)
RELATIVE CHANGE



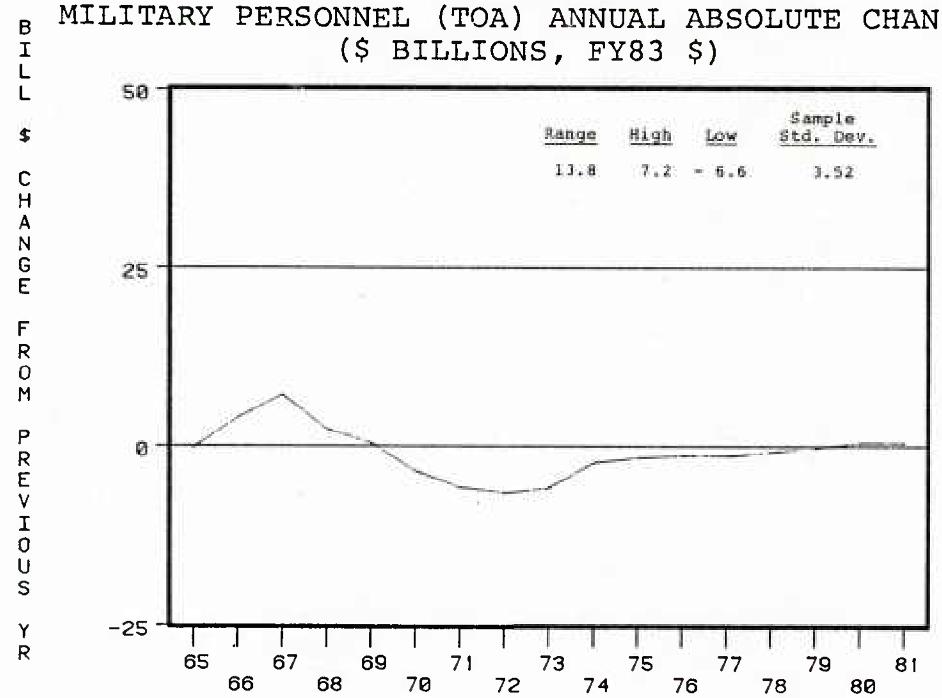
SOURCE: NATIONAL DEFENSE BUDGET ESTIMATES FY83, OSD COMPTROLLER

FIGURE B-20
MILITARY PERSONNEL (TOA)
($ BILLIONS, FY83 $)



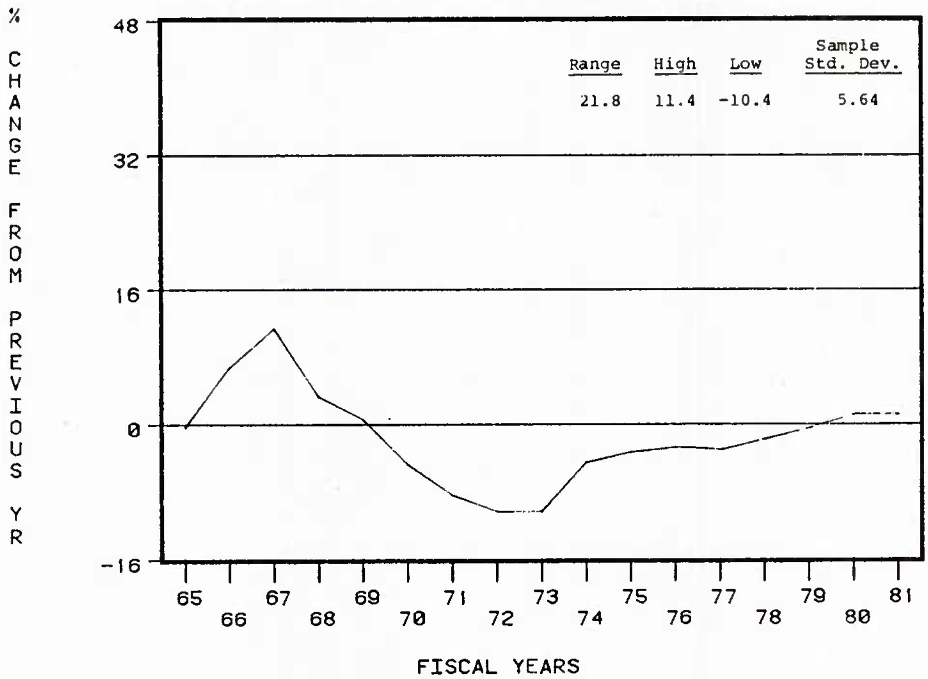
SOURCE: NATIONAL DEFENSE BUDGET ESTIMATES FY83, OSD COMPTROLLER

FIGURE B-21
MILITARY PERSONNEL (TOA) ANNUAL ABSOLUTE CHANGES
($ BILLIONS, FY83 $)



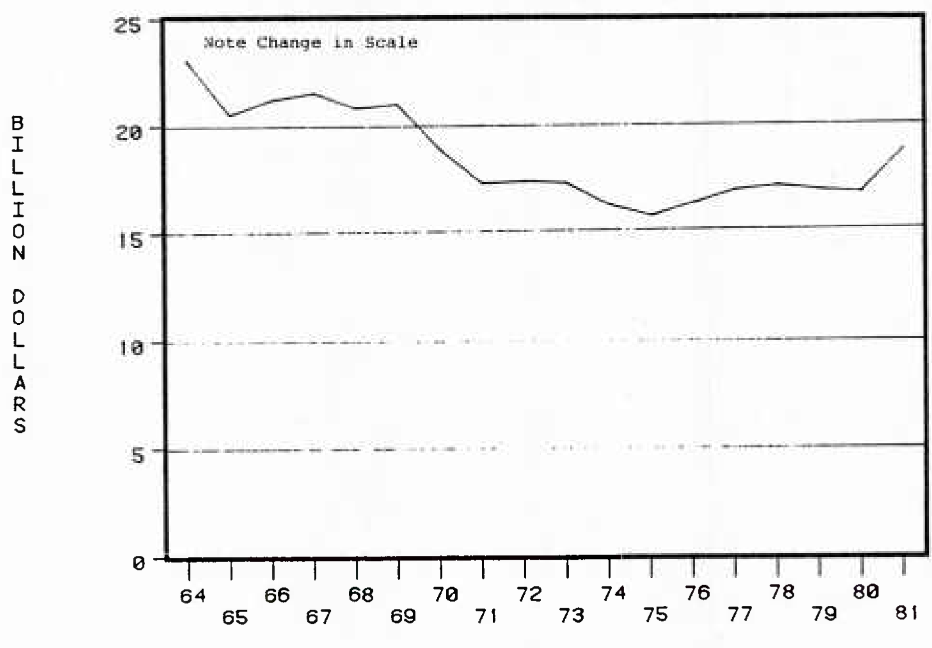
SOURCE: NATIONAL DEFENSE BUDGET ESTIMATES FY83, OSD COMPTROLLER

FIGURE B-22
MILITARY PERSONNEL (TOA)
RELATIVE CHANGE



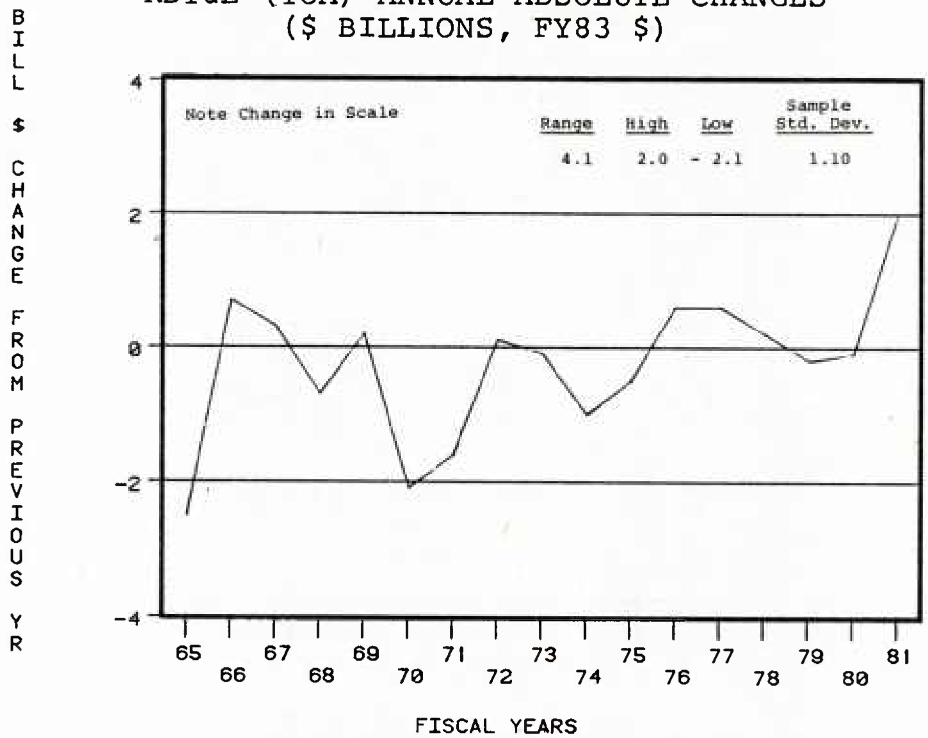
SOURCE: NATIONAL DEFENSE BUDGET ESTIMATES FY83, OSD COMPTROLLER

FIGURE B-23
RDT&E (TOA)
($ BILLIONS, FY83 $)



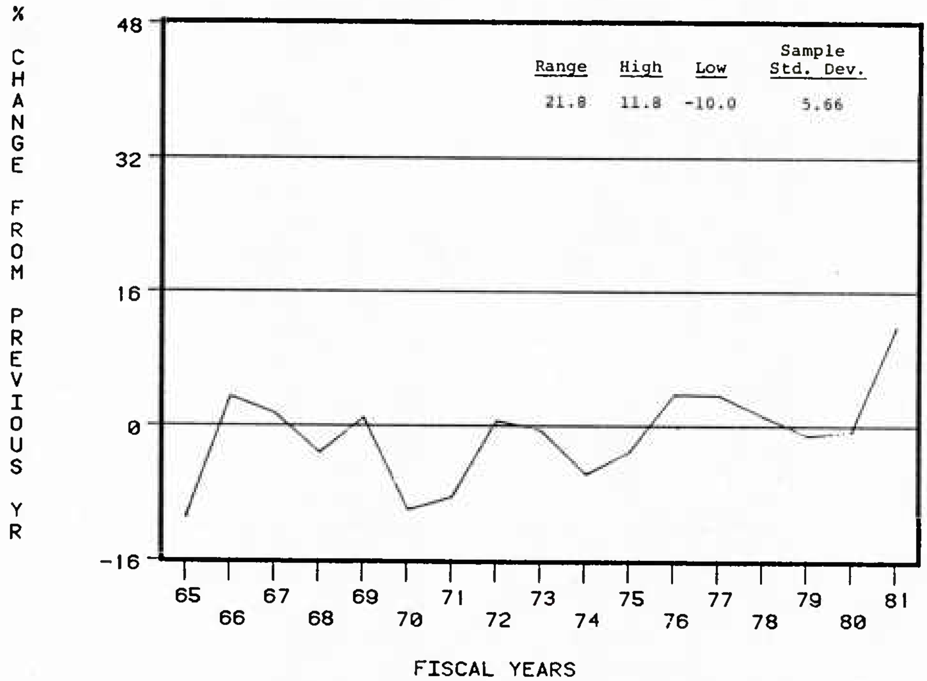
SOURCE: NATIONAL DEFENSE BUDGET ESTIMATES FY83, OSD COMPTROLLER

FIGURE B-24
RDT&E (TOA) ANNUAL ABSOLUTE CHANGES
($ BILLIONS, FY83 $)



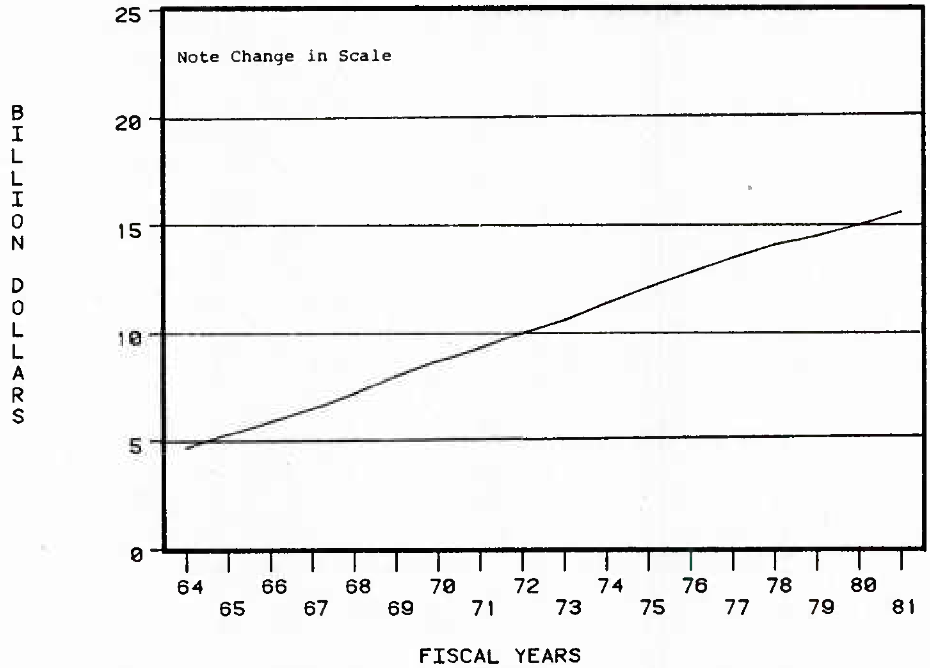
SOURCE: NATIONAL DEFENSE BUDGET ESTIMATES FY83, OSD COMPTROLLER

FIGURE B-25
RDT&E (TOA)
RELATIVE CHANGE



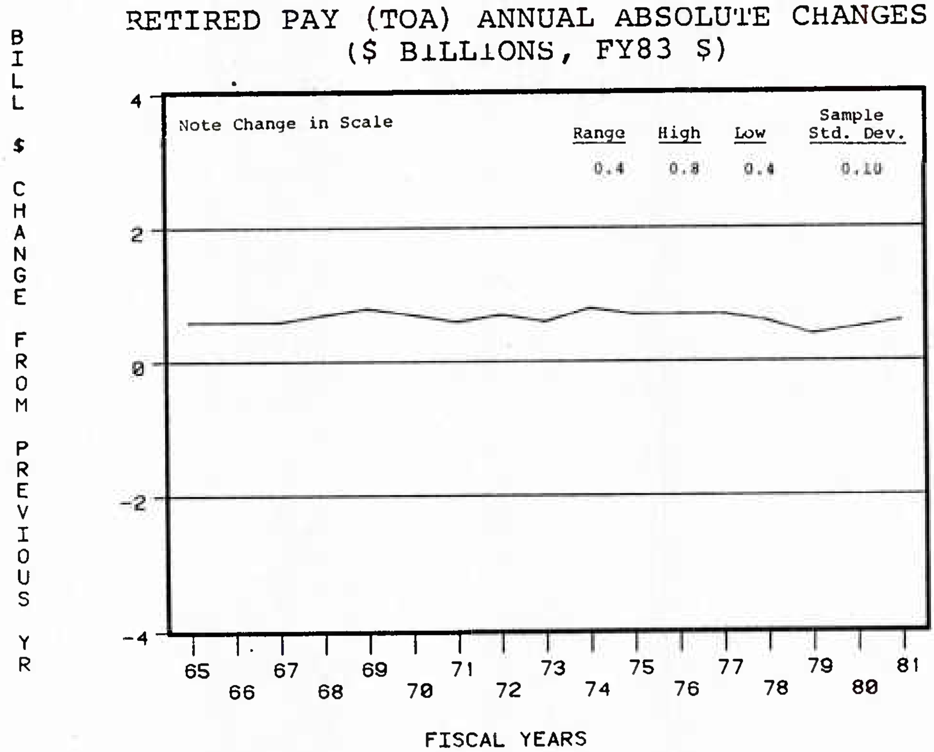
SOURCE: NATIONAL DEFENSE BUDGET ESTIMATES FY83, OSD COMPTROLLER

FIGURE B-26
RETIRED PAY (TOA)
($ BILLIONS, FY83 $)



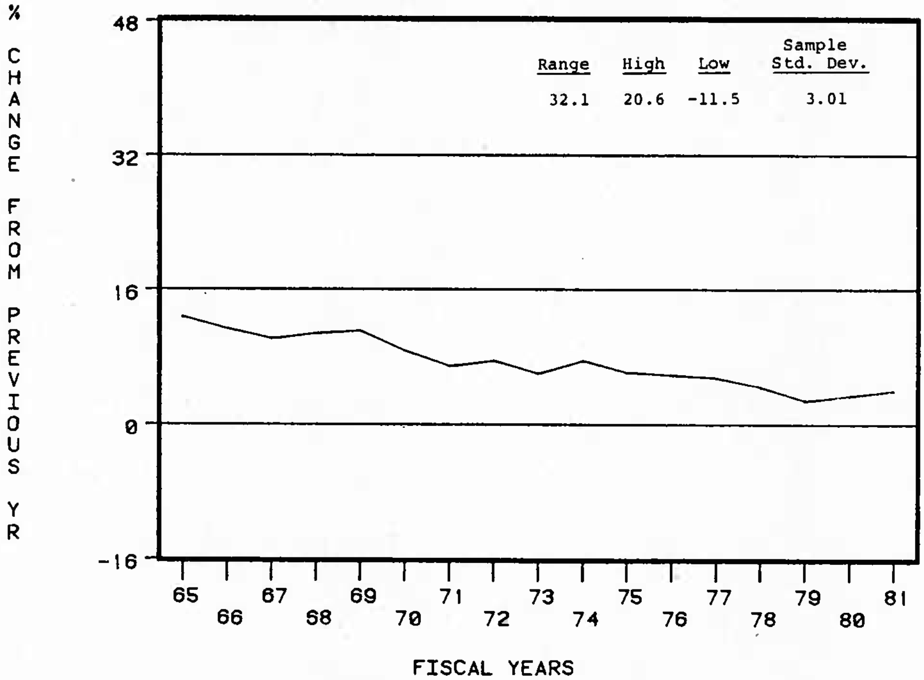
SOURCE: NATIONAL DEFENSE BUDGET ESTIMATES FY83, OSD COMPTROLLER

FIGURE B-27
RETIRED PAY (TOA) ANNUAL ABSOLUTE CHANGES
($ BILLIONS, FY83 $)



SOURCE: NATIONAL DEFENSE BUDGET ESTIMATES FY83, OSD COMPTROLLER

FIGURE B-28
RETIRED PAY (TOA)
RELATIVE CHANGE



SOURCE: NATIONAL DEFENSE BUDGET ESTIMATES FY83, OSD COMPTROLLER

TABLE B-3

Budget Statistics (FY 64-FY 81)

Procurement Account (TOA)

FY 83$ (Billions)

	Mean	Standard Deviation	Range	Max	Min
Procurement ($B) (TOA)	48.95	10.82	70.3	36.8	-33.5
A/C* ($B)	17.77	5.59	31.39	21.18	-10.21
Missile* ($B)	7.00	1.58	12.03	6.93	- 5.10
Ships* ($B)	5.97	1.06	7.57	3.99	- 3.58
W/CV* ($B)	1.42	.79	3.70	3.20	- .50
Other* ($B)	10.83	3.95	18.29	11.29	- 6.99

*Total Direct Program Obligations

TABLE B-4

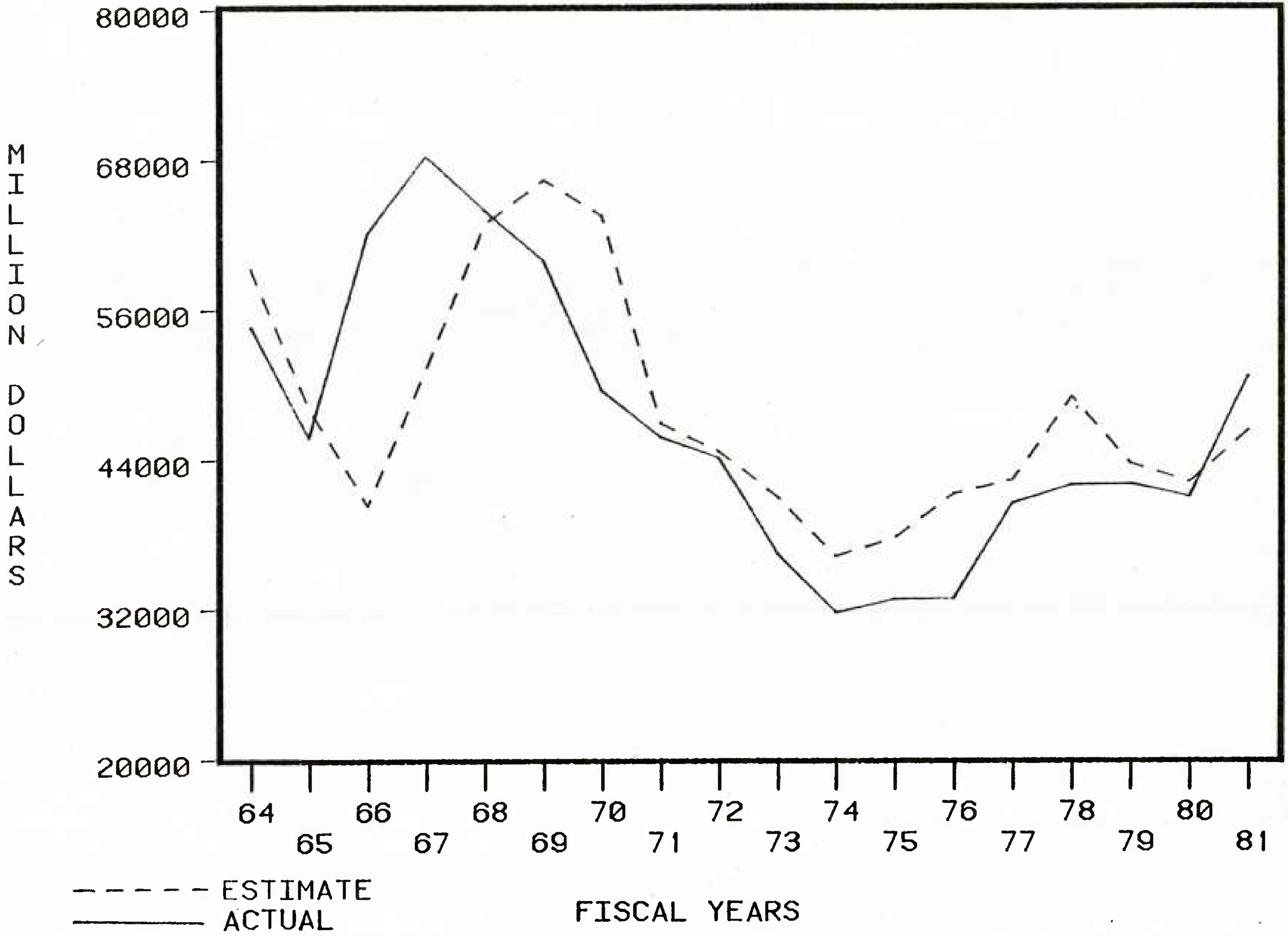
Procurement Budget Statistics

Relative Changes (%)

	Range	Max	Min	Standard Deviation
Procurement	53.5	36.0	-17.4	15.22
Aircraft	59.5	29.0	-30.5	12.27
Missiles	46.4	23.4	-23.0	16.74
Shipbuilding & Conversion	158	106	-52	45.5
Weapons & Combat Vehicles	159.1	126.1	-33	43.5
Other	118.2	85.8	-32.4	27.52

FIGURE B-29

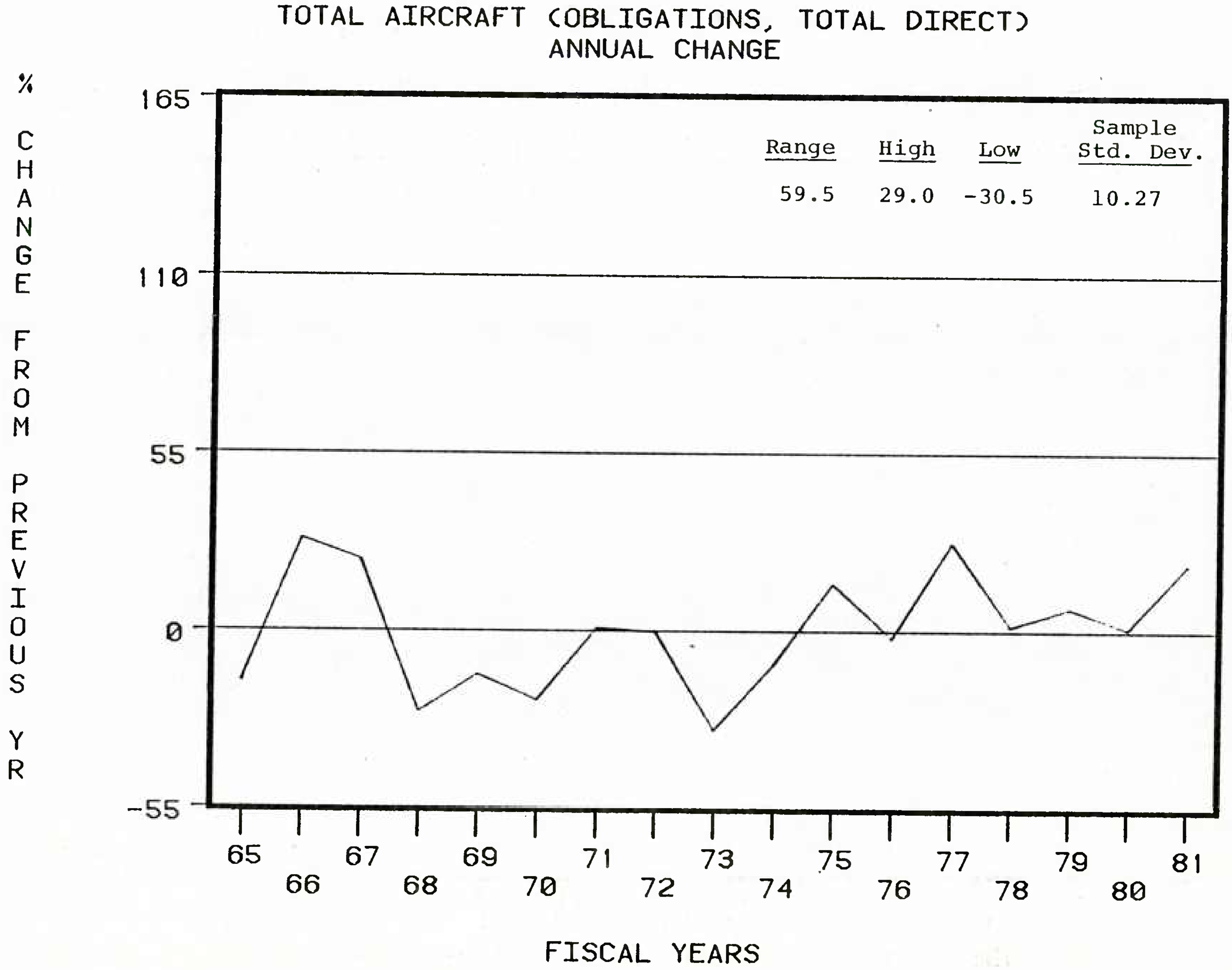
TOTAL PROCUREMENT* (OBLIGATIONS, TOTAL DIRECT)
ESTIMATE VS. ACTUAL
($ MILLIONS, FY83 $)



SOURCE: BUDGETS OF THE US GOVERNMENT FY64-FY83, OMB

* LESS NATIONAL GUARD EQUIPMENT AND DEFENSE AGENCIES

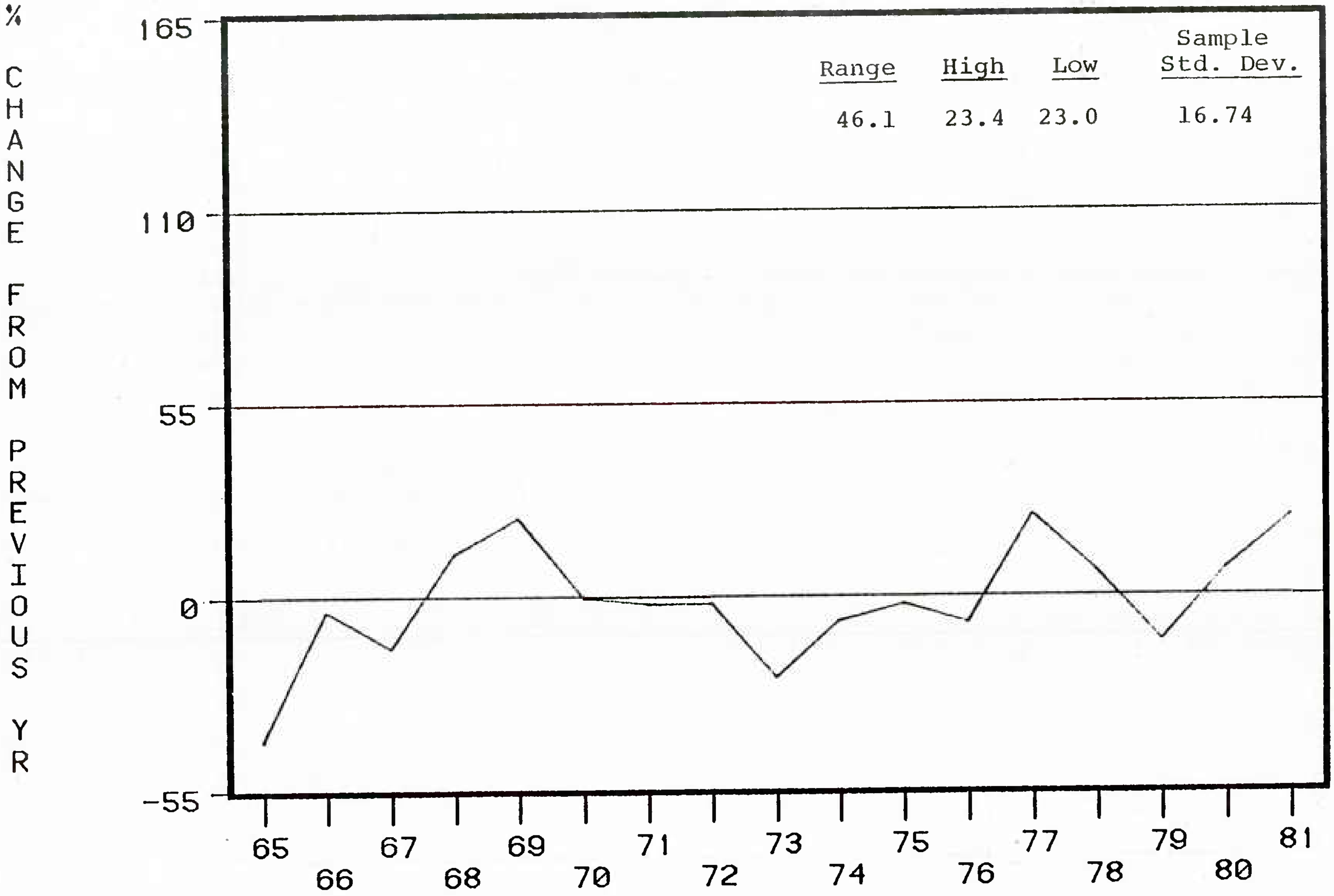
FIGURE B-30



SOURCE: BUDGETS OF THE US GOVERNMENT FY64-FY83, OMB

FIGURE B-31

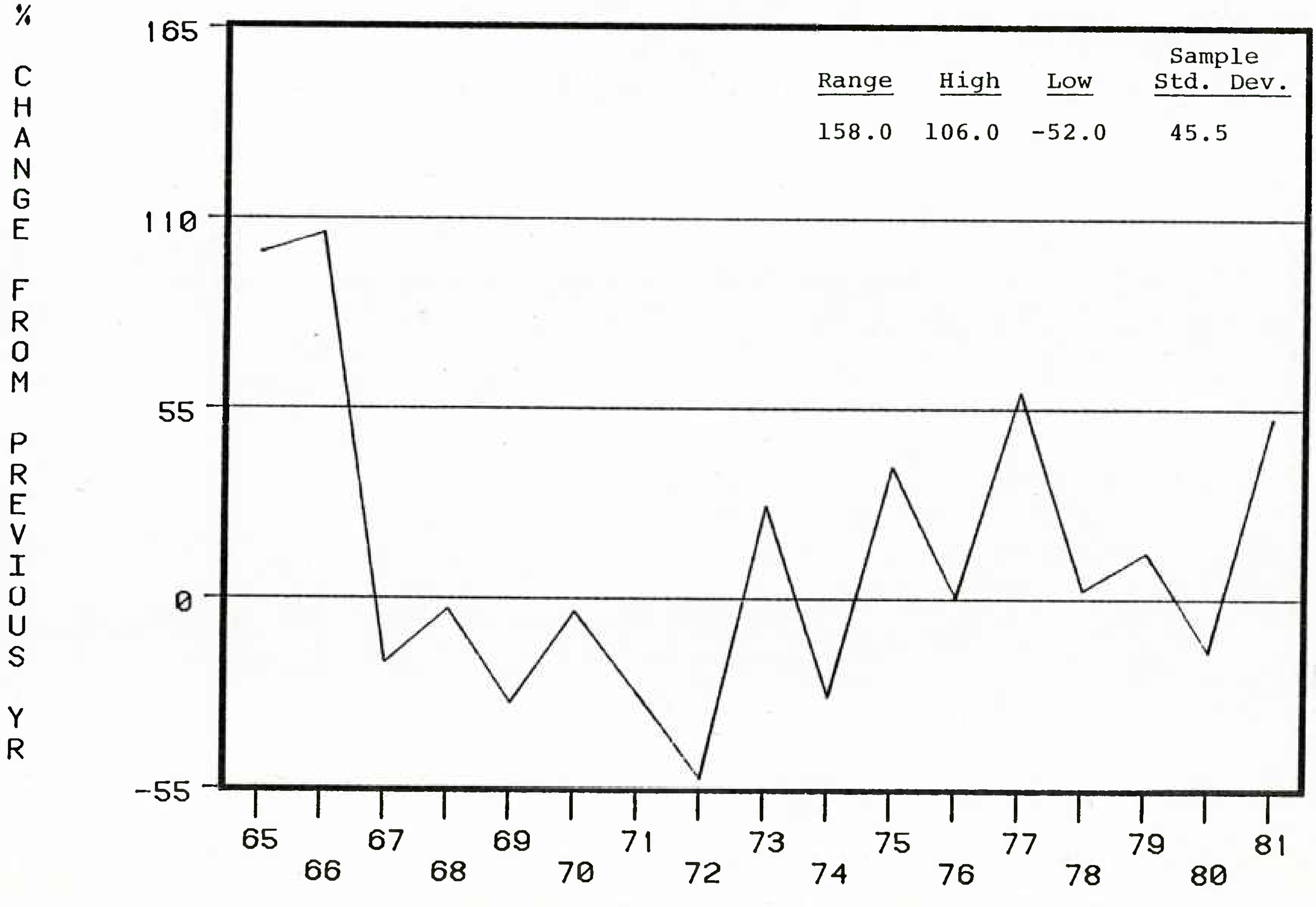
TOTAL MISSILES (OBLIGATIONS, TOTAL DIRECT)
ANNUAL CHANGE



SOURCE: BUDGETS OF THE US GOVERNMENT FY64-FY83, OMB

FIGURE B-32

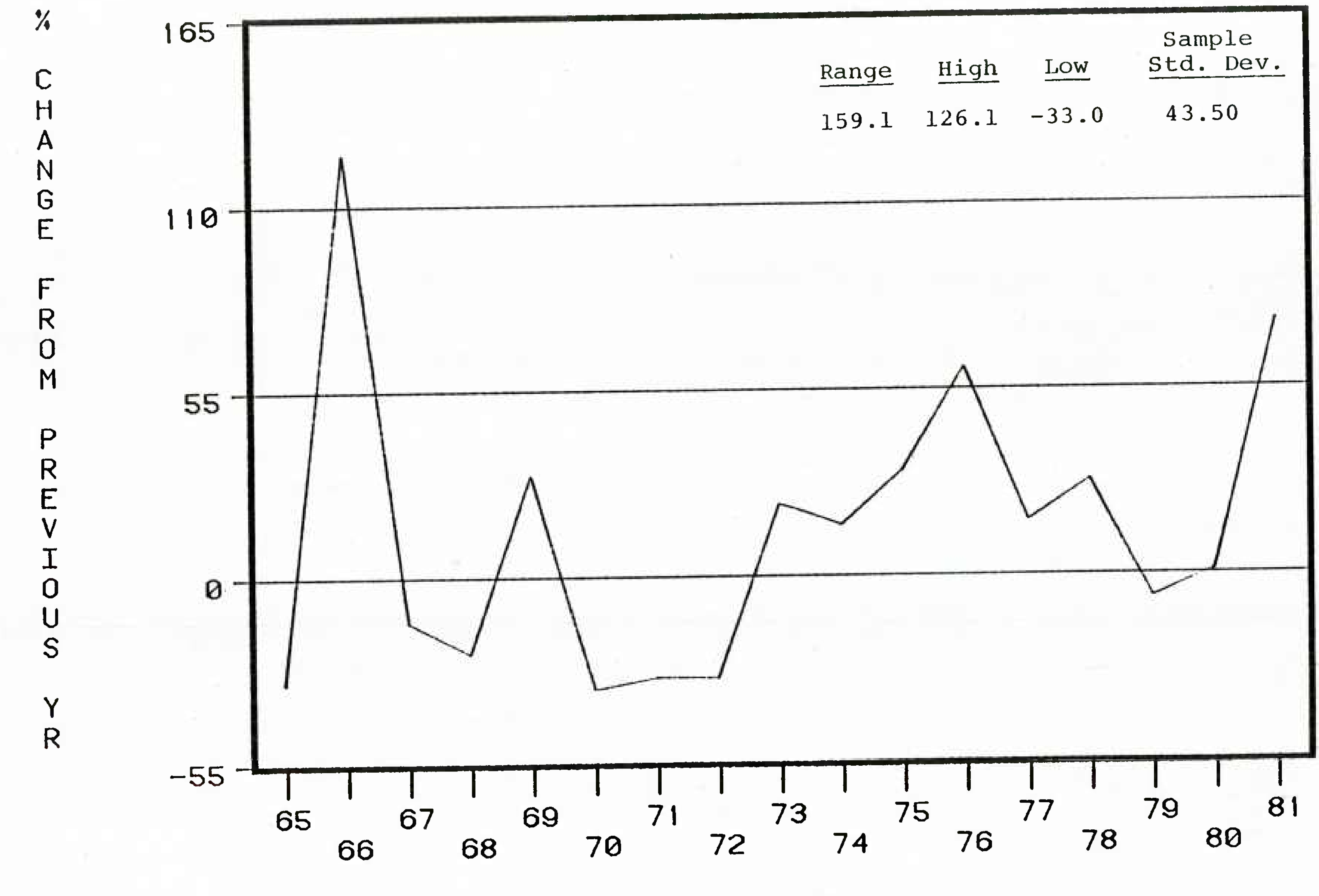
SHIPBUILDING AND CONVERSION, NAVY (OBLIGATIONS, TOTAL DIRECT)
ANNUAL CHANGE



SOURCE: BUDGETS OF THE US GOVERNMENT FY64-FY83, OMB

FIGURE B-33

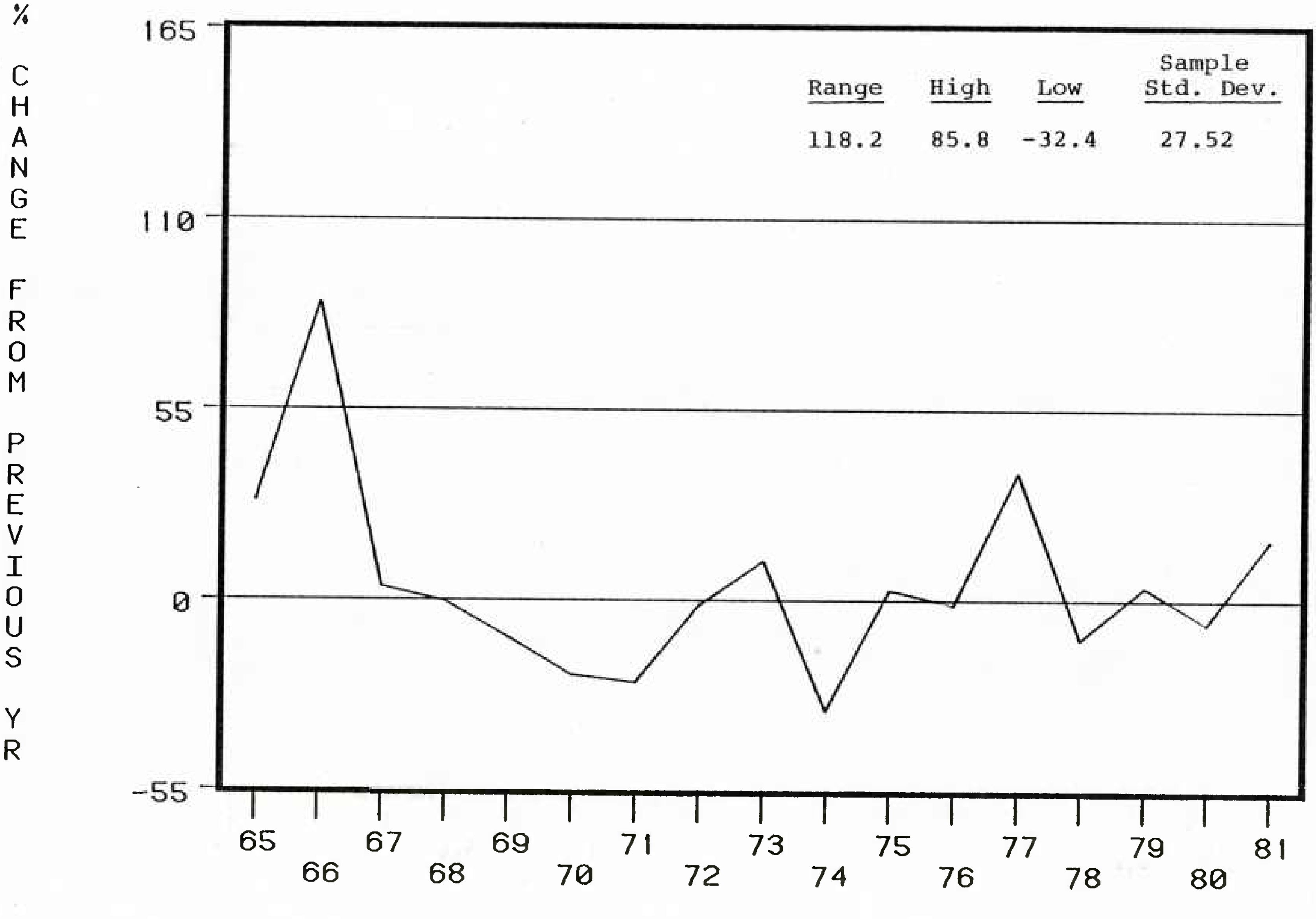
TOTAL WEAPONS AND COMBAT VEHICLES (OBLIGATIONS, TOTAL DIRECT)
ANNUAL CHANGE



SOURCE: BUDGETS OF THE US GOVERNMENT FY64-FY83, OMB

FIGURE B-34

TOTAL OTHER (OBLIGATIONS, TOTAL DIRECT)
ANNUAL CHANGE



SOURCE: BUDGETS OF THE US GOVERNMENT FY64-FY83, OMB

APPENDIX C

CAUSES OF TURBULENCE

Budget turbulence is introduced by Congress when it acts on the President's proposed (estimated) budget. Budget turbulence is also introduced in the planning process in the formulation of the FYDP. This appendix provides additional detailed analysis and backup to the material given in Chapter 4.

C.1 CONGRESS AND TURBULENCE

By law, Congress is responsible for the budget and, therefore, could be said to be responsible also for some of the turbulence in the budget. However, as described in Chapter 2.0, the Executive Branch prepares the President's budget. Due to the evolution of the budget process, the topline budget turbulence introduced by Congress is considered within this report to be the changes between the President's budget (estimated) and the appropriation bills (actual) as passed by Congress.

As the major thrust of topline budget turbulence is related to acquisition and therefore procurement, differences between the estimated (President's) and actual (Congressional) budgets were analyzed for the procurement accounts. The data used to support this analysis were obtained from the U.S. Government budgets for FY 64 through FY 83, as prepared by OMB and submitted to the Congress. Data on procurement activities were obtained from the following Service accounts by program:

- U.S. Army: Aircraft, Missiles, Weapons/Combat Vehicles, Ammunition, and other Procurement.

- U.S. Navy: Aircraft, Weapons/Missiles, Shipbuilding and Conversion, Other Procurement, and Marine Corps Procurement and Weapons/Combat Vehicles.

- U.S. Air Force: Aircraft, Missiles, and Other Procurement. National Guard Equipment and Defense Agency accounts were excluded.

In each program the budget data are composed of Total Direct Program Obligations (i.e., Estimates and Actuals). Estimate data were obtained from the submission year, and actual data were obtained from the budget submitted 2 years estimates were obtained from the FY 79 Presidential submission, and actual data were obtained (for similar accounts) from the FY 81 submission. The budgetary data were converted to constant FY 83 dollars using the inflation indices. The Total Procurement amounts were obtained by summing procurement data across all Service accounts by program.

Data were then aggregated across major equipment categories to obtain total estimates and actual figures for aircraft, missiles, weapons and tracked vehicles, ships, and other procurement. Navy Weapons Procurement data were placed in the aggregated missile account.

Percent differences between the estimates and actual obligations for each program account were calculated based on the following equation:

$$\% \text{ Difference} + \frac{(\text{EST.} - \text{ACT.})}{\text{ACT.}} \times 100$$

The graphical plots supporting the comparative analysis are categorized as follows:

Account	Estimate vs. Actual	Percent Differences
Total Procurement	Figure C-1	Figure C-7

Procurement, Aircraft	Figure C-2	Figure C-8
Procurement, Missile	Figure C-3	Figure C-9
Procurement, Shipbuilding and Conversion	Figure C-4	Figure C-10
Procurement, Combat Vehicles	Figure C-5	Figure C-11
Procurement Other	Figure C-6	Figure C-12

For convenience, these figures are located at the end of this appendix beginning on page C-17.

A statistical analysis was performed on the percent differences between the estimates and actuals for these procurement accounts. The results of this analysis are shown in Table C-1. The deviations shown in the table are large and more than would be expected. Examination of the estimate and actual total procurement plots shown in Figure C-1 reveals a 1- to 2- year time displacement between the plots which, if accounted for, would greatly

TABLE C-1

Procurement Statistics

Estimate vs. Actual Annual Percent Change

Account	Standard Deviation	Range	High	Low
Total	24.1	63.5	28.3	-35.2
Aircraft	17.6	72.0	33.4	-38.5
Missile	14.9	62.7	41.2	-21.5
Shipbuilding & Conversion	17.4	76.9	14.4	-62.4
Combat Vehicles	26.0	114.7	70.2	-44.6
Other	20.9	87.3	33.3	-54.0

reduce the deviation. Large discrepancies are noted during the buildup years in Vietnam when the actual budgets led the estimates. The scope of this effort did not permit a more detailed investigation of these anomalies.

C.2 PROCEDURAL AND MANAGEMENT CAUSES OF BUDGET TURBULENCE

In addition to the budget turbulence caused by wars, changing defense policy, and Congressional actions, budget turbulence can be introduced in the defense budget by the planning process and program execution. The simplified budget process shown in Figure 2-2 (Volume I, page 2-6) illustrates the places in the planning process where turbulence may be introduced. An analysis of the turbulence caused by the planning process depends on the availability of FYDP data. These data were not available for the study. Therefore, the turbulence introduced at the major steps in the budget process could not be determined. However, previous analyses of FYDP data provide insights on turbulence introduced in the budget process.

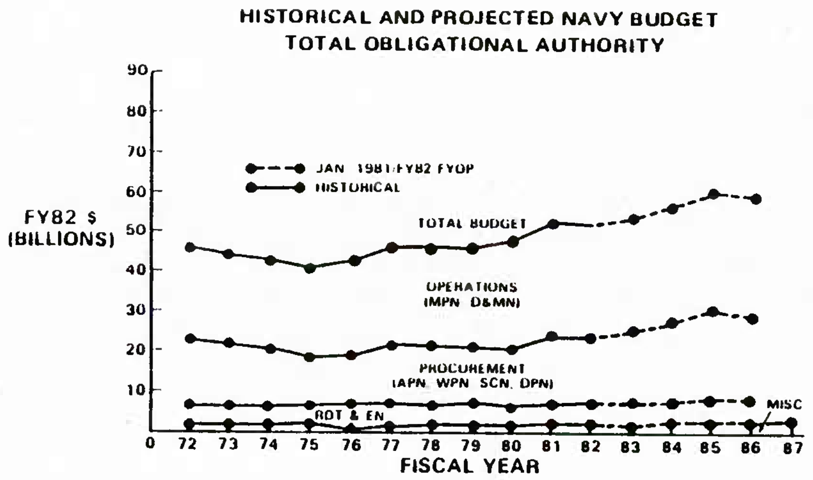
Turbulence introduced by the planning process is somewhat different than turbulence caused by wars and by Executive and Congressional priorities. However, the end results of this turbulence are the same, that is, turbulence in (1) planned fielding of equipment, (2) cost and performance of acquired equipment, and (3) in some instances, the deletion of desired equipments. A significant cause of turbulence is an optimistic planning process. Programs that are planned at higher fiscal levels than achievable must be reduced in the budget year to make the program conform to budget reality. The Naval Materiel Command (NAVMAT) performed a study* that describes the drawbacks of optimistic planning. The following brief overview of the NAVMAT study illustrates this cause of program turbulence.

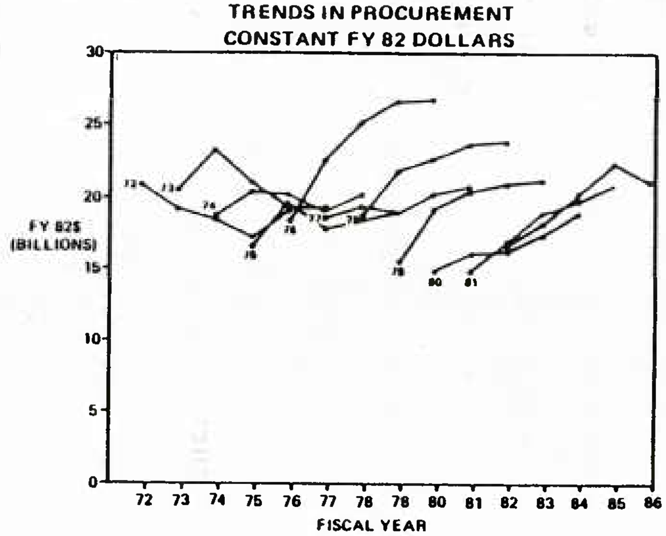
Figure C-13 shows the NAVMAT analytical framework. Past FYDPs were plotted to show the dollars programmed in each FYDP for the next 5 years. Historical budget data were used to adjust the FYDP budget baseline each year to bring the FYDP budget year into agreement with the budget. These data show that the FYDP out-years are planned at budget levels that, historically, have not been supported by the actual budget. Out-year planning for specific system acquisition and equipment procurements are

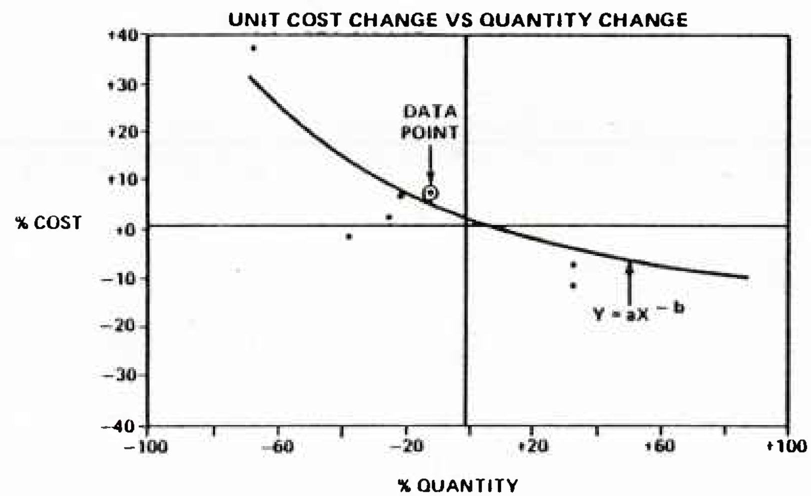
*Major Procurement Cost Growth Assessment, Naval Materiel Command, Feb. 1980.

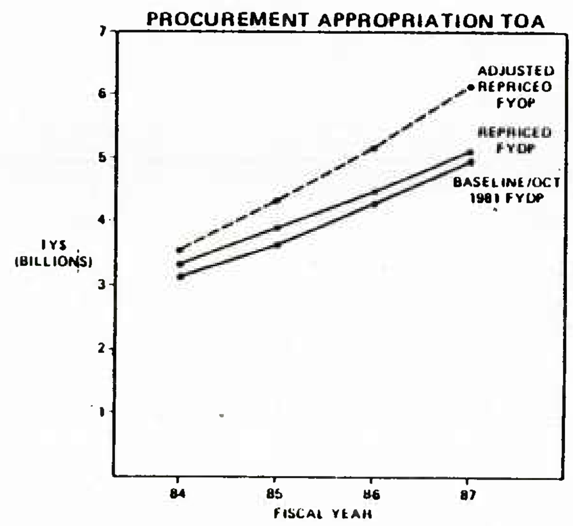
FIGURE C-13

APPROACH









based on economic production rates to achieve the number of units planned in the FYDP. When the planned system and equipment procurements reach the budget year, they usually are budgeted at a lower level than planned which causes a reduction in the number of units that can be acquired. The reduction in units is not linear with budget changes in dollars because the cost per unit increases due to their production at a noneconomical rate.

Economic cost-quantity curves were used to determine the penalties associated with optimistic planning. Figure C-14 shows the Navy FYDP budget projections for FY 72 through FY 81 in constant FY 82 dollars. In general, this figure shows that the out-years of each FYDP plan for increased funds. The actual budgets for FY 72 through FY 82 have been compared with the FYDP as shown on the heavy line in Figure C-15. In general, there are significant differences between the plans as represented by the FYDP and the actual budget. Figure C-16 shows the cost-quantity curve for Naval aircraft. It shows that a reduction in the number of units purchased causes the cost per unit to increase in a nonlinear way.

FIGURE C-14

TRENDS IN "REAL" NAVY FYDP PROJECTIONS CONSTANT FY82 DOLLARS

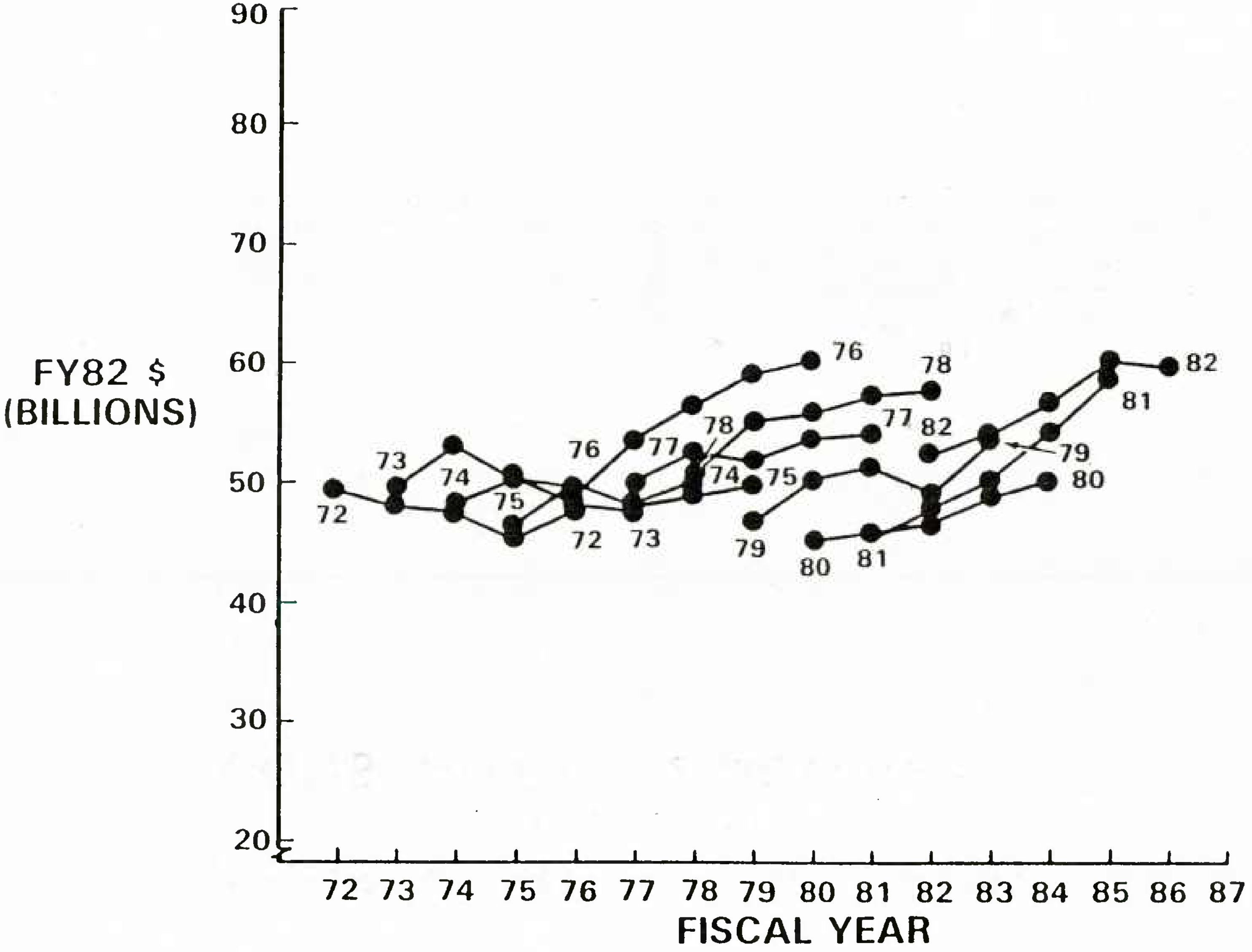


FIGURE C-15

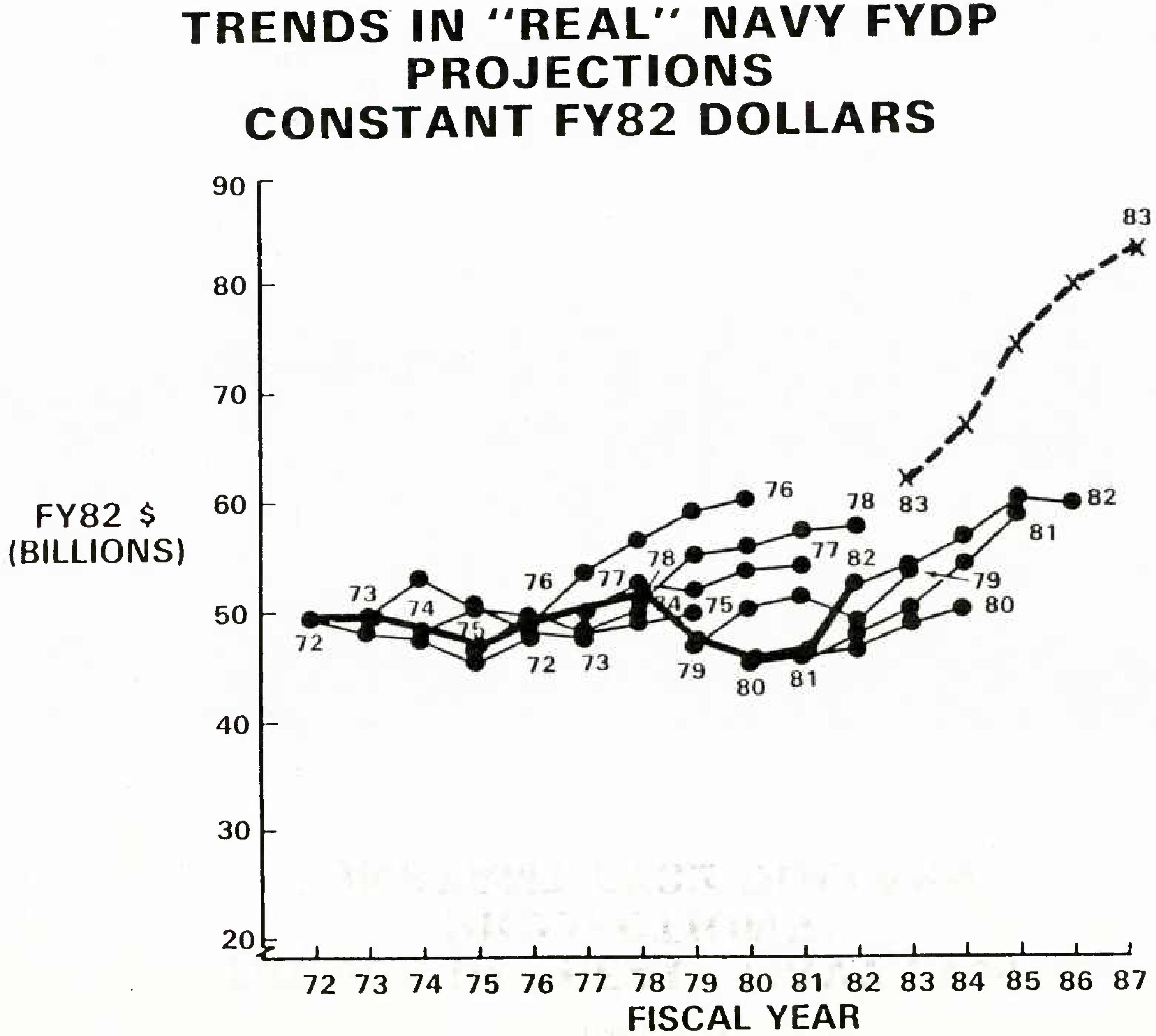
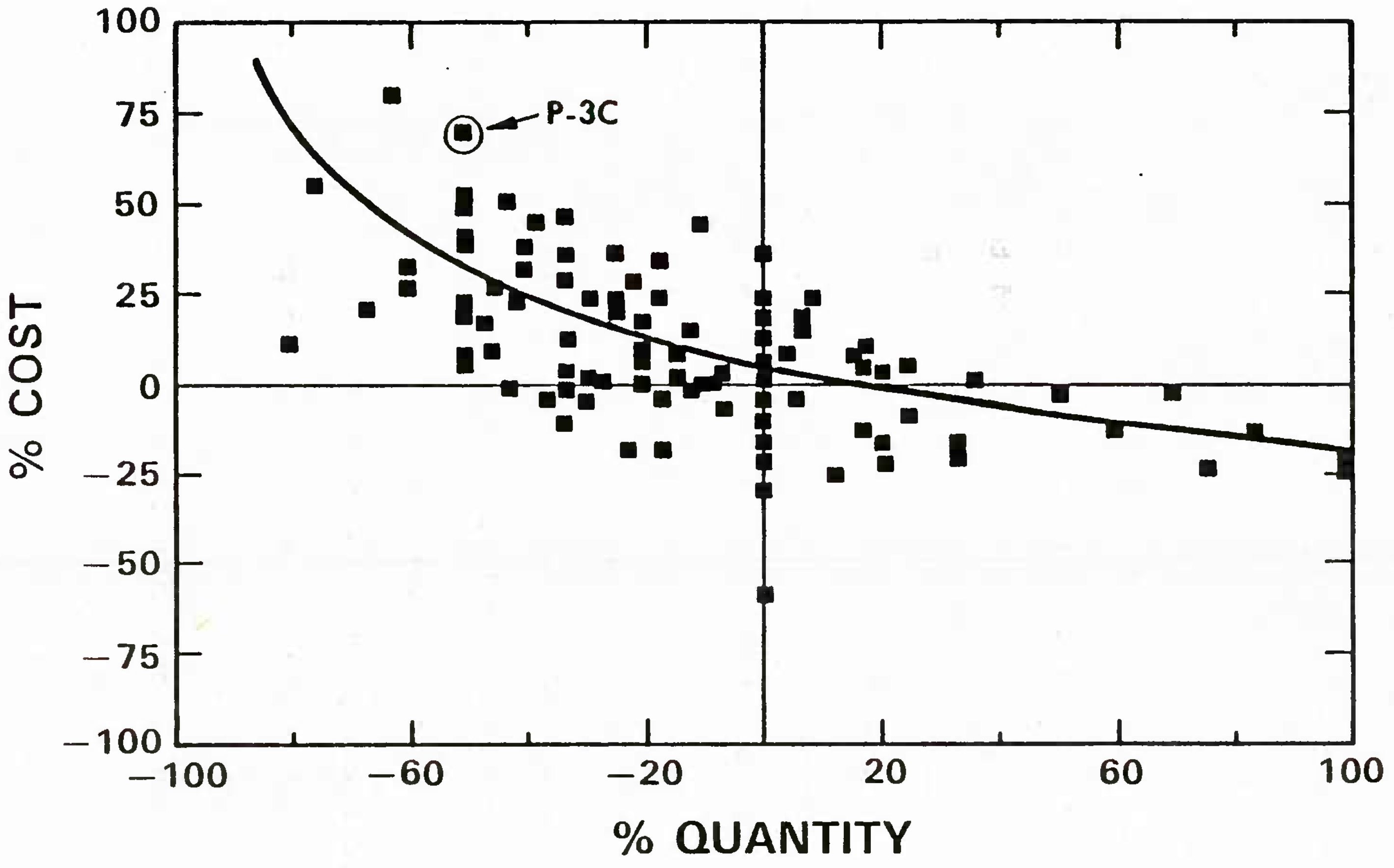

TRENDS IN "REAL" NAVY FYDP
PROJECTIONS
CONSTANT FY82 DOLLARS
FY82 $
(BILLIONS)
90
80
70
60
50
40
30
20
72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87
FISCAL YEAR

FIGURE C-16

UNIT COST CHANGE VS QUANTITY CHANGE APN



C.3 TURBULENCE IN ACQUISITION PROGRAMS AND PROCUREMENTS

As described earlier, the DoD budget is a complex mechanism incorporating the results of actions of a large number of personnel and agencies. Specifically, the budget is the plan for assignment of fixed dollars for an approved specific use in the current year and in specific cases for the out-years. Changes in planned use of dollars is as much a change in the budget as a change in dollars. The budget presented to Congress by DoD is the result of a 2-year process during which material requirement plans have been developed. It is composed of numerous individual elements or building blocks formed into a comprehensive defense policy. As each top-level budget is compiled, adjustments are made to maintain an effective defense plan as the individual programs are strengthened, reduced, or deleted. At the Presidential/OMB and Congressional levels, budget changes are sometimes made without readjustment of the overall defense plan. Individual elements of the budget are interrelated, such as, weapon programs, required manpower, material, system readiness, and so forth. Reduction in scope or deletion of an individual element can leave related budget elements or programs with either insufficient or excess support and cause them to be ineffective or inefficient. In other words, topline budget turbulence cannot be identified solely through an inspection of Federal budget dollar amounts.

The budget variables are Funds, Schedule, and Plans. Funds receive the largest visibility, often masking turbulence due to erratic changes in defense plans and schedules.

As the defense budget is the sum of the individual appropriations, Congress approves in detail how funds will be expended; that is, Congress approves the number and type of items to be procured in the budget and sets a dollar limit for each proposed expenditure. Changes in the number of items or the item itself produce changes in the actual budget.

The third component of the budget is schedule. Schedule or time has two relationships to the budget: outlays and out-years budget. The former is the schedule or plan for actually expending the funds allotted by the Budget Authority for a specified fiscal year. The latter, out-year budget plans, are those budget authorities and outlay plans for completion of a program. These are combined to form the total budget plan for future years. Significant erratic change in these components is budget turbulence. Changes in schedule for allocation of funds or changes in procurement are changes in the budget although the total defense budget dollars may not have changed appreciably. In this instance, budget turbulence may have occurred and have had a significant impact; yet, the outward signs of change have disappeared.

Relatively long-term budget changes are also significant in the consideration of major projects or programs. These programs take from 10 to 20 years from inception to completion. What appears as gradual change in defense policy or planning can have a significant impact on the effectiveness of an individual major program resulting in numerous modifications to the original program. These modifications can be in quantity, technical performance, or schedule and thus affect the planned acquisition program in areas of cost, development risk, and schedule.

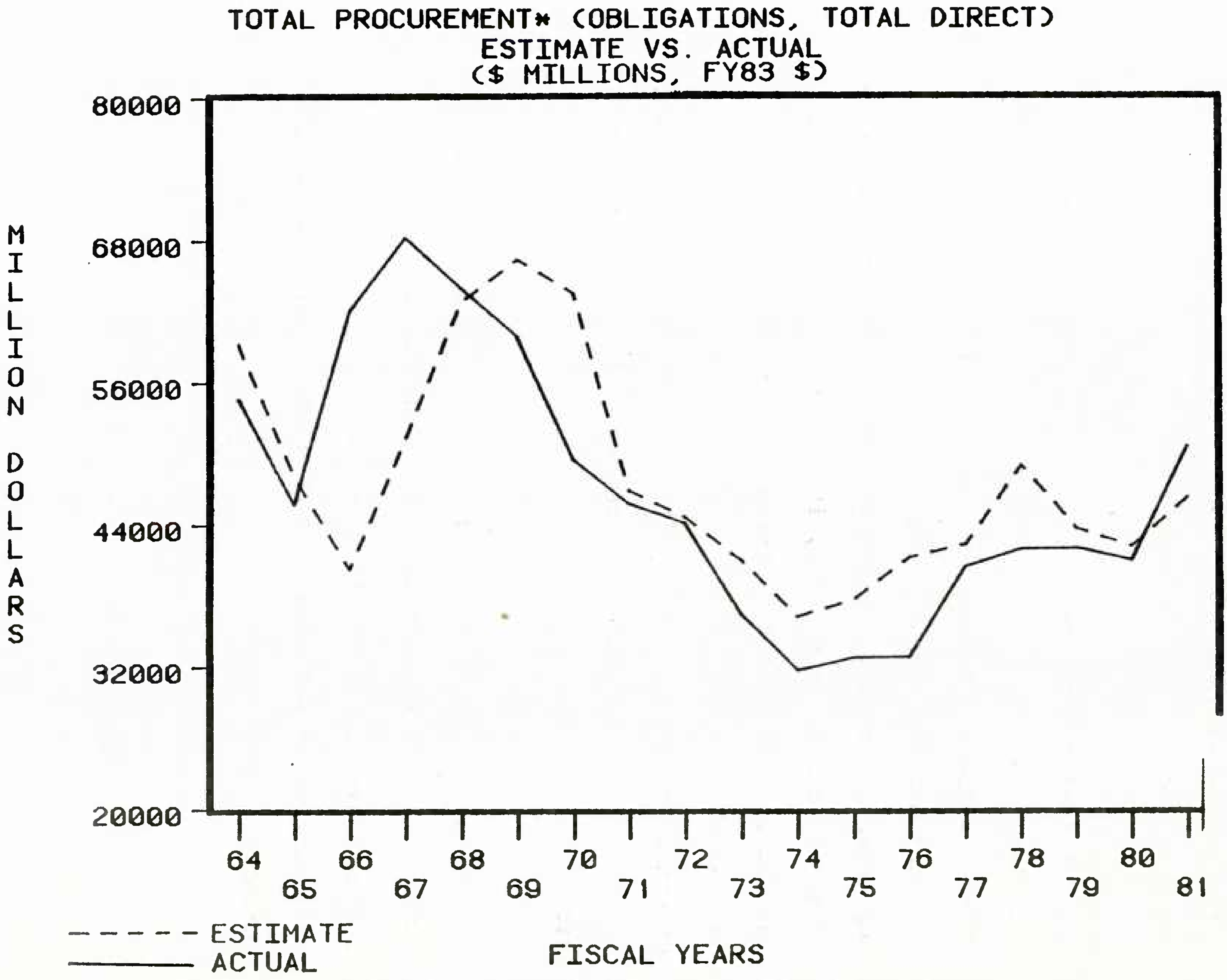
4.9 SUMMARY OF TURBULENCE CAUSES

Wars are, of course, the largest cause of turbulence over the three decades since 1950 with the Korean War creating the greatest turbulence. An indication of the turbulence caused by the Korean War is the increase in the standard deviation over the 30-year period from 13 to 18 percent. Although the Korean War lasted for only a small part of the 30-year period analyzed, it added 5 percent to the standard deviation for this period. The next largest cause of turbulence is changing administration policies.

The analysis of the 30-year period reveals that turbulence in GNP is not transmitted to turbulence in the defense budget. The analysis also demonstrates that the emerging U.S.S.R. threat cannot be correlated with the top-level DoD budget. Based on the macroeconomic analysis conducted during this study, it cannot be concluded that individual acquisition programs are, or are not, influenced by specific U.S.S.R. threats. Therefore, generalized conclusions cannot be drawn based on the lack of correlation between the threat and the budget at the macroeconomic level.

Turbulence is also introduced in the budget during budget planning and formulation. Congressional action is a significant cause of this turbulence. However, overoptimism in planning is also a significant cause of turbulence in procurements.

FIGURE C-1

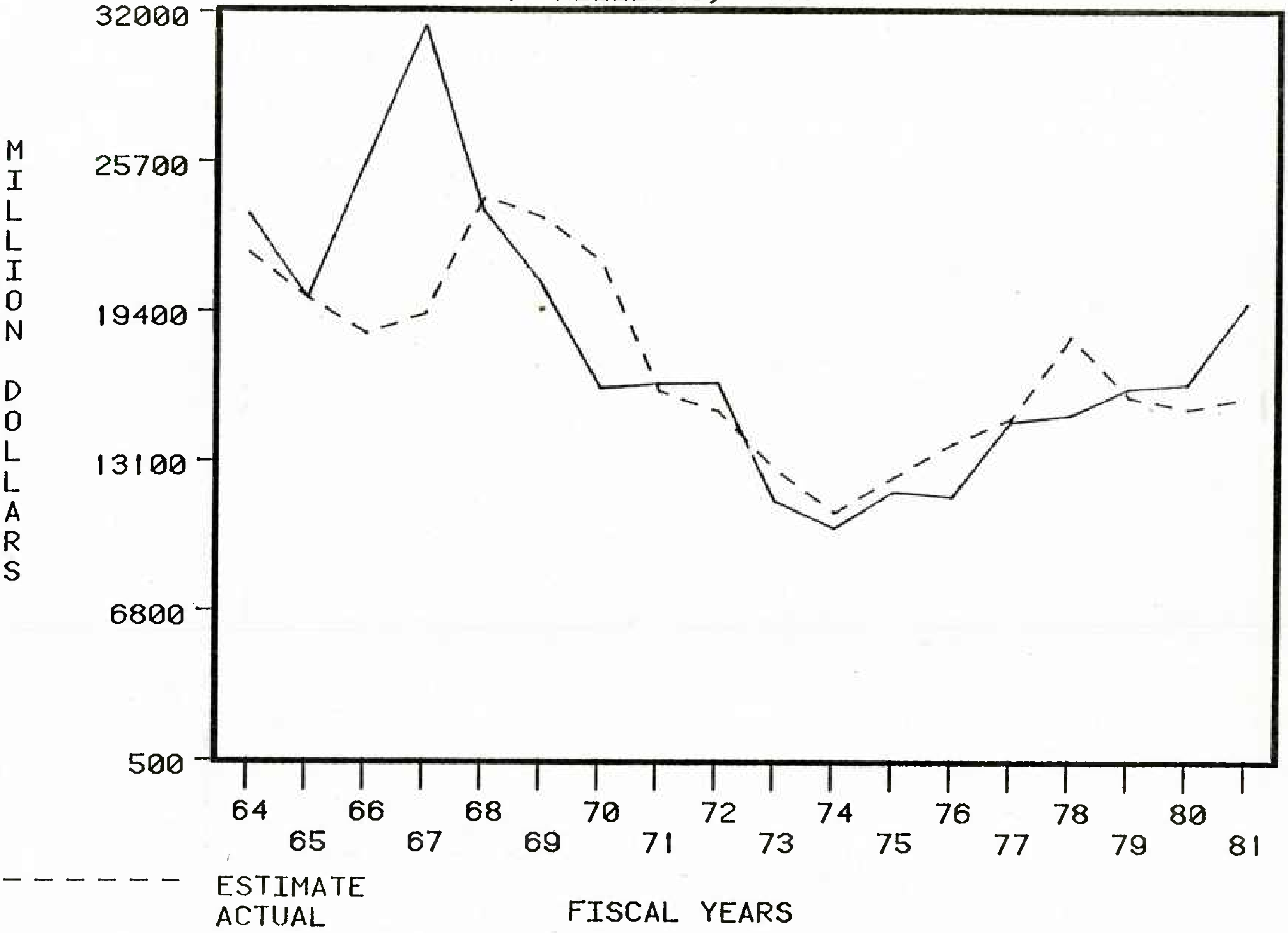


SOURCE: BUDGETS OF THE US GOVERNMENT FY64-FY83, OMB

* LESS NATIONAL GUARD EQUIPMENT AND DEFENSE AGENCIES

FIGURE C-2

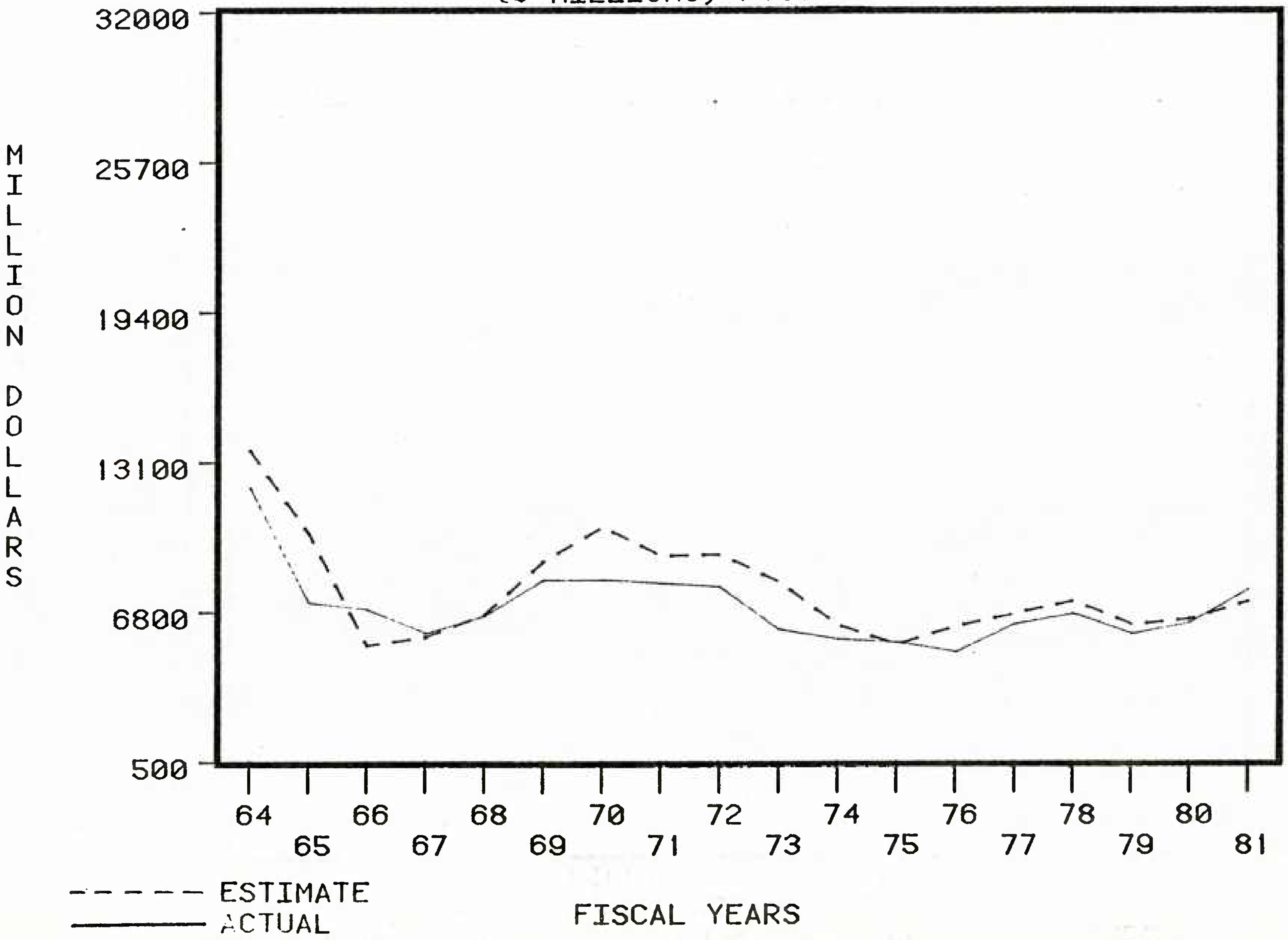
TOTAL AIRCRAFT PROCUREMENT (OBLIGATIONS, TOTAL DIRECT)
ESTIMATE VS. ACTUAL
($ MILLIONS, FY83 $)



SOURCE: BUDGETS OF THE US GOVERNMENT FY64-FY83, OMB

FIGURE C-3

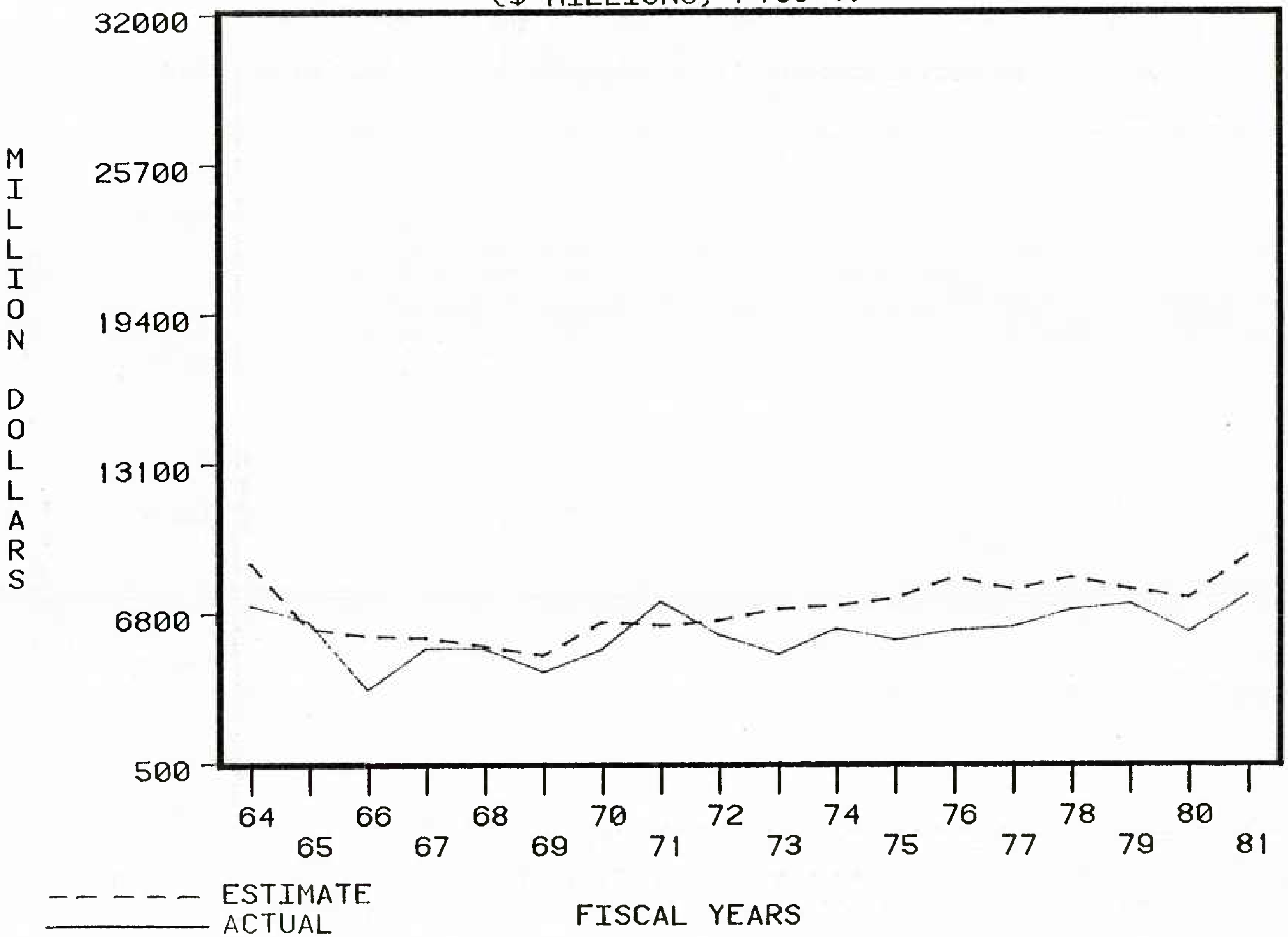
TOTAL MISSILE PROCUREMENT (OBLIGATIONS, TOTAL DIRECT)
ESTIMATE VS. ACTUAL
($ MILLIONS, FY83 $)



SOURCE: BUDGETS OF THE US GOVERNMENT FY64-FY83, OMB

FIGURE C-4

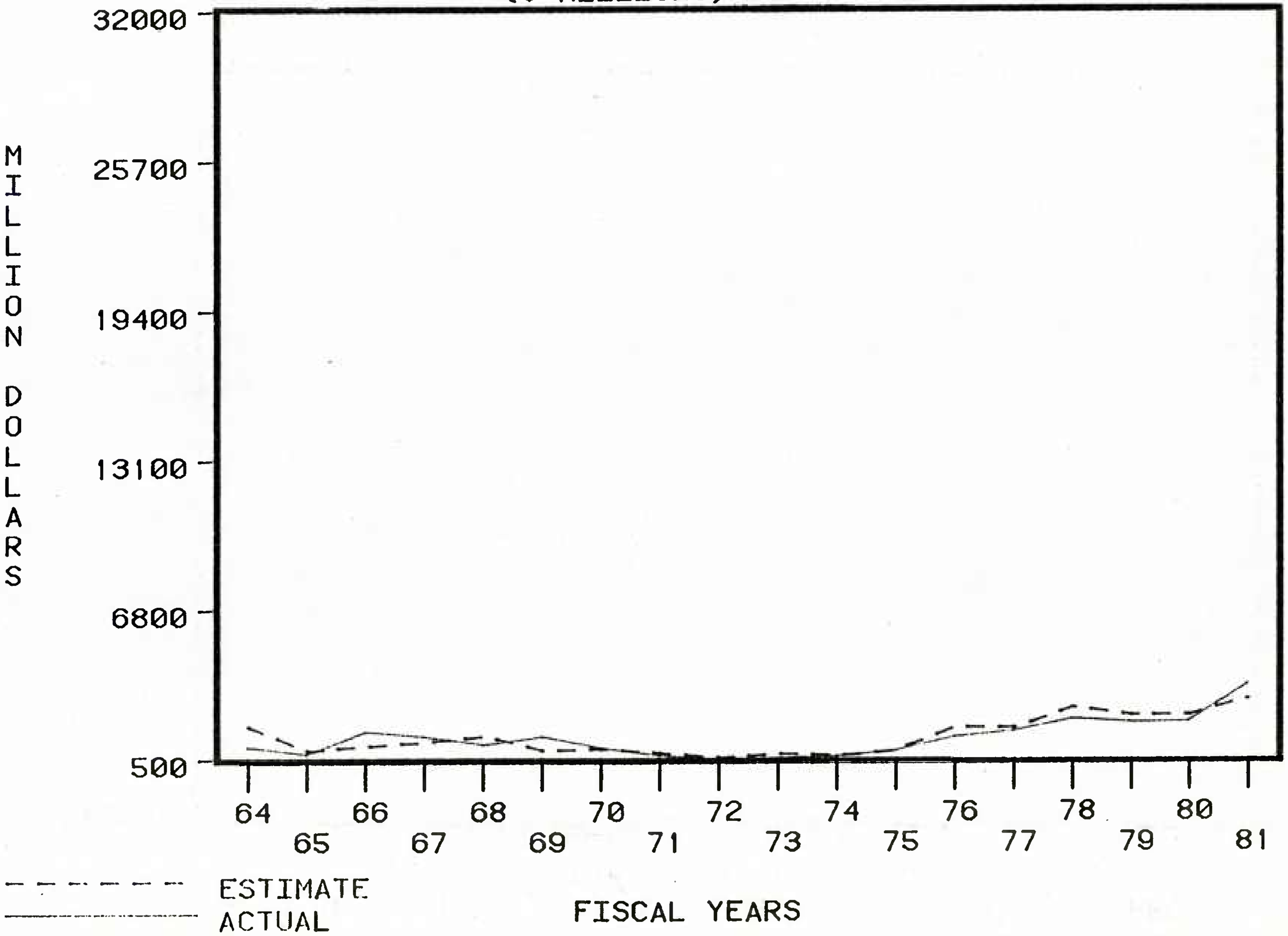
SHIPBUILDING AND CONVERSION, NAVY (OBLIGATIONS, TOTAL DIRECT)
ESTIMATE VS. ACTUAL
($ MILLIONS, FY83 $)



SOURCE: BUDGETS OF THE US GOVERNMENT FY64-FY83, OMB

FIGURE C-5

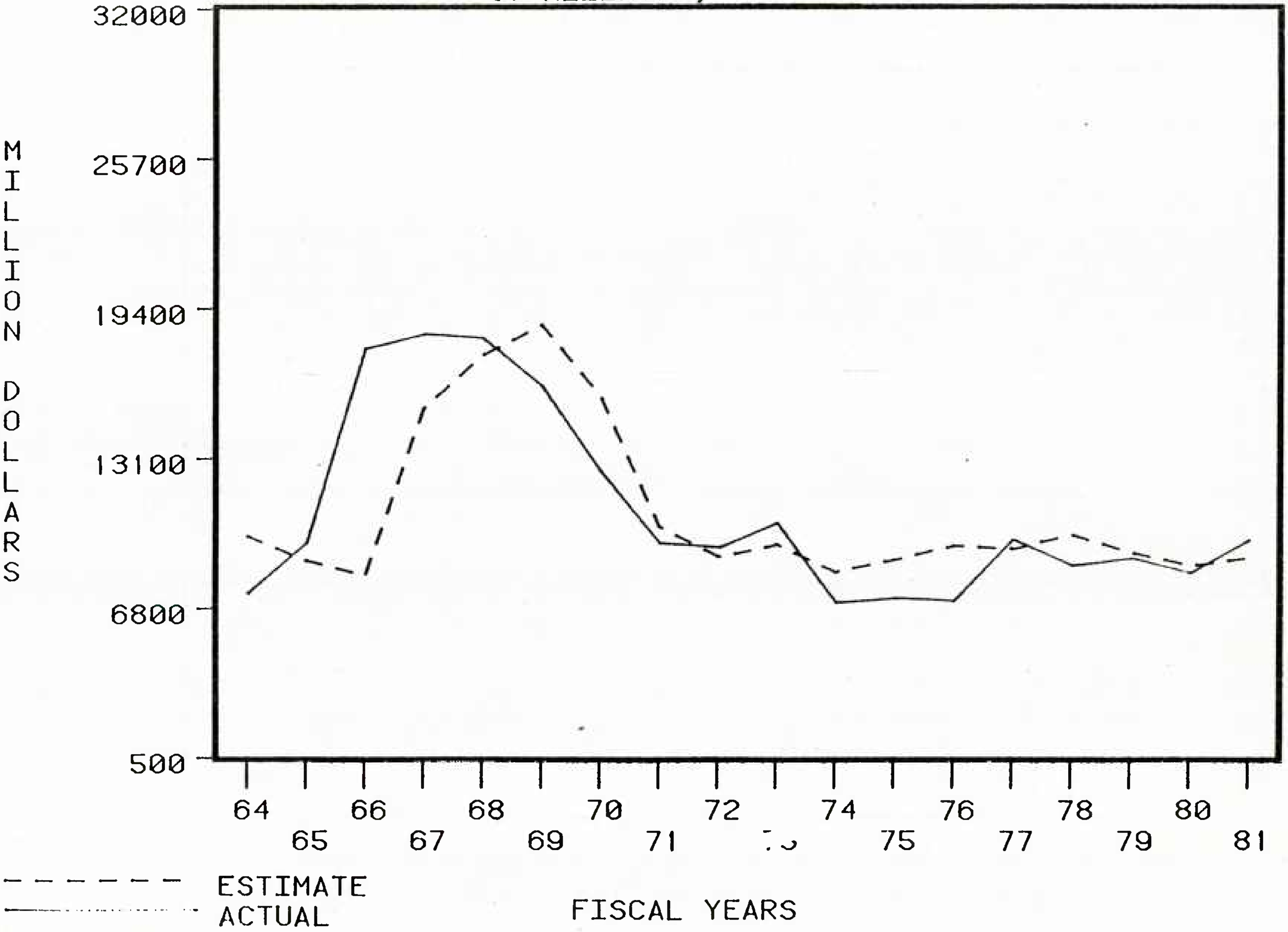
TOTAL WEAPONS AND COMBAT VEHICLES (OBLIGATIONS, TOTAL DIRECT)
ESTIMATE VS. ACTUAL
($ MILLIONS, FY83 $)



SOURCE: BUDGETS OF THE US GOVERNMENT FY64-FY83, OMB

FIGURE C-6

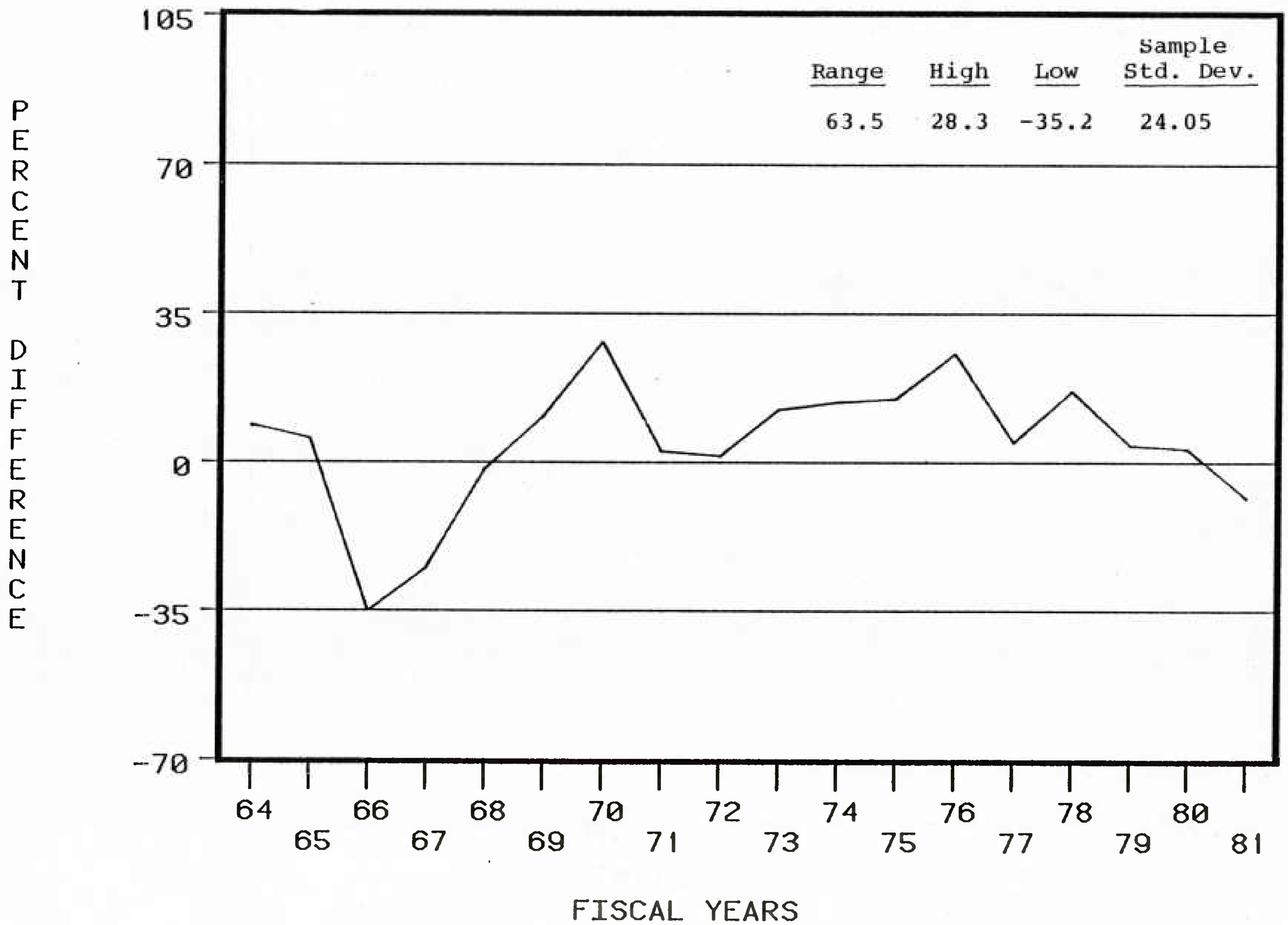
TOTAL OTHER (OBLIGATIONS, TOTAL DIRECT)
ESTIMATE VS. ACTUAL
($ MILLIONS, FY83 $)



SOURCE: BUDGETS OF THE US GOVERNMENT FY64-FY83, OMB

FIGURE C-7

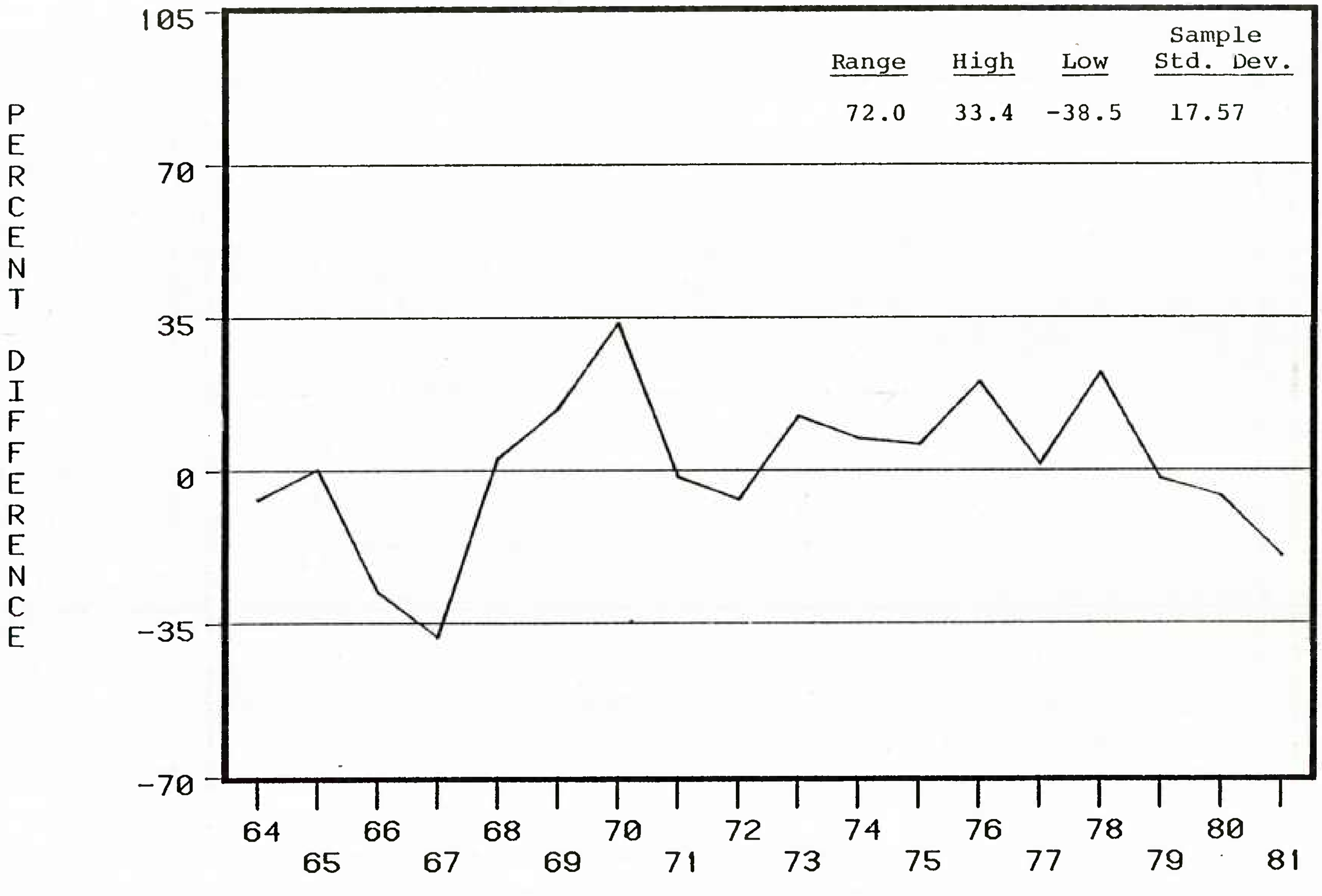
TOTAL PROCUREMENT (OBLIGATIONS, TOTAL DIRECT)
ESTIMATE VS. ACTUAL ANNUAL CHANGE



SOURCE: BUDGETS OF THE US GOVERNMENT FY64-FY83, OMB

FIGURE C-8

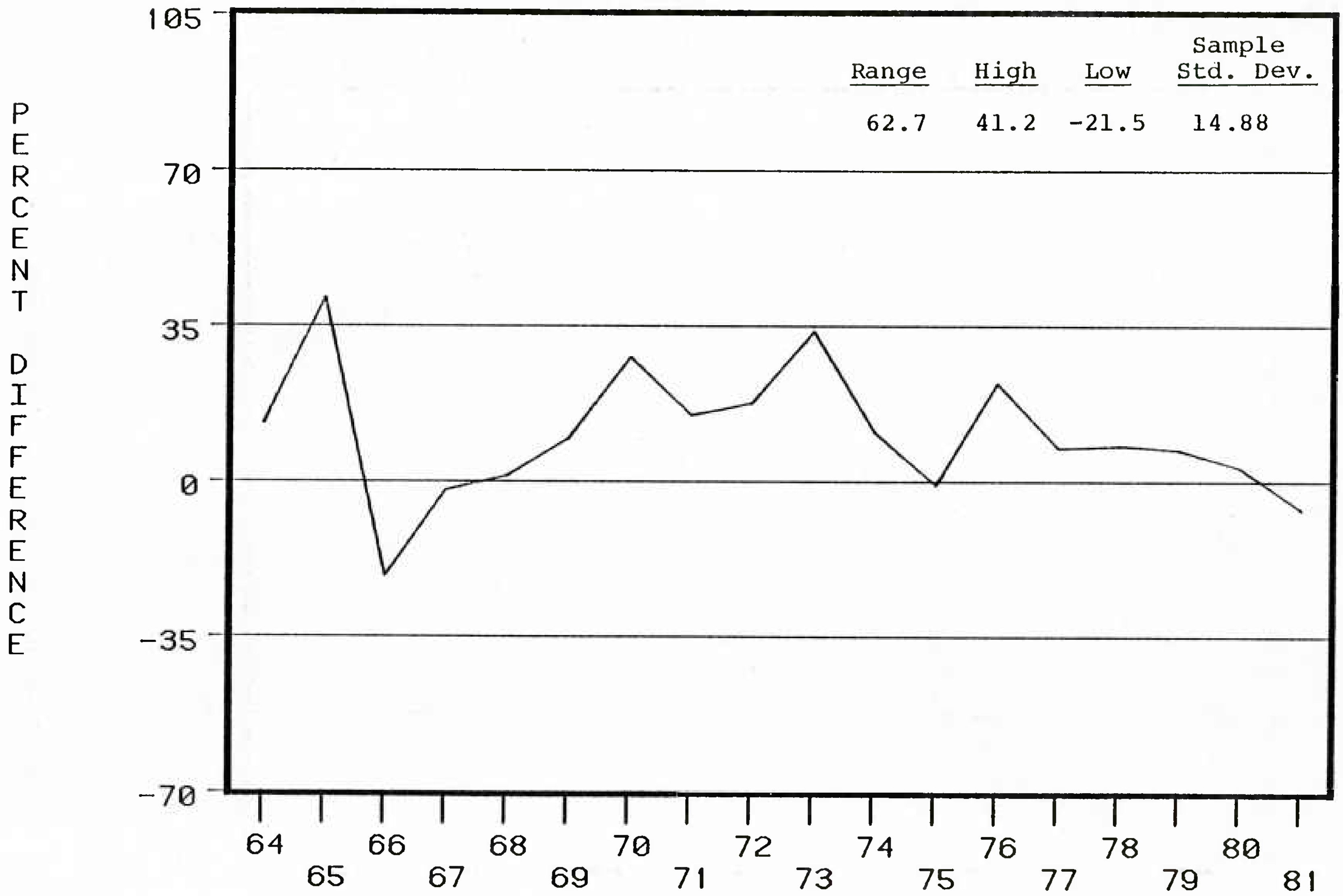
TOTAL AIRCRAFT (OBLIGATIONS, TOTAL DIRECT)
ESTIMATE VS. ACTUAL ANNUAL CHANGE



SOURCE: BUDGETS OF THE US GOVERNMENT FY64-FY83, OMB

FIGURE C-9

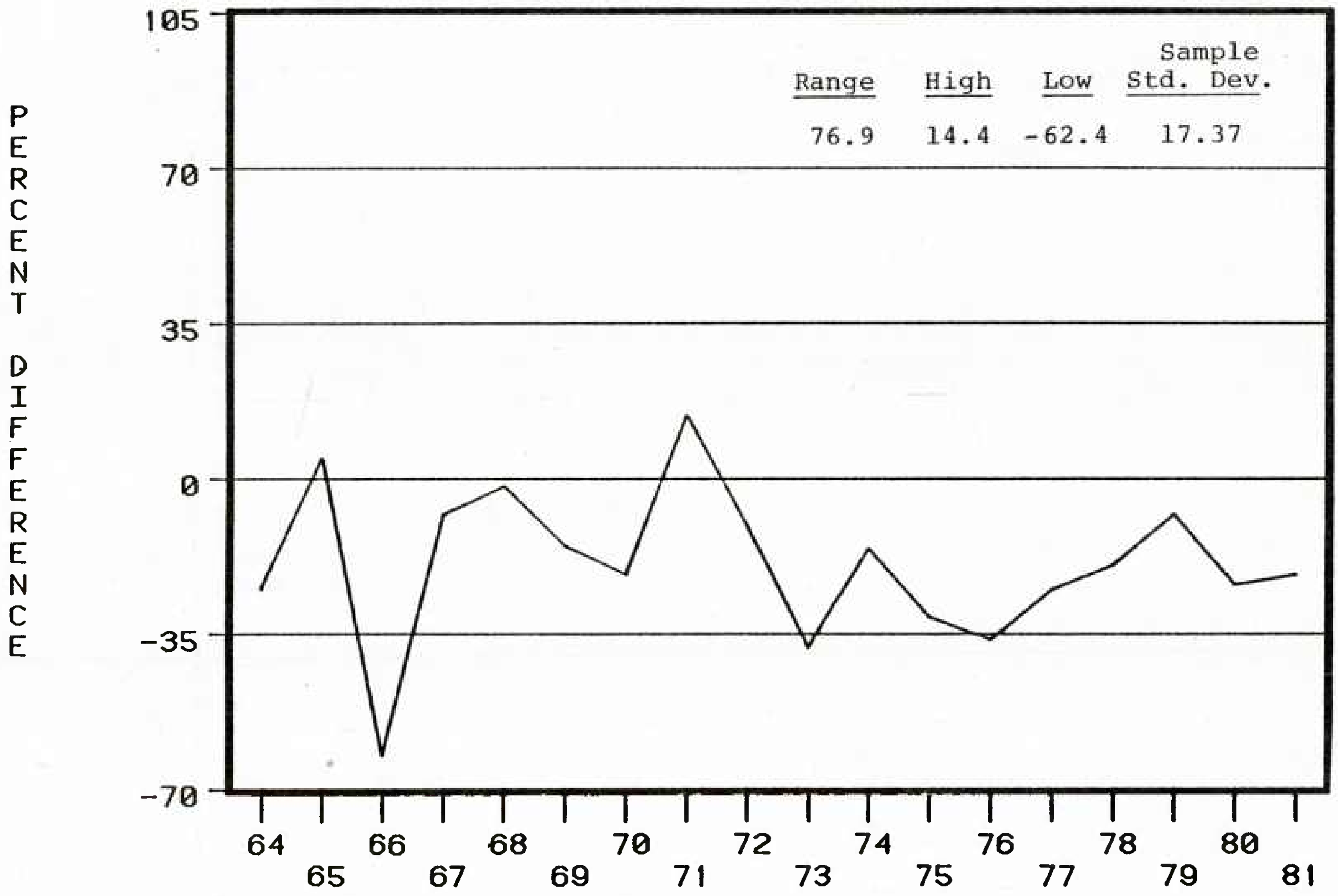
TOTAL MISSILES (OBLIGATIONS, TOTAL DIRECT)
ESTIMATE VS. ACTUAL ANNUAL CHANGE



SOURCE: BUDGETS OF THE US GOVERNMENT FY64-FY83, OMB

FIGURE C-10

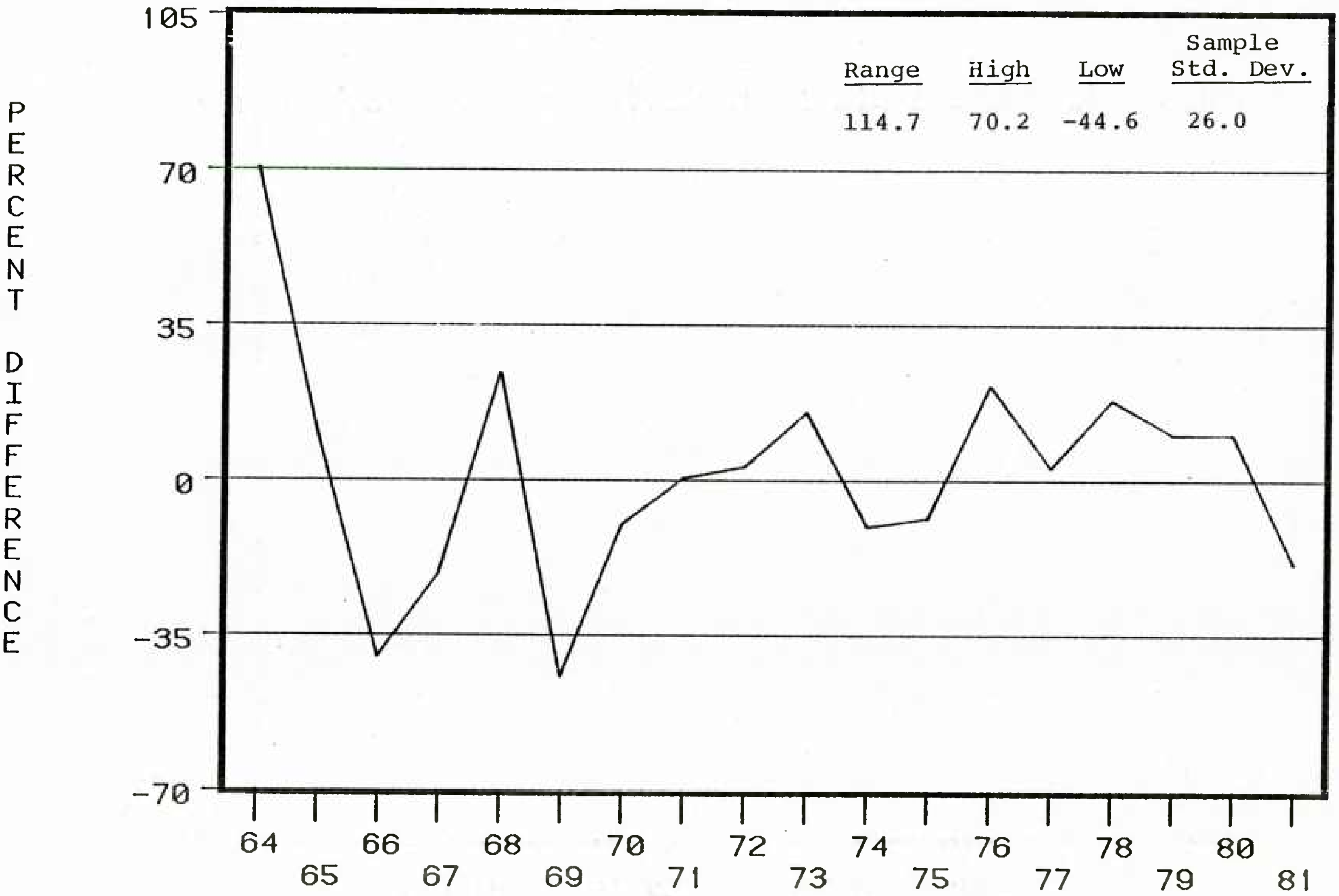
SHIPBUILDING AND CONVERSION, NAVY (OBLIGATIONS, TOTAL DIRECT)
ESTIMATE VS. ACTUAL ANNUAL CHANGE



SOURCE: BUDGETS OF THE US GOVERNMENT FY64-FY83, OMB

FIGURE C-11

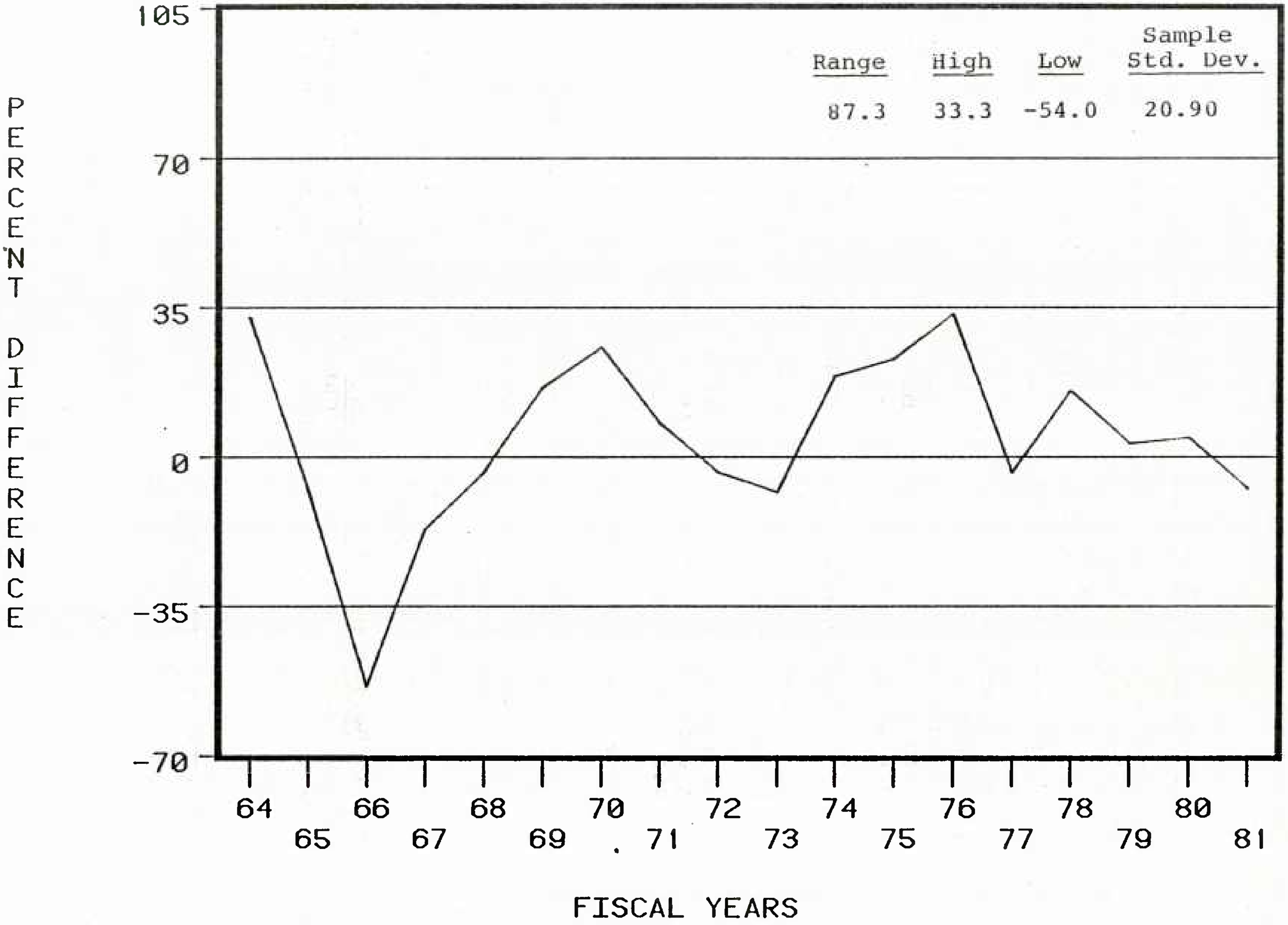
TOTAL WEAPONS AND COMBAT VEHICLES (OBLIGATIONS, TOTAL DIRECT)
ESTIMATE VS. ACTUAL ANNUAL CHANGE



SOURCE: BUDGETS OF THE US GOVERNMENT FY64-FY83, OMB

FIGURE C-12

TOTAL OTHER (OBLIGATIONS, TOTAL DIRECT)
ESTIMATE VS. ACTUAL ANNUAL CHANGE



SOURCE: BUDGETS OF THE US GOVERNMENT FY64-FY83, OMB

APPENDIX D

ECONOMIC AND EFFECTIVENESS COMPARISONS

D.1 ECONOMIC COMPARISON OF THE "PURE" STRATEGIES*

Our objective for the economic analysis of the competitive strategies was to select a simplified case that was easy to calculate, yet reflected the principal phenomena, and would bracket most real situations. This simplified case involved three classes of systems with different cost-quantity relationships (weapons, aircraft, and ships), and also involved two types of cost-quantity relationships (exponential and those in the vicinity of the economical production rate -- see Figure D-1). We considered two scenarios over a multiyear period (the length is not significant):

- Level budget - B$ throughout the period
- Turbulent - 20% below B$ for half the period and 20% above B$ for half.

We decided to examine ± 20% turbulence in order to determine effects of the same order of magnitude as the observed topline budget turbulence in procurement.

Our analysis consisted of the following steps:

- Derivation of cost-quantity relationships
- Derivation of relationships between changes in budget and quantity changes
- Quantitative comparison of the strategies for the two cost-quantity relationships.

D.1.1 Derivation of Cost-Quantity Relationships. A typical production cost-quantity curve has the shape shown in Figure D-1. There are two interesting regions on this

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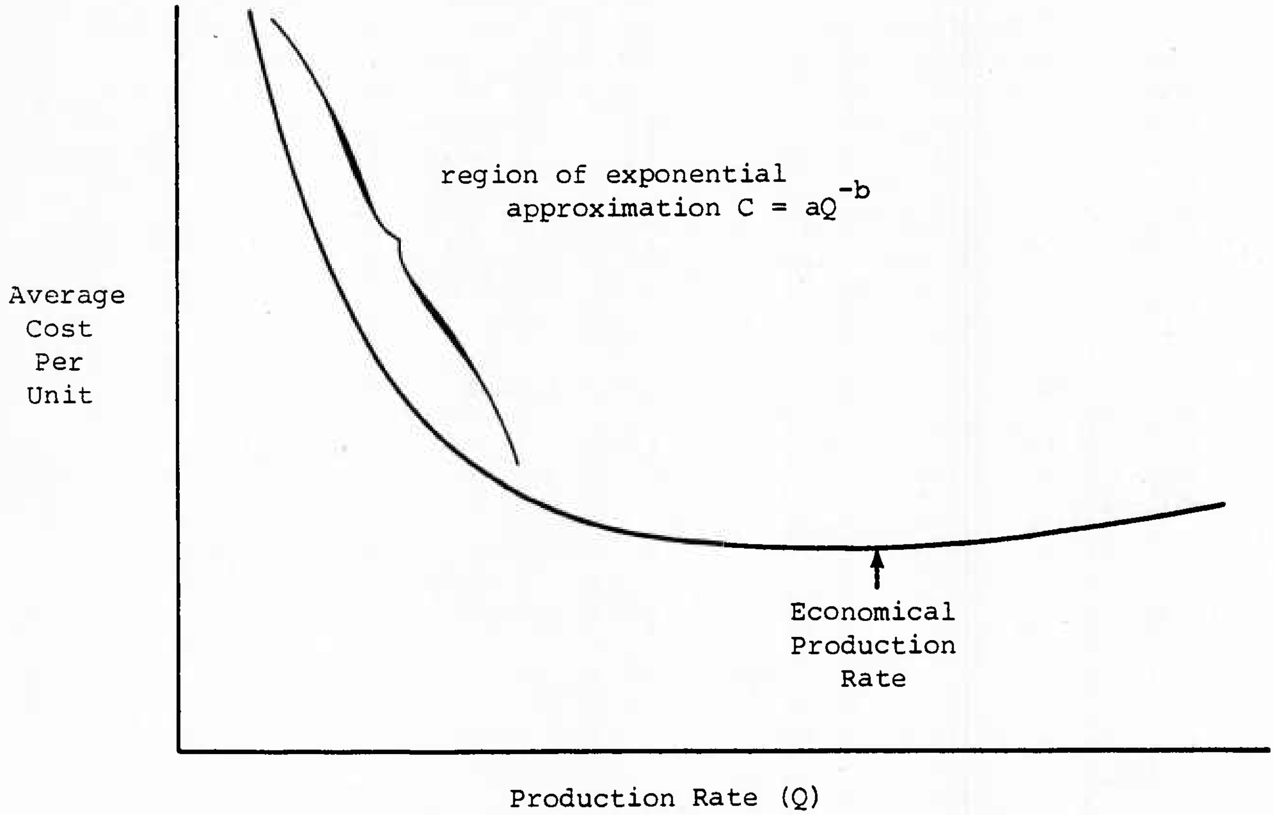
* By "pure" we mean characterized by simplistic, no-exception decisionmaking rules.

FIGURE D-1

Typical Average Unit Cost Curve



Reference: Lipsey & Steiner, "Economics," Fifth Edition, Harper & Row, New York, 1978.

curve. The first is the region of steeply increasing cost with decreased production, often approximated as an exponential of the form:

$$C = aQ^{-b}$$

where C = cost, Q = production rate ("quantity"), and a,b are constants.

The second region is in the vicinity of the economical production rate -- at which the minimum unit cost is attained. The economical rate is determined by factors such as plant capacity, trained manpower, tooling and test equipment. We examined both regions because, as shown later, the economic effects of the strategies depend on the particular region a program is in.

In order to examine the effects of various exponential cost-quantity relationships, we chose Navy aircraft, weapons, and ships. Reference (1) provides a wealth of data on the cost-quantity relationships that we were able to use for this calculus.

Figure D-2 depicts the relationship derived for Navy Weapons (WPN). The data points are program quantity and unit cost changes that occurred between two consecutive January FYDPs (FY 81 and FY 82). Costs were analyzed in constant FY 82 dollars, and were normalized to percent change to allow for comparisons among different programs; that is, a 10% reduction in a large program is assumed to cause the same percentage increase in unit cost as a 10% reduction in a small program. The large scatter in the data indicates the crudeness of this exponential approximation and of the data. Indeed, the best-fit exponential does not pass through the 0%/0% point as it theoretically should.

To correct this latter problem, we renormalized the derived cost-quantity relationship to pass through the 0%/0% point -- no change in quantity should lead to no change in unit cost. The resultant curve was plotted on a log-log scale, resulting in the straight line of Figure D-3. Similar relationships were derived from Reference (1) for the Navy aircraft (APN) and for ships (SCN), as shown in Figures D-4 and D-5, respectively. The raw data for ships and aircraft had a large amount of dispersion similar to that of Figure D-2, again indicating that these relationships are only approximate. As might be expected, cost-quantity effects are greatest (slopes are steepest) for weapons, less for aircraft, and still less for ships.

FIGURE D-2

UNIT COST CHANGE VS QUANTITY CHANGE WPN

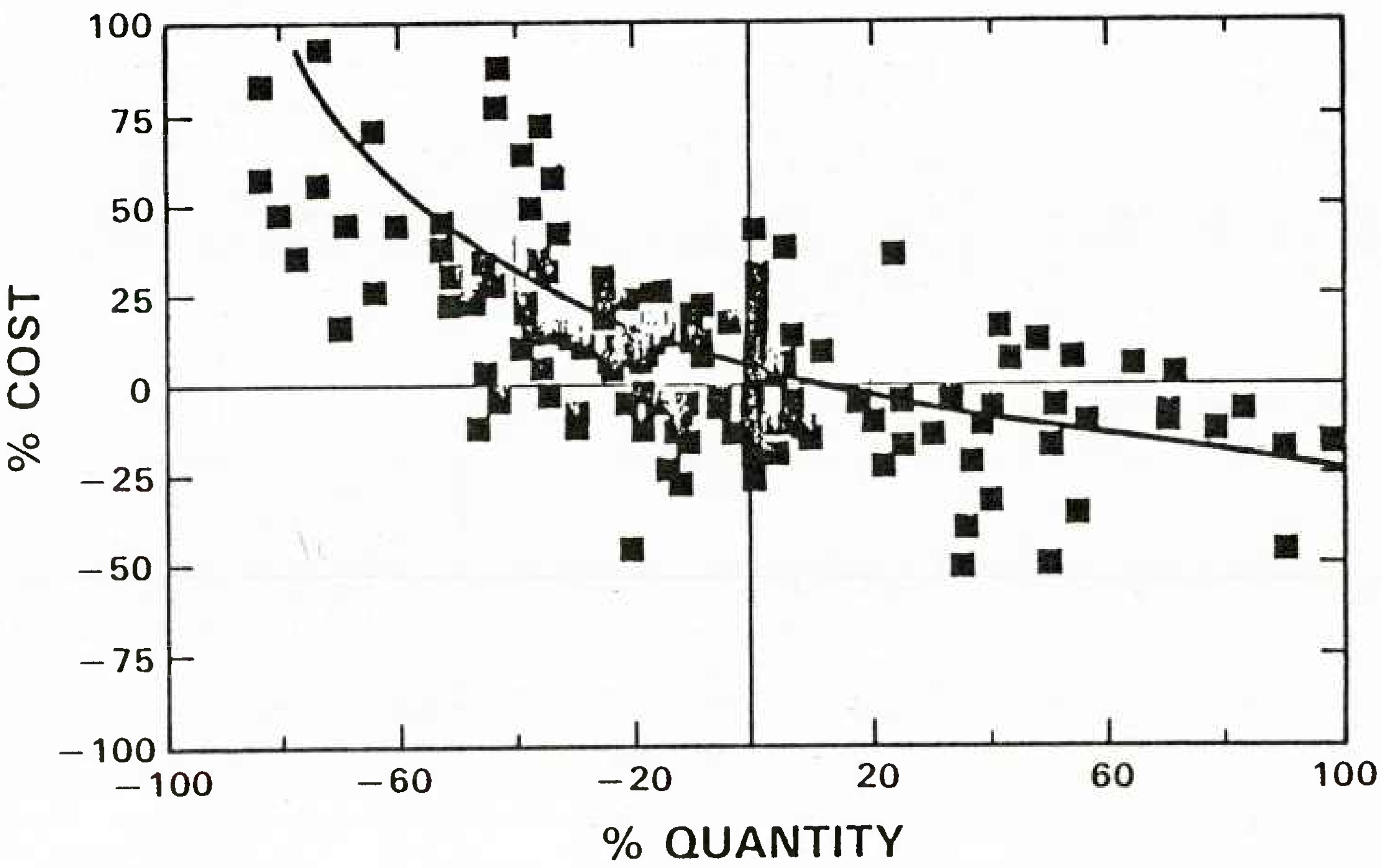


FIGURE D-3
WPN Unit Cost Changes Vs. Quantity Changes

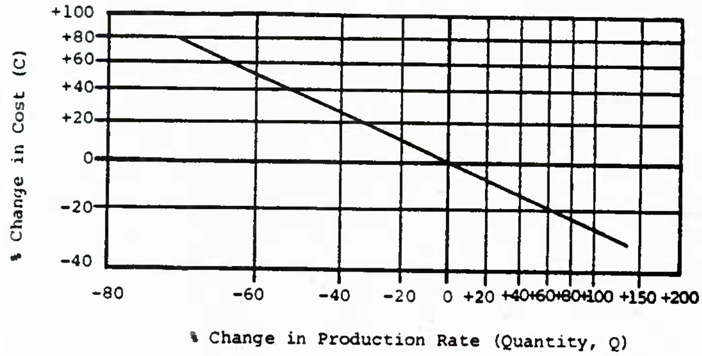


FIGURE D-4
APN Unit Cost Changes Vs. Quantity Changes

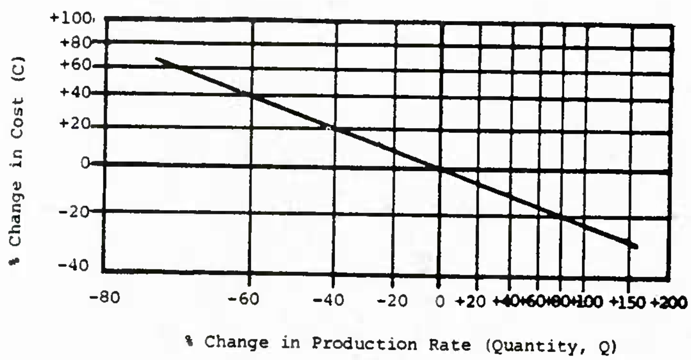
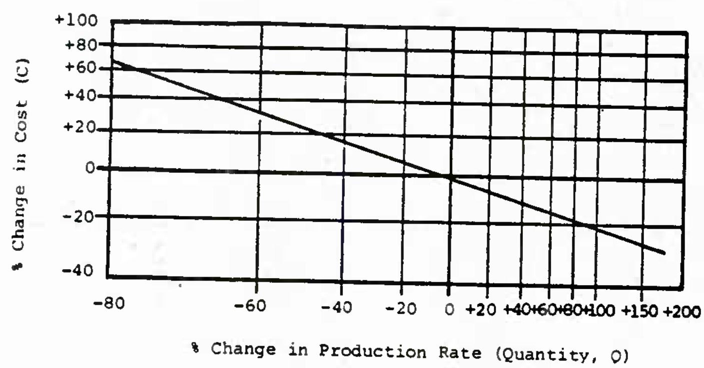


FIGURE D-5
SCN Unit Cost Changes Vs. Quantity Changes



As shown in Figure D-1, the exponential assumption does not apply near the economical production rate (where, by definition, average unit cost is a minimum). There is little data for this situation. For the purposes of our analysis, therefore, we used the hypothetical costquantity curve shown in Figure D-1.

D.1.2 <u>Derivation of Budget-Quantity Relationships</u>. The above cost-quantity relationships can be translated into budget-quantity relationships if we assume that total program or budget cost is equal to the product of the average unit cost and the number procured. With this assumption, an exponential cost-quantity relationship leads to an exponential budget-quantity relationship. The translation is simple if graphical methods are employed. For example, for WPN (Figure D-2), a -40% quantity change Q, leads to a +25% average unit cost change, C. If the budget required for Q units at average unit cost C is B:

$$B = QC$$

Then the budget B' required to purchase the fewer units is:

$$\begin{aligned} B' &= ((1-.4)Q)((1+.25)C) \\ &= (.6Q)(1.25C) \\ &= .75QC \\ &= .75B \end{aligned}$$

That is, a budget reduction of 25% (1-.75) will lead to a -40% quantity change, reflecting the effect of the consequential higher average unit costs. The WPN budget-quantity curve can then be drawn on a log-log scale by drawing a straight line through the point (-25%, -40%) and the origin (0%,0%) (Figure D-6). We also developed budget-quantity relationships for APN and SCN, as shown in Figures D-7 and D-8, respectively.

From these relationships, we can see that equal decreases and increases in budget result in dissimilar changes in quantity. For example, Table D-1 shows the effects of 20% budget decreases and increases on weapons, aircraft, and ship production. Two points emerge for procurement of systems whose production costs can be approximated by an exponential cost-quantity relationship:

- Relative changes in quantity will be larger than the budget changes that caused them
- Gains on the up-side will be greater than losses on the down-side for equal positive or negative changes.

FIGURE D-6

WPN Budget Changes Vs. Quantity Changes

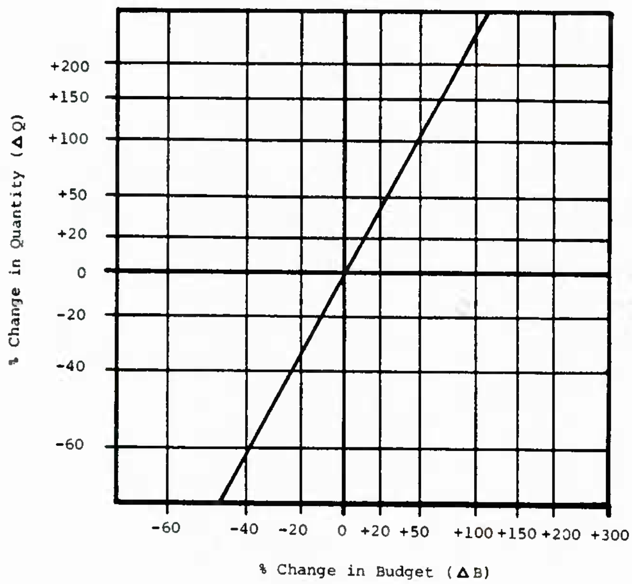


FIGURE D-7

APN Budget Changes Vs. Quantity Changes

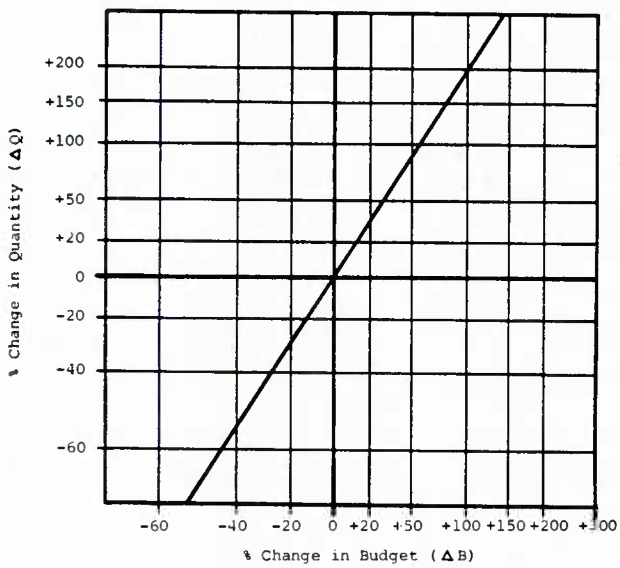


FIGURE D-8

SCN Budget Changes Vs. Quantity Changes

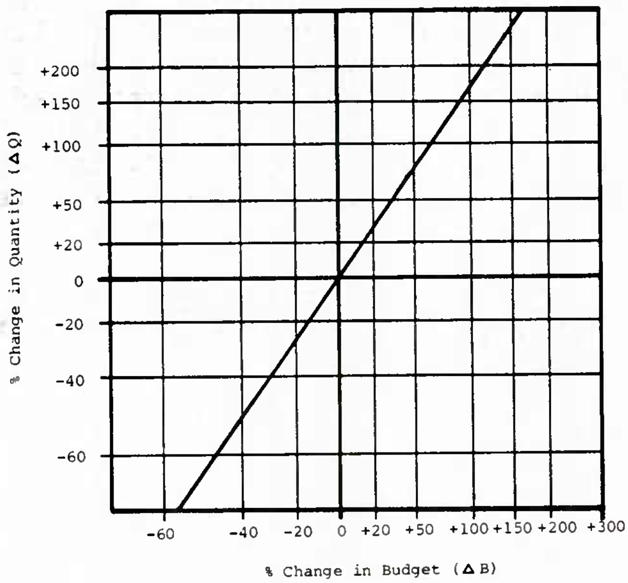


TABLE D-1
Impact of Equal Positive and Negative Changes in Budget on Quantity

	Budget Change	
	-20%	+20%
Weapons (WPN)	-33%	+42%
Aircraft (APN)	-29%	+34%
Ships (SCN)	-27%	+30%

Near the economical production rate, both reductions and additions to budget lead to higher average unit costs. When we calculated budget-quantity points using Figure D-1, we obtained the relationship between budget and quantity changes shown in Figure D-9. In this case, negative budget changes produce proportionately larger quantity changes (e.g., -20% budget change leads to -22% quantity change), but positive budget changes lead to proportionately smaller quantity changes (e.g., +20% budget change leads to a +19% quantity change). Furthermore, the larger the budget change, the greater the effect (e.g., +40% budget change yields +36% quantity change).

D.1.3 Evaluation of Competitive Strategies. To compute the effects of the competitive strategies, we examined the two scenarios previously described:

- Level Budget
- Turbulent -- ±20%

The three strategies we examined were:

- Complete fencing
- Uniform distribution of turbulence
- Hybrid.

The analytical technique consisted of calculating each scenario the relative number of units that can be obtained based on the budget-quantity relationships developed in the previous section.

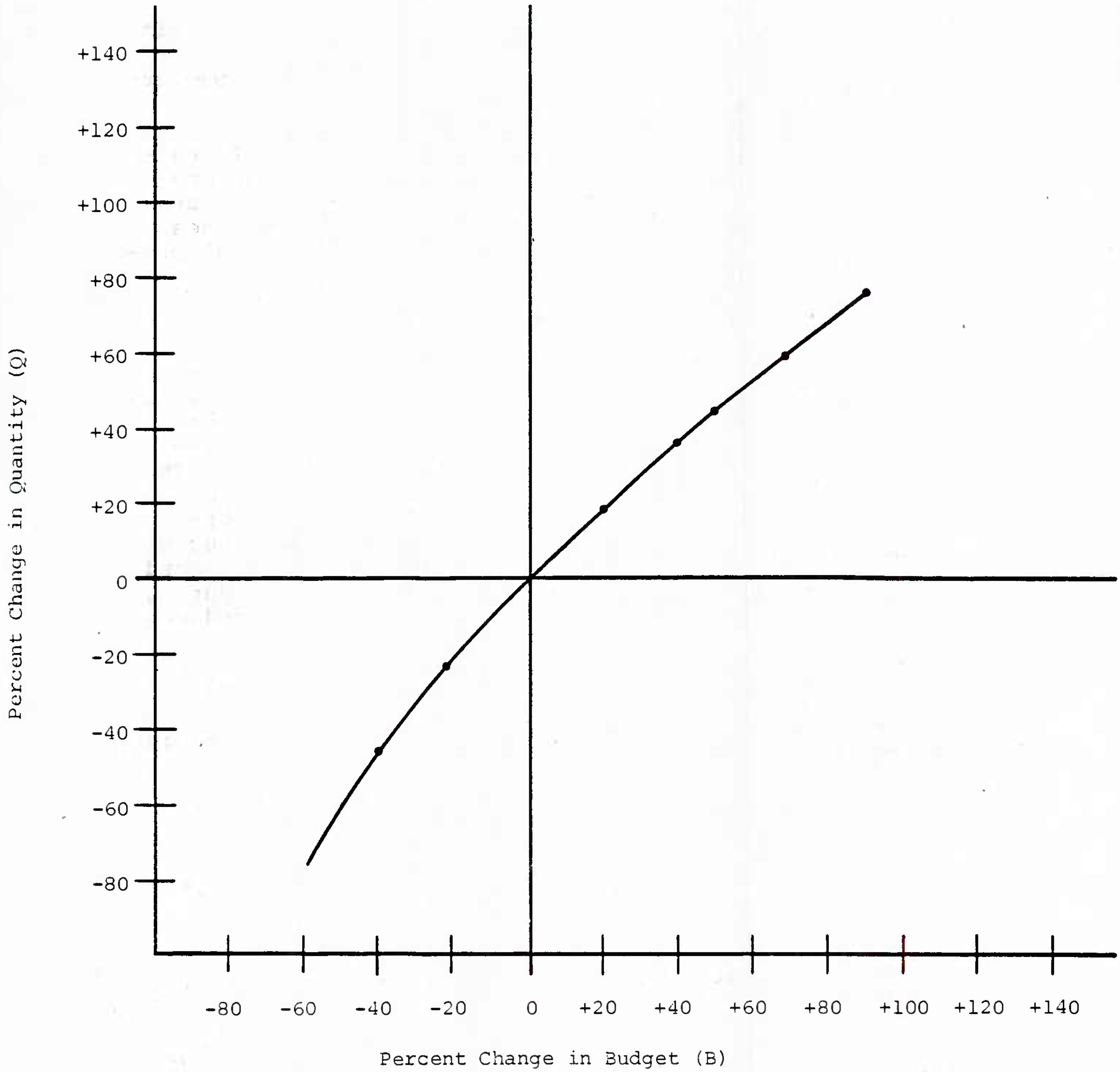
We first calculated the three strategies with the exponential cost quantity relationships, then made the calculations for variations near the economical production rate, and finally compared the results.

D.1.3.1 Complete Fencing Strategy -- Exponential Cost--Quantity Relationships. In the level budget scenario, the total number of units bought (T) is equal to the number of weapons (W), aircraft (A) and ships (S). That is,

$$W + A + S = T$$

We kept track of W, A and S separately in order to observe the effects of their different budget-quantity relationships. However, in order to be able to calculate an overall measure as well (as will be shown later), we chose for

FIGURE D-9
Hypothetical Quantity vs. Budget Changes for Production Near the Economical Rate



this analysis a case in which the Level Budget number of weapons, aircraft and ships bought are equal:

$$W = A = S$$

Finally, we assumed artificially that their average unit costs at the Level Budget are equal so that the only difference in our calculus was due to differences in budget-quantity relationships.

For the complete fencing strategy, the 20% cut leads to stopping 20% of the weapons, aircraft, and ship programs during the cut period. We assumed these 20% cuts could be taken completely by stopping production lines. Then the fenced programs are produced at their level budget scenario rates, producing

$$.8W + .8A + .8S = .8T$$

units. During the cut period, no other units are produced. However, during the surge period, the funds above the 80% for the fenced programs go into the other programs, doubling their level of funding compared to the level budget case. As shown in Figure D-6, a +100% WPN budget change will yield a 270% increase in number of units produced, totalling 3.7W. Similarly, 200% more aircraft (3.0A) and 170% more ships (2.7S) are produced. Since this extra production applies only to the unfenced 20% of the programs for half of the total period (during the surge period), the number of unfenced units produced is:

$$(.20)\ (1/2)\ (3.7W + 3.0A + 2.7S) = .37W + .30A + .27S$$

When this is added to the number of fenced systems bought, we obtained:

Fenced programs:	.80W	.80A	.80S
Other programs:	.37W	.30A	.27S

Amount bought: $1.17W + 1.10A + 1.07S = 1.11T$

By assuming W=A=S for this example, the coefficient of T is simply the average of the coefficients for W, A, and S. This calculation is called Case A in Table D-2. We noted that the turbulent scenario leads to an average of 11% greater production than the level budget scenario. This is a consequence of the more economical production rates for the unfenced programs resulting from the turbulent scenario (i.e., production of unfenced programs

TABLE D-2

Number of Units Bought
Complete Fencing Strategy with Exponential Cost-Quantity Relationships

Level Budget Scenario:

Amount Bought: W + A + S = T

Turbulent (±20%) Scenario*:

Case A: No cost penalty for stopping and starting programs

Fenced programs:	.80W	.80A	.80S
Others - cut period:	0	0	0
- surge period:	.37W	.30A	.27S
Amount bought:	1.17W +	1.10A +	1.07S = 1.11T

Case B: Cost to start and stop production = 15% of surge funding

Fenced programs:	.80W	.80A	.80S
Others - cut period:	0	0	0
- surge period:	.28W	.24A	.22S
Amount bought:	1.08W +	1.04A +	1.02S = 1.05T

Case C: Cost to start and stop production = 30% of surge funding

Fenced programs:	.80W	.80A	.80S
Others - cut period:	0	0	0
- surge period:	.19W	.17A	.16S
Amount bought:	.99W +	.97A +	.96S = .97T

* Budget cut 20% for half of the period and surged 20% above the Level Budget for half of the period.

was at 200% of the rate in the Level Budget scenario for half the time).

For most cases, such turbulent stopping and starting of production would incur substantial additional costs. We parameterized these costs as 15% and 30% of the surge funding for the non-fenced programs. The results are shown in Table D-2 as Case B and Case C, respectively. We noted that even if the added cost of stopping and starting is 15% of the surge budget for the unfenced programs, there will still be a net increase in all types of units produced. If the added cost is 30%, then complete fencing in the turbulent scenario will result in fewer units of all types (weapons, aircraft, and ships).

We further noted the significant effect of the different cost-quantity relationships. For all three cases, more weapons will be bought in the turbulent scenario than aircraft or ships, and more aircraft than ships.

D.1.3.2 Even Distribution of Turbulence Strategy -- Exponential Cost-Quantity Relationship. The calculation for the level budget scenario was the same. For the cut period (1/2 of the total period), we used the budget-quantity curves to obtain the following production with all procurements cut 20%:

$$(1/2)((1-.33)W + (1-.29)A + (1-.27)S)$$

$$= .34 W + .36A + .37S$$

With a similar calculation for the surge period, we obtained Table D-3. Again, we noted increased production with the turbulent budget, a consequence of losing fewer systems during the cut period than are gained during the surge period.

D.1.3.3 Hybrid Strategy -- Fencing 50% and Even Distribution of Turbulence to 50%. Finally, we addressed a combined strategy, fencing 50% of the programs and spreading the turbulence evenly among the other 50%. The calculation was similar to the previous calculation, with results shown in Table D-4. Again, more can be bought under turbulent conditions.

D.1.3.4 Complete Fencing -- Near Economical Production Rate. For this and the next two calculations we looked only at one class of purchase, T. Using assumptions and calculations similar to those in the previous sections, we

TABLE D-3

Number of Units Bought
Even Distribution Strategy with Exponential
Cost-Quantity Relationships

Level Budget Scenario:

Amount bought: W + A + S = T

Turbulent (±20%) Scenario*:

Cut Period:	.34W	.36A	.37S
Surge period:	.71W	.67A	.65S

Amount bought: 1.05W + 1.03A + 1.02S = 1.03T

* Budget cut 20% for half of the period and surged to 20% above the Level Budget for half of the period.

TABLE D-4

Number of Units Bought
Hybrid Strategy: Fencing 50%; Even Distribution of
Turbulence to 50% with Exponential Cost-Quantity
Relationships

Level Budget Scenario:

Amount Bought: W + A + S = T

Turbulent (±20%) Scenario*:

Fenced programs:	.50W	.50A	.50S
Others - cut period:	.10W	.12A	.12S
- surge period:	.48W	.43A	.41S

Amount bought: 1.08W + 1.05A + 1.035S = 1.05T

* Budget cut 20% for half of the period and surged to 20% above the Level Budget for half of the period.

obtained the results for complete fencing shown in Table D-5. The turbulent scenario leads to reduced production, varying from 2% less if there is no differential cost for stopping and starting the unfenced programs to 7% less if the cost is 30%.

D.1.3.5 Even Distribution of Turbulence -- Near Economical Production Rates. The calculation for the even distribution strategy near the economical production rate is shown in Table D-6. Here, the loss of production is less than with fencing. The reason is that it is better to distribute the turbulence as widely as possible for this situation so that it is absorbed as much as possible on the flat part of the cost-quantity curves.

D.1.3.6 Hybrid -- 50% Fenced; Even Distribution to Remaining 50%; Near Economical Production Rate. The calculation for the hybrid strategy near the economical production rate is shown in Table D-7. This strategy is better than complete fencing but not as good as even distribution. Again, when programs are near their economic production rates, the broader the distribution of turbulence, the less its negative effects.

D.1.3.7 Summary of Competitive Strategies. The effects of all three strategies are summarized in Table D-8. Our conclusions from this data are:

- It is important to know where each program is on its cost-quantity curve before choosing strategies for coping with turbulence:
  - Exponential portion: Complete fencing may be most efficient if costs of stopping and starting programs are low; otherwise, hybrid (partial fencing) is most efficient and even distribution is next
  - Near economical production rates: Even distribution is most efficient and fencing least efficient.
- In any case, for realistic assumptions about the costs of stopping and starting programs (15-30%), the differences in efficiency are so small (generally 1-2%) that other factors should probably predominate.

TABLE D-5

Number of Units Bought
Complete Fencing Strategy at Economical Production Rates

Level Budget Scenario:

Amount bought: T

Turbulent (±20%) Scenario*:

Case A: No cost penalty for stopping and starting production

Fenced programs:		.80T
Others	- cut period:	0
	- surge period:	.18T
Amount bought:		.98T

Case B: Cost to stop and start production = 15% of surge funding

Fenced programs:		.80T
Others	- cut period:	0
	- surge period:	.16T
Amount bought:		.96T

Case C: Cost to stop and start production = 30% of surge funding

Fenced programs:		.80T
Others	- cut period:	0
	- surge period:	.13T
Amount bought:		.93T

* Budget cut 20% for half of the period and surged to 20% above the Level Budget for half of the period.

TABLE D-6

Number of Units Bought
Even Distribution Strategy Base Case at
Economical Production Rate

Level Budget Scenario:

Amount bought: T

Tubulent (±20%) Scenario*:

Cut period:	.39T
Surge period:	.60T
Amount bought:	.99T

TABLE D-7

Number of Units Bought
Hybrid Strategy: 50% Fenced; 50% Even Distribution
at Economical Production Rate

Level Budget Scenario:

Amount bought: T

Turbulent (±20%) Scenario*:

Fenced programs:		.50T
Others:	cut period:	.14T
	surge period:	.34T
Amount bought:		.98T

* Budget cut 20% for half of the period and surged to 20% above the Level Budget for half of the period.

TABLE D-8

The Effect of Alternate Strategies on Total Amount Bought

Strategy	Relative Quantity Bought*		
	Topline Budget Scenario		
	Level Budget	Turbulence (20% Cut - 20% Surge)	
		Exponential Cost-Quantity Relationship	Near Economical Production Rate
Complete Fencing			
A - No Cost to Stop & Start	1.00	1.11	.98
B - Cost to Stop & Start = 15%	1.00	1.05	.96
C - Cost to Stop & Start = 30%	1.00	.97	.93
Even Distribution	1.00	1.03	.99
Hybrid: Fence 50%; 50% Even Distribution	1.00	1.05	.98

*All quantities relative to amount bought with level budget.

NOTE: If the same total quantity of systems were to be purchased under each strategy, then the cost of that same quantity of each would be the following:

	Exponential Cost Quantity	Economical Production Rate
Complete Fencing		
A	.90	1.02
B	.95	1.04
C	1.03	1.07
Even Distribution	.97	1.01
Hybrid	.95	1.02

Finally, we noted the similarities between the economics of the "pure" strategies and the current competitive strategies:

- Extra protection for top-priority programs
- Stretching-out/speeding-up programs
- Stopping/starting "marginal" programs.

By analogy, the stretching-out/speeding-up strategy is a variant of the "even distribution" strategy, and thus the most economic if production lines are near the economical rate. Extra protection is a facet of the Hybrid strategy -- more economic than Stretching-Out/ Speeding-Up if the production rates are such that an exponential approximation is appropriate for the cost-quantity relationships. If the program stability from extra-protection results in the significant savings expected by advocates, this strategy will be even more attractive. Stopping/ Starting "marginal" programs are an aspect of Complete Fencing, and could be less costly than Stretching-Out/ Speeding-Up if the additional costs of stopping and restarting production lines are small (roughly 15% or less of the surge period funding).

D.2 EVALUATION OF MISSION EFFECTIVENESS OVER TIME

The several strategies have different effects on mission capability over time. For example, complete fencing will provide the same level of capability for the fenced programs as the level budget, but the operational introduction of the other programs will surge. With even distribution of turbulence, the cut period will see a reduction of a small amount of every program, followed by a small surge of every program. We do not believe it is possible to create a mechanism for explicitly weighing each program by its time-value contribution to mission capability but, with some logical deductions, we were able to calculate several cases which we believe bound the results a rigorous calculation would yield.

We took three key steps in order to bracket the "real world" and to be sure effects were not understated:

- Chose two extreme marginal utility relationships to study:
  - Systems bought have identical marginal utility curves (i.e., the n^{th} system of each type contributes equally to mission effectiveness)

- Systems bought have large differences in marginal utility.

- Assumed $\pm 50\%$ TLBT (i.e., budget 50% below the long-term average for half the period and 50% above it for the other half).

- Assured mission effectiveness decreased 10% per year after the second year.

In addition, we made other assumptions in order to simplify the calculations and cause them to reflect only the differences in mission effectiveness directly caused by the different strategies:

- Two-year production period and ten-year system life

- Flat cost-quantity relationships (economic benefits were analyzed separately in the previous section)

- Systems have equal costs.

We then took a simple case in which the most effective mix of weapons affordable with long-term budget B is four of weapon X and four of weapon Y. We designated $W_X(n)$ and $W_Y(n)$ as the worth of the nth weapons of type X and Y respectively.

Some criteria for the marginal utility curves could then be deduced. By virtue of our assumption that four of each weapon makes the most effective mix,

$$W_X(4) > W_Y(5), \text{ and}$$

$$W_Y(4) > W_X(5).$$

If this were not the case then the proper mix would be 5 of weapon Y and 3 of weapon X, or vice versa.

Further, if we assume that the marginal utilities of these weapons are regular, decreasing functions of the number of units, then

$$W_X(n) > W_X(n+1) \quad n = 1,2,3 \ldots$$

and the same is true of $W_Y(n)$. Finally, we examined the two "bracketing" cases:

- No difference in mission effectiveness between weapons X and Y

- Large difference in mission effectiveness between weapons X and Y, with weapon X being the most effective -- i.e., the top-priority.

D.2.1 No Difference in Effectiveness. Figure D-10 shows a marginal utility curve for the two types of systems X and Y, which meets the criteria above. The units of mission effectiveness are unimportant and for this analysis are arbitrary.

With the assumptions of the previous section, we then derived the curve shown in Figure D-11 for total mission effectiveness over time. The only differences in the strategies are the hatched part of the curves. Even with this extreme scenario, we see negligible differences in strategies if weapons X and Y contribute the same to mission effectiveness. For total effectiveness-years, we obtained (in our arbitrary units):

Complete Fencing: 123.9
Even Distribution: 124.6

The hybrid strategy would obviously fall in between the two results, approximately 124.2; and the difference between either of the two strategies above and the hybrid would be less than 1/2%.

Two phenomena dominated this result of nearly equal effectiveness over time:

- There were equal numbers of weapons in both strategies for most of the total life cycle (9 of 11 years), dominating the effectiveness over time

- During the first year, the even distribution strategy provided most effectiveness ($W_X(1) + W_Y(1)$ compared to $W_X(1) + W_X(2)$), but this is partially cancelled in year 12 by the greater effectiveness of the complete fencing strategy.

Thus, if the weapons systems are roughly equal on a one-to-one basis in contribution to mission effectiveness, the choice of strategies will have negligible effect on the time value of their contribution to mission effectiveness, with the even distribution strategy providing the greater effectiveness.

FIGURE D-10

Marginal Mission Contributions of Hypothetical Weapons X and Y

Weapons X and Y Equally Effective

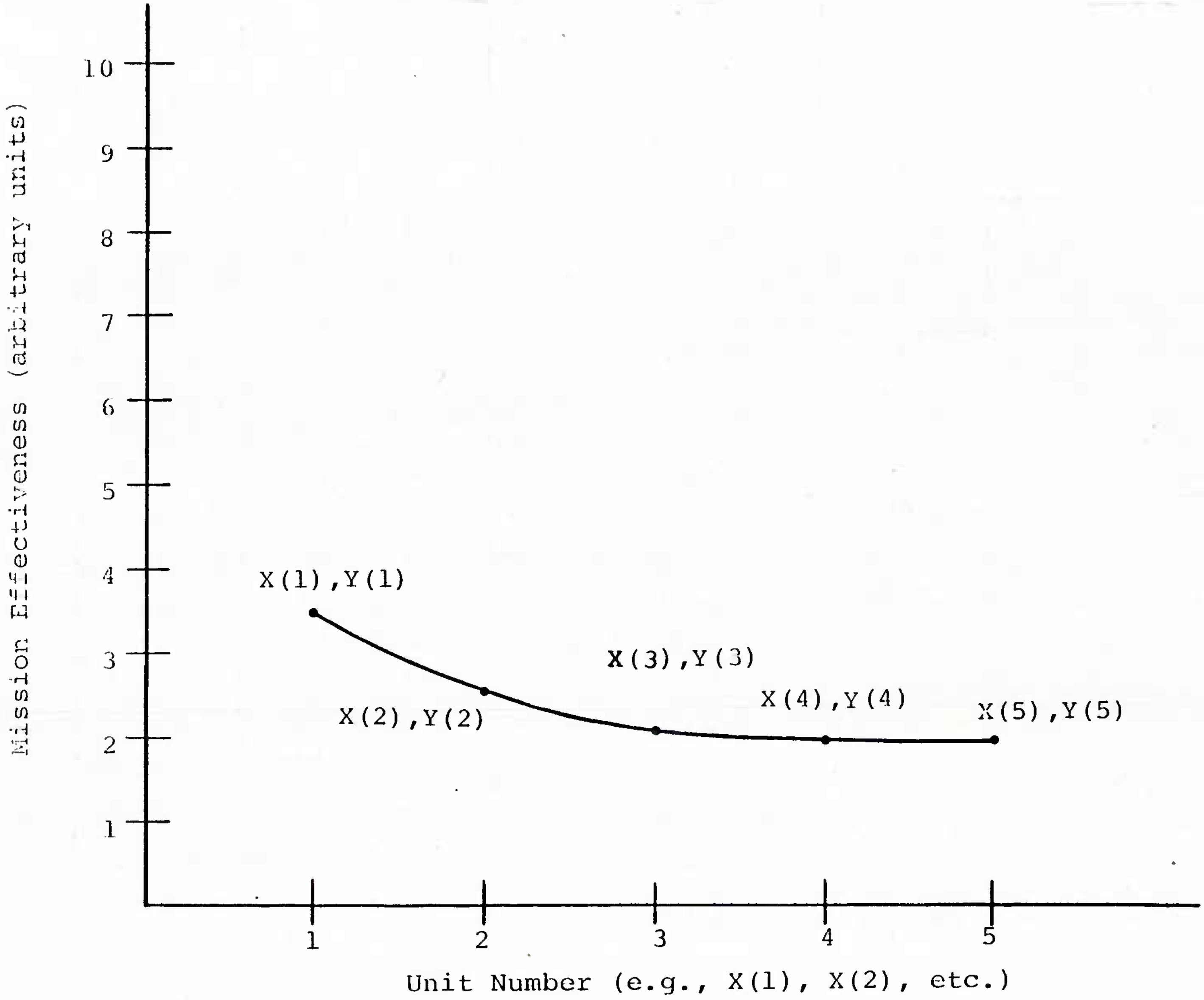
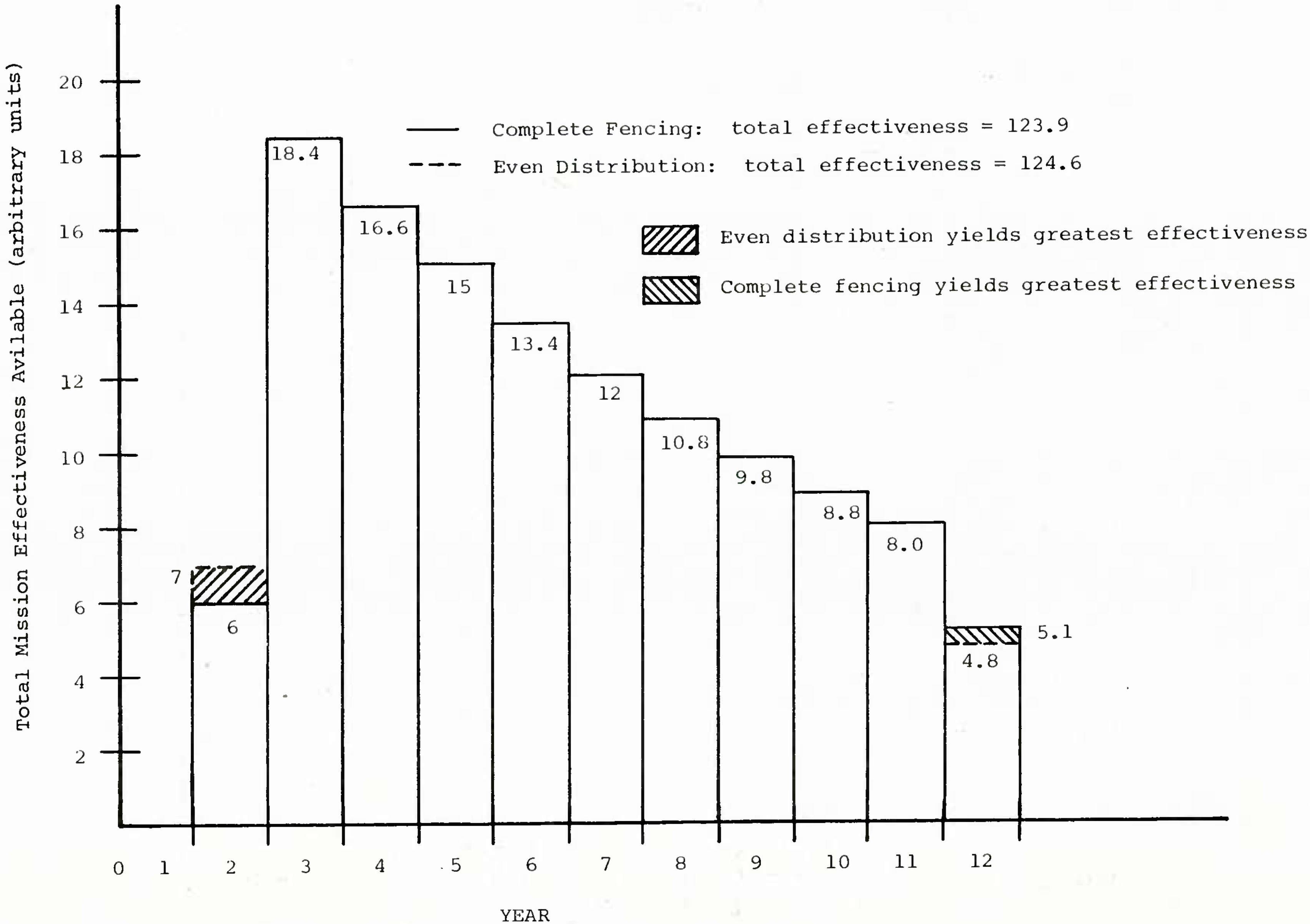


FIGURE D-11
Total Mission Effectiveness Over Time
Weapons X and Y Equally Effective



D.2.2 Large Differences in Mission Effectiveness. We used the same logical process for two weapons with large differences in mission effectiveness.

Figure D-12 provides curves with large differences in effectiveness that meet the criteria of Section D.2. We believe this example provides sufficient contrast to the previous one to "bracket" most real-world cases. For example, here the first system of X is almost three times as effective as the first system of Y (as opposed to being equally effective).

Using the same assumptions as in the previous section, we obtained the effectiveness curves shown in Figure-D-13. The hatched sections show the differences in the two strategies. The differences are again insignificant, albeit reversed in order (191.6 for fenced vs. 191.2 for uniform distribution, a difference of less than one-half percent).

D.3 REFERENCE

(1) "Major Procurement Cost Growth Assessment," Naval Material Command, February 1982.

FIGURE D-12

Marginal Mission Contributions of Hypothetical Weapons X and Y
Weapon X More Effective than Weapon Y

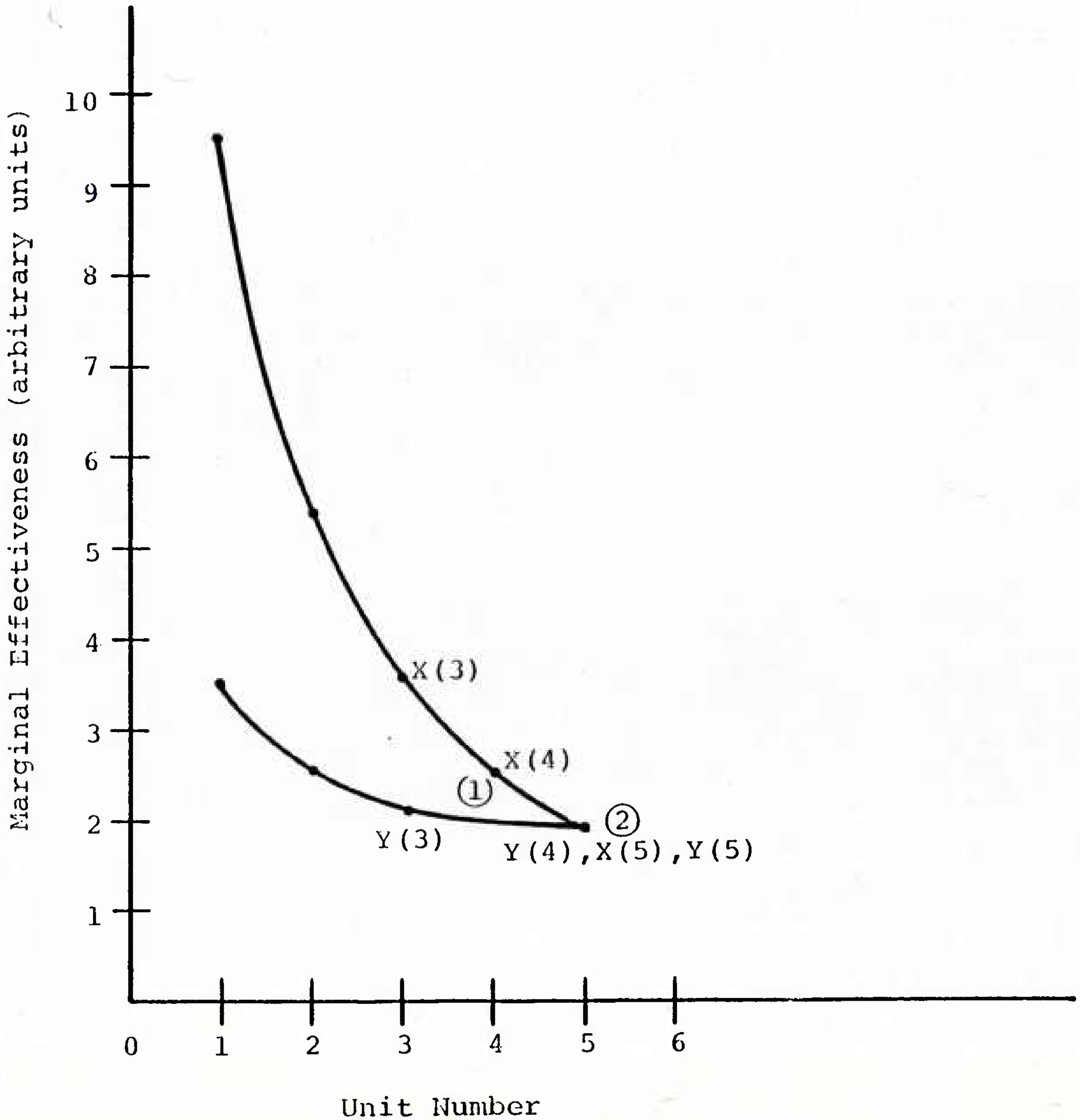
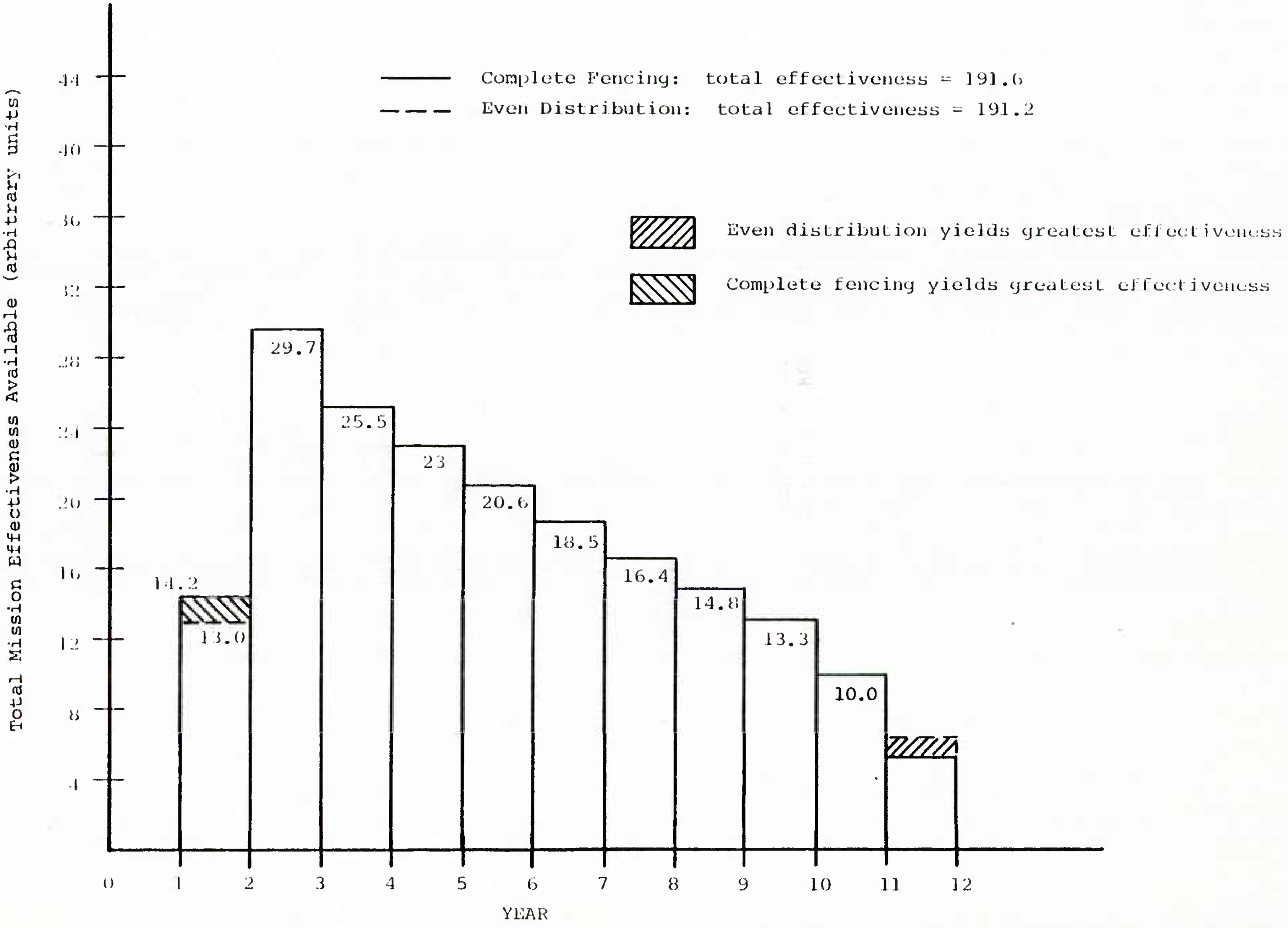


FIGURE D-13
Total Mission Effectiveness Over Time
Weapon X More Effective Than Weapon Y



STRATEGIES FOR COPING WITH
TOPLINE BUDGET TURBULENCE

Volume III
APPENDICES
E, F

Defense Systems
Management College

APPENDIX E

ACQUISITION PROGRAM TURBULENCE USING THE BUDGETRACK DATA BASE

This Appendix depicts the procurement categories and major decision points for evaluating short-term topline budget turbulence within the Procurement Account. The structure for evaluating this turbulence provides the means for tracing changes in the budget from topline procurement TOA to selected weapon system programs within each service. Included within this structure is the Congressional Authorization and Appropriations process, whch encompasses tracing a selected program through each major decision point in the Congressional approval process (FY 80 through FY 83), from the Presidential request, through Congressional Committees and Conferences until it is enacted into public law.

Specific programs (a total of 42) within each of the service procurement categories were selected to provide a means of measuring budget turbulence within specific program element numbers (PENs) (i.e., F-15, AEGIS Cruiser CG-47, Air Launched Cruise Missile, etc.). The analysis is based on budgetary data obtained from the OSD Comptroller, National Defense Budget Estimates for FY 83, Congressional Military Posture, DOD Authorizations and Appropriations testimony (FY 81, FY 82, and FY 83) and the Data Resources, Inc. (DRI) BUDGETRACK data base (refs. 107, 108, 109, and 156 in Appendix F).

Procurement data (dollar amounts and equipment quantities) include data from the Carter and Reagan administrations as follows:

- The approved Procurement TOA for FY 80
- The revised Carter request for FY 81
- The Reagan supplemental amendment to the Carter FY 81 request, and the Reagan FY 82 budget amendment
- The initial Reagan FY 83 request.

The following procurement categories were selected:

- U.S. Army: Aircraft, Missile, Weapons/Combat Vehicle Procurement
- U.S. Navy: Aircraft, Shipbulding and Conversion, Weapons, Marine Corps Procurement
- U.S. Air Force: Aircraft and Missile Procurement.

The BUDGETRACK data base was accessed to provide Congressional budget history of selected weapons systems from FY 80 through FY 83. In addition, footnotes on each selected system have been edited and included in the output to provide an explanation of the significant actions associated with the fluctuations in the procurement item quantities and dollar amounts as these programs passed through the Congressional approval processes.

Cell entries in each of these matrices are in current year dollars. Inflation indices contained in the service procurement equipment summaries may be used to convert current year dollars to constant dollars.

DOD TOPLINE TURBULENCE
vs.
DOD PROCUREMENT TURBULENCE
(TOA, & Billions)
(Current and Constant FY 83 Dollars)

	FY80	FY81			FY82			FY83
	(1)	(2)**	(3)**	(4)	(5)**	(6)**	(7)	(8)
Topline TOA ($B)								
Current $	142.2	171.2	178.0	176.1	196.4	222.2	214.2	258.0
Constant FY83 $	182.4	196.6	204.4	202.2	208.9	236.4	227.8	258.0
Inflation Index *	77.96			87.1			94.0	100
Procurement TOA ($B)								
Current $	35.3	44.5	47.2	47.8	49.1	68.9	65.4	89.6
Constant FY83 $	44.1	50.7	54.2	54.8	52.5	73.6	69.8	89.6
Inflation Index* (Based on $M in National Defense FY 82 Budget Estimates)*	80.1			87.1			93.6	100

Notes: (1) Columns (1), (4), (7), and (8) are identified in OSD Comptroller National Defense Budget Estimates for FY 83.

- Column (1), (4), and (7) represent actual TOA; column (8) represents the initial FY 83 TOA request.
- Column (2) is Carter's FY 81 request.
- Column (3) is Reagan's amendment to the FY 81 request (including the supplemental amendment).
- Column (5) is Carter's FY 82 estimates contained in the FY 81 request.
- Column (6) is the Reagan FY 82 budget amendment.

* (2) Inflation indices for FY 83 as the base year

** (3) Constant FY 83 $ in columns (2) and (3) were obtained using the Inflation Index in column (4); constant FY 83 $ in columns (5) and (6) were obtained by using the inflation index in column (7).

U.S. Army

Procurement vs. Category vs. Program Turbulence

(TOA, $ Millions)

	FY80	FY81			FY82			FY83
	(1)	(2)**	(3)**	(4)	(5)**	(6)**	(7)	(8)
Army Procurement, TOA($M)								
Current $	6542	8969	10655	10522	9874	15096	14172	17830
Constant FY83 $	8100	10227	12149	11991	10493	16043	15067	17830
Inflation Index*	80.8			87.7			94.1	100
Aircraft Procurement($M)								
Current $	946.2	1076	1204	1203	1362	1797	1936	2746
Constant FY83 $	1191	1244	1392	1391	1461	1928	2077	2746
Inflation Index	79.4			86.5			93.2	100
Missile Procurement ($M)								
Current $	1150	1520	1546	1545	1650	2842	2155	2847
Constant FY83 $	1461	1765	1797	1795	1772	3053	2314	2847
Inflation Index	78.7			86.1			93.1	100
Weapons/Combat Vehicle Procurement ($M)								
Current $	1811	2582	3378	3374	2720	4143	4002	5031
Constant FY83 $	2279	2985	3905	3902	2919	4445	4292	5031
Inflation Index*	79.5			86.5			93.2	100

U.S. Army Aircraft
($ Millions)
(Current Year Dollars)

	FY80	FY81			FY82			FY83
	(1)	(2)**	(3)**	(4)	(5)**	(6)**	(7)	(8)
UH-60 BLACKHAWK *	341.0 (380.7)*	352.3 (412.3)	384.3 (506.1)	369.4 (486.5)	N.A. (463.7)	508.7 (629.7)	491.3 (613.0)	508.6 (733.0)
AH-64 APACHE	0.0 (0.0)	0.0 (0.0)	0.0 (8.0)	0.0 (58.8)	N.A. (365.5)	365.0 (464.7)	444.4 (544.0)	760.3 (964.9)

* Amounts in brackets include Procurement, Advance Procurement, and Initial Spares. Amount above bracket is Procurement only. N.A. indicates that line-item procurement data was not listed in sources.

TITLE: UTILITY HELICOPTER UH-60A (BLACKHAWK)
PEN: 64206A

FY 81

DOD Budget Activity	HISTORY: FY 80 Act	FY 81 Est	Supplem FY 82 Request	AUTHORIZATION: HASC	House	SASC	Senate	Conf	APPROPRIATION: HAC	House	SAC	Senate	Conf
Procurement ($M)	341.0	352.3	32.0	=	=	=	=	32.0	16.0	16.0	=	=	20.7
Diff.									-16.0	-16.0			-11.3
Adv. Proc. ($M)	15.3	9.5	14.0	=	=	=	=	14.0	7.0	7.0	=	=	14.0
Diff.									-7.0	-7.0			
Qty. (Units)	94	80	0	=	=	=	=	0	=	=	=	=	0
Init. Spares ($M)	24.4	50.5	47.8	=	=	=	=	47.8	=	=	=	=	47.8

FY 82

DOD Budget Activity	FY 81 Est	Amended FY 82 Request	AUTHORIZATION: HASC	House	SASC	Senate	Conf	APPROPRIATION: HAC	House	SAC	Senate	Conf
Procurement ($M)	384.3	508.7	475.7	475.7	483.6	483.6	484.6	=	=	=	=	484.6
Diff.			-33.0	-33.0	-25.1	-25.1	-24.1	=	=	=	=	-24.1
Adv. Proc. ($M)	23.5	60.6	=	=	=	=	60.6	=	=	=	=	60.6
Diff.												
Qty. (Units)	80	96	90	90	=	=	96	=	=	=	=	96
Diff.			-6	-6								
Init. Spares ($M)	98.3	60.4	56.0	56.0	=	=	60.4	=	=	=	=	60.4
Diff.			-4.4	-4.4								

Note: SASC expects a program surplus to offset its reduction.

9/23/81: DOD recommended reduction of procurement by $25.1M.

Authorization reduction due to lack of approval for multiyear procurement.

HAC denies $126.0M requested by DOD for multiyear contracting (MYC) but feels MYC is possible in future years if confidence is gained in cost forecasting.

The 4 committees required a 45-day review period after DOD notification of a proposed multiyear contract before award can be made.

TITLE: UTILITY HELICOPTER UH-60A (BLACKHAWK)
PEN: 64206A

DOD Budget Activity	HISTORY FY 81 Act	FY 82 Est	Initial FY 83 Request	AUTHORIZATION HASC	House	SASC	Senate	Conf	APPROPRIATION HAC	House	SAC	Senate	Conf	Projected FY 84 Request
				FY 83										
RDT&E ($M)	5.0	6.2	6.7	5.7	=	=	=	5.7	=	=	=	=	5.7	13.5
Diff.				-1.0	=	=	=	-1.0					-1.0	
Procurement ($M)	369.4	491.3	508.6	423.0	=	=	=	423.0	=	=	=	=	423.0	402.9
Diff.				-85.6	=	=	=	-85.6					-85.6	
Adv. Proc. ($M)	26.0	60.6	207.6	145.9	145.9	1459.0	1459.0	145.9	=	=	=	=	145.9	128.9
Diff.				-61.7	-61.7	+1251.4	+1251.4	-61.7					-61.7	
Qty. (Units)	80	96	96	=	=	=	=	96	=	=	=	=	96	84
Init. Spares	91.1	61.1	16.8	=	=	=	=	16.8						

Note: Multiyear procurement (MYP) program.

HASC reduced funding not required in FY 83 because multiyear procurement was approved in FY 82.

Funding reductions were made possible by savings from multiyear contracting in FY 82. SAC approved multiyear contracting for the T-700 engine as well.

HAC approved this program for multiyear procurement.

TITLE: ADVANCED ATTACK HELICOPTER AH-64 (APACHE)
PEN: 64207A

	HISTORY			AUTHORIZATION					APPROPRIATION				
				HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
FY 81													
DOD Budget Activity	FY 80 Act	FY 81 Est	Supplem FY 81 Request										
Init. Spares ($M)	0.0	0.0	8.0	-	-	-	-	8.0	-	-	-	-	8.0
Diff.													
FY 82													
DOD Budget Activity		FY 81 Est	Amended FY 82 Request										
Procurement ($M)		0.0	365.0	-	-	-	-	438.4	-	-	438.4	-	438.4
Diff.								+73.4			+73.4	-	+73.4
Adv. Proc. ($M)		50.8	64.4	-	-	-	-	64.4	-	-	-	-	64.4
Qty. (Units)		0	14	-	-	-	-	14	-	-	-	-	8
Diff.											-	-	-6
Init. Spares ($M)		8.0	35.3	-	-	-	-	-	-	-	-	-	35.3
Diff.													

Note: Authorization conferees feel program is underfunded.

SAC requires that DOD submit detailed cost estimate and control measures being established to Congress before any appropriated funds are committed.

TITLE: ADVANCED ATTACK HELICOPTER AH-64 (APACHE)
PEN: 64207A

DOD Budget Activity	HISTORY FY 81 Act	FY 82 Est	Initial FY 83 Request	AUTHORIZATION HASC	House	SASC	Senate	Conf	APPROPRIATION HAC	House	SAC	Senate	Conf	Projected FY 84 Request
				FY 83										
Procurement ($M)	0.0	444.4	760.3	713.3	713.3	73.0	=	710.0	695.3	695.3	710.0	710.0	695.3	1187.7
Diff.				-47.0	-47.0	-687.3		-50.3	-65.0	-65.0	-50.3	-50.3	-65.0	
Adv. Proc. ($M)	50.8	64.4	116.5	=	=	0.0	=	115.0	=	=	=	=	115.0	121.5
Diff.						-116.5		-1.5					-1.5	
Qty. (Units)	0	11	48	=	=	0	=	48	=	=	=	=	48	96
Diff.						-48								
Init. Spares ($M)	8.0	35.2	88.1	=	=	0.0	=	88.1	=	=	=	=	88.1	
Diff.						-88.1		+88.1						

Note: Total program estimate is $7.3B for 446 units.

HASC deleted $47M not needed for management reserve. SASC deferred production for one year until program better defined, justified, and costs are brought in line.

SASC recommended $73M only to sustain the option of initiating production in FY 84. SASC intent is that none of the unobligated $444.4M authorized in FY 82 bill for the procurement of AH-64 helos shall be used for production of AH-64 A/C until expressly authorized by a future Act of Congress.

Conferees reduced funding for the same number of units, and SAC endorsed the authorization position.

HAC believes that non-hardware costs are over-estimated.

U.S. Army Missile
($ Millions)
(Current Year Dollars)

	FY80	FY81			FY82			FY83
	(1)	(2)**	(3)**	(4)	(5)**	(6)**	(7)	(8)
HELLFIRE	(-)	21.0	20.7	25.7	96.5	128.4	114.4	249.2
MLRS (1)	63.8	118.0	116.5	115.6	210.7	204.8	205.6	444.4
STINGER	81.6	71.6	70.4	70.1	132.7	223.9	193.4	214.6
PATRIOT (1)	413.8	463.1	475.0	462.2	527.1	900.5	755.1	881.0
PERSHING II	(-)	2.1	1.9	4.0	196.6	191.8	193.7	498.3

(1) Program amount was obtained by adding Procurement, Advance Procurement, and Initial Spares Dollars.

TITLE: HELIBORNE MISSILE SYSTEM LASER GUIDED (HELLFIRE)
PEN: 64310A

HISTORY				AUTHORIZATION					APPROPRIATION				
				HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf

FY 81

DOD Budget Activity	FY 80 Act	FY 81 Est	Supplem FY 81 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
Procurement ($M)	0.0	21.0	-0.3	=	=	=	=	-0.3	=	=	=	=	-0.3

FY 82

DOD Budget Activity	FY 81 Est	Amended FY 82 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
Procurement ($M)	20.7	128.4	=	=	=	=	113.4	=	=	=	=	113.4
Diff.							-15.0	=	=	=	=	-15.0
Qty. (Units)	0	1075	=	=	=	=	800	=	=	=	=	800
Diff.							-275	=	=	=	=	-275

Note: SASC requested assessment of the feasibility of using the MAVERICK tri-service seeker on the laser.

HAC denied $31.8M because of the 20-month slip in the passive optical seeker technique (Post) version of the missile.

FY 83

DOD Budget Activity	FY 81 Act	FY 82 Est	Initial FY 83 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf	Projected FY 84 Request
Procurement ($M)	25.7	114.4	249.2	=	=	=	=	249.2	=	=	=	=	249.2	255.1
Qty. (Units)	0	680	3971	=	=	=	=	3971	=	=	=	=	3971	6218

TITLE: 227MM SELF-PROPELLED MLRS
PEN: 64314A

FY 81

DOD Budget Activity	FY 80 Act	FY 81 Est	Supplem FY 81 Request	AUTHORIZATION HASC	House	SASC	Senate	Conf	APPROPRIATION HAC	House	SAC	Senate	Conf
Procurement ($M)	61.9	81.1	-1.5	=	=	=	=	-1.5	=	=	=	=	-1.5
Qty. (Units)	1374	2340	0	=	=	=	=	0	=	=	=	=	0
Init. Spares ($M)	1.7	2.8	-					-					-

FY 82

DOD Budget Activity	FY 81 Est	Amended FY 82 Request	AUTHORIZATION HASC	House	SASC	Senate	Conf	APPROPRIATION HAC	House	SAC	Senate	Conf
Procurement ($M)	113.7	179.3	=	=	=	=	179.3	=	=	=	=	179.3
Qty. (Units)	2340	2496	=	=	=	=	2496	=	=	=	=	2496
Init. Spares ($M)	2.8	25.5										

FY 83

DOD Budget Activity	FY 81 Act	FY 82 Est	Initial FY 83 Request	AUTHORIZATION HASC	House	SASC	Senate	Conf	APPROPRIATION HAC	House	SAC	Senate	Conf	Projected FY 84 Request
Procurement ($M)	112.8	180.5	368.9	=	=	0.0	0.0	368.9			=			461.6
Diff.						-368.9	-368.9							
Adv. Proc. ($M)	0.0	0.0	53.2	=	=	=	=	53.2			0.0			104.9
Diff.				=	=	=	=				-53.2			
Qty. (Units)	2340	2496	23640	=	=	=	=	23640			=			36000
Init. Spares ($M)	2.8	25.1	22.3	=	=	=	=	22.3			-			

Note: $38.6M MILCON requested for this program. Multiyear procurement (MYP) program.

SAC denied multiyear procurement and directed a second source of production, for which $20M was added to P.E. MP025A. The Army says a second producer would increase program costs from $3.7B to $3.9B.

TITLE: SHOULDER FIRED MISSILE SYSTEM (STINGER)
PEN: 64306A

FY 81

DOD Budget Activity	FY 80 Act	FY 81 Est	Supplem FY 81 Request	AUTHORIZATION HASC	House	SASC	Senate	Conf	APPROPRIATION HAC	House	SAC	Senate	Conf
Procurement ($M)	81.6	71.4	-1.0	=	=	=	=	-1.0	=	=	=	=	-1.0
Qty. (Units)	1874	1356	0	=	=	=	=	0	=	=	=	=	0

FY 82

DOD Budget Activity	FY 81 Est	Amended FY 82 Request	AUTHORIZATION HASC	House	SASC	Senate	Conf	APPROPRIATION HAC	House	SAC	Senate	Conf
Procurement ($M)	70.4	223.9	203.9	=	=	=	203.9	192.1	192.1	203.9	203.9	192.1
Diff.			-20.0	=			-20.0	-31.8	-31.8	-20.0	-20.0	-31.8
Qty. (Units)	1356	2544	=	=	=	=	2544	=	=	=	=	2544
Init. Spares ($M)	0.2	0.4	=	=	=	=	0.4	=	=	=	=	0.4

Note: Full funding authorized with the understanding that R&D will be completed during FY 82.

FY 83

DOD Budget Activity	FY 81 Act	FY 82 Est	Initial FY 83 Request	AUTHORIZATION HASC	House	SASC	Senate	Conf	APPROPRIATION HAC	House	SAC	Senate	Conf	Projected FY 84 Request
Procurement ($M)	70.1	193.4	214.6	=	=	=	=	214.6	=	=	172.1	172.1	214.6	258.3
Diff.											-42.5	-42.5		
Qty. (Units)	1144	2544	2256	=	=	=	=	2256	=	=	1809	1809	2256	3293
Diff.											-447	-447		
Init. Spares ($M)	0.2	0.4	0.0	=	=	=	=	0.0	=	=	=	=	0.0	

Note: $42.5M of request is for 44 STINGER-POST (passive optical seeker technique) missiles.

SAC thinks production funding is premature, but added RDT&E. Reprogramming after a successful flight test program will be considered.

TITLE: AIR DEFENSE MISSILE SYSTEM XMIM-104 (PATRIOT) SAM-D
PEN: 64307A

FY 81

DOD Budget Activity	HISTORY: FY 80 Act	HISTORY: FY 81 Est	HISTORY: Supplem FY 81 Request	AUTHORIZATION: HASC	AUTHORIZATION: House	AUTHORIZATION: SASC	AUTHORIZATION: Senate	AUTHORIZATION: Conf	APPROPRIATION: HAC	APPROPRIATION: House	APPROPRIATION: SAC	APPROPRIATION: Senate	APPROPRIATION: Conf
Procurement ($M)	396.0	448.7	6.4	=	=	=	=	-6.4	=	=	=	=	-6.4
Qty. (Units)	155	130	0	=	=	=	=	0	=	=	=	=	0
Init. Spares ($M)	17.8	20.4	-0.5	=	=	=	=	-0.5	=	=	=	=	-0.5

Note: The Senate receded to the House on requested items already authorized for FY 81; no lack of House support indicated.

FY 82

	FY 81 Est	Amended FY 82 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
Procurement ($M)	442.3	820.8	795.8	795.8	486.1	486.1	670.0	=	=	=	=	670.0
Diff.			-25.0	-25.0	-334.7	-334.7	-150.8	=	=	=	=	-150.8
Qty. (Units)	130	364	=	=	130	130	244	=	=	=	=	244
Diff.					-234	-234	-120	=	=	=	=	-120
Init. Spares ($M)	19.9	79.7	=	=	41.0	41.0	79.7	=	=	=	=	79.7
Diff.					-38.7	-38.7						

Note: Both HASC and SASC support the program but are concerned that past problems be shown to have been resolved by testing and that risks are now prudent.

DOD recommended reduction of procurement items by $100.0M (42 units).

TITLE: AIR DEFENSE MISSILE SYSTEM XMIM-104 (PATRIOT) SAM-D
PEN: 64307A

	HISTORY			AUTHORIZATION					APPROPRIATION					
				HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf	
							FY 83							
	FY 81 Act	FY 82 Est	Initial FY 83 Request											Projected FY 84 Request
Procurement ($M)	442.3	675.6	805.1	=	=	=	=	805.1	779.1	779.1	687.3	687.3	779.1	965.2
Diff.									-26.0	-26.0	-117.8	-117.8	-26.0	
Qty. (Units)	130	176	376	=	=	=	=	376	=	=	287	287	376	664
Diff.											-89	-89		
Init. Spares ($M)	19.9	79.5	75.9	=	=	=	=	75.9	=	=	50.6	50.6	75.9	
Diff.											-25.3	-25.3		

Note: $48.7M MILCON requested for this program.
SAC reduced funding because of production delays which have revised delivery schedules.

HAC reduced funds for arm decoys which were rescheduled for procurement in FY 84.

TITLE: THEATRE MISSILE SYS. MGM-31A (PERSHING II)
PEN: 64311A

	HISTORY			AUTHORIZATION					APPROPRIATION					
				HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf	
FY 81														
DOD Budget Activity	FY 80 Act	FY 81 Est	Supplem FY 81 Request											
Procurement ($M)	0.0	2.1	1.9	=	=	=	=	1.9	0.0	=	=	=	0.0	
Diff.									-1.9	=	=	=	-1.9	
Modification($M)	8.4	9.9	-2.0	=	=	=	=	2.0	=	=	=	=	-2.0	
FY 82														
		FY 81 Est	Amended FY 82 Request											
Procurement ($M)		4.0	191.8	=	=	=	=	191.8	=	=	=	=	191.8	
Qty. (Units)		0	39	=	=	=	=	39	=	=	=	=	39	
Init. Spares ($M)		0.0	27.9	=	=	=	=	27.9	=	=	=	=	27.9	
FY 83														
DOD Budget Activity	FY 81 Act	FY 82 Est	Initial FY 83 Request											Projected FY 1984 Request
Procurement ($M)	2.3	193.7	498.3	=	=	=	=	498.3	0.0	=	=	=	0.0	428.0
Diff.									-498.3				-498.3	
Qty. (Units)	0	21	91	=	=	=	=	91	0	=	=	=	0	95
Diff.									-91				-91	
Init. Spares ($M)	0.0	27.9	10.3	=	=	=	=	10.3	0.0	=	=	=	0.0	
Diff.									-10.3				-10.3	

Note: HAC's concern is excessive concurrency in program schedules and recent test failures. The 21 missiles should allow meeting the IOC target date, along with full RDT&E funding.

12/20/82: The second continuing resolution deleted production funding, subject to supplemental request if technical problems encountered in testing can be resolved.

U.S. Army Weapons and Tracked Combat Vehicles
($ Millions)
(Current Year Dollars)

	FY80	FY81			FY82			FY83
	(1)	(2)**	(3)**	(4)	(5)**	(6)**	(7)	(8)
FVS (M2/M3 Bradley)(1)	231.2	505.7	669.2	668.7	740.2	930.1	918.0	872.4
M60A1/A3 Tank	111.0	0.0	143.0	0.0	0.0	0.0	0.0	0.0
M-1 Tank (Abrams)	717.8	1147.5	1484.0		1346.8	1924.0	1516.6	1908.3
DIVAD Gun	0.0	129.1	127.1		100.0	372.2	339.2	595.5

(1) Program amount was obtained by adding Procurement, Advance Procurement, and Initial Spares

TITLE: INFANTRY/CAVALRY FIGHTING VEHICLE SYSTEM (FVS) M2, M3 (BRADLEY)
PEN: 64616A

FY 81

DOD Budget Activity	HISTORY FY 80 Act	HISTORY FY 81 Est	HISTORY Supplem FY 81 Request	AUTHORIZATION HASC	AUTHORIZATION House	AUTHORIZATION SASC	AUTHORIZATION Senate	AUTHORIZATION Conf	APPROPRIATION HAC	APPROPRIATION House	APPROPRIATION SAC	APPROPRIATION Senate	APPROPRIATION Conf
Procurement ($M)	226.4	469.2	158.5	153.5	153.5	=	=	158.5	=	=	=	=	158.5
Diff.				-5.0	-5.0								
Qty. (Units)	100	300	100	=	=	=	=	100	=	=	=	=	100
Init. Spares ($M)	4.8	36.5	5.0	=	=	=	=	5.0	=	=	=	=	5.0

FY 82

DOD Budget Activity	HISTORY FY 81 Est	HISTORY Amended FY 82 Request	AUTHORIZATION HASC	AUTHORIZATION House	AUTHORIZATION SASC	AUTHORIZATION Senate	AUTHORIZATION Conf	APPROPRIATION HAC	APPROPRIATION House	APPROPRIATION SAC	APPROPRIATION Senate	APPROPRIATION Conf
Procurement ($M)	627.7	809.8	800.0	800.0	859.8	859.8	800.0	=	=	=	=	800.0
Diff.			-9.8	-9.8	+50.0	+50.0	-9.8	=	=	=	=	-9.8
Adv. Proc. ($M)	0.0	59.1	=	=	=	=	59.1	=	=	=	=	59.1
Qty. (Units)	400	600	=	=	=	=	600	=	=	=	=	600
Init. Spares ($M)	41.5	61.2	=	=	=	=	61.2	=	=	=	=	61.2

Note: HASC requested a report by 1/1/82 on plans for equipping the National Guard with ITVs as FVSs enter service. SASC, concerned over cost growth, recommended $50M to prepare a second source producer.

HASC recommended competition at the subcontractor level.

HAC directs the Army to conduct side-by-side tests with a wide range of vehicles (M113, TOW, AIFV, etc.) to find lower cost alternatives, and to notify the HAC of its plans.

TITLE: INFANTRY/CAVALRY FIGHTING VEHICLE SYSTEM (FVS) M: M3 (BRADLEY)
PEN: 64616A

DOD Budget Activity	HISTORY			AUTHORIZATION					APPROPRIATION					
				HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf	
				FY 83										
	FY 81 Act	FY 82 Est	Initial FY 83 Request											Projected FY 84 Request
Procurement ($M)	627.7	808.2	793.3	805.7	805.7	783.3	=	=	=	=	=	=	783.3	739.8
Diff.				+12.4	+12.4	-10.0	=	=					-10.0	
Adv. Proc. ($M)	0.0	59.8	49.2	=	=	=	=	49.2	=	=	=	=	49.2	56.7
Qty. (Units)	400	600	600	=	=	=	=	600	=	=	=	=	600	555
Init. Spares ($M)	41.0	50.0	29.9	=	=	=	=	29.9	=	=	=	=	29.9	

Note: $42.6M MILCON requested for this program.

HASC was advised that $20.6 of request was surplus to requirements. So with an addition of $12.4M, $33M is available to increase production rates to 90 per month in FY 84.

SASC deleted overhead cost increases.

TITLE: COMBAT TANK FT 105MM GUN M60A3
PEN: WV009A

	HISTORY			AUTHORIZATION					APPROPRIATION				
				HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
FY 81													
DOD Budget Activity	FY 80 Act	FY 81 Est	Supplem FY 81 Request										
Procurement ($M)	111.0	0.0	143.0	-	-	-	-	143.0	-	-	-	-	143.0
Qty. (Units)	106	0	120	-	-	-	-	120	-	-	-	-	120
FY 82													
DOD Budget Activity		FY 81 Est	Amended FY 82 Request										
Procurement ($M)		143.0	0.0	-	-	-	-	0.0	-	-	-	-	0.0
Qty. (Units)		120	0	-	-	-	-	0	-	-	-	-	0
FY 83													
DOD Budget Activity	FY 81 Act	FY 82 Est	Initial FY 83 Request										
Procurement ($M)	143.0	0.0	0.0	-	-	-	-	0.0	-	-	-	-	0.0
Qty. (Units)	120	0	0	-	-	-	-	0	-	-	-	-	0

Note: HAC directed that funds be used to procure 453 complete Mod kits, made possible by savings from competitive second source procurement.

TITLE: COMBAT TANK FT 105MM GUN M1 (ABRAMS)
PEN: 64620A

FY 81

DOD Budget Activity	HISTORY			AUTHORIZATION					APPROPRIATION				
	FY 80 Act	FY 81 Est	Supplem FY 81 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
Procurement ($M)	581.8	946.3	337.5	327.5	327.5	=	=	337.5	=	=	=	=	337.5
Diff.				-10.0	-10.0			+10.0					
Qty. (Units)	309	360	209	=	=	=	=	209	=	=	=	=	209

Note: Authorization conferees directed that $278.1M not be obligated until the SECDEF advises both committees that transmission durability performance results from RAM-D testing do not indicate an unacceptable risk level.

*Advance Procurement and Initial Spares data not listed in BUDGETTRACK output.

FY 82

DOD Budget Activity	HISTORY		AUTHORIZATION					APPROPRIATION				
	FY 81 Est	Amended FY 82 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
Procurement ($M)	1283.8	1624.0	1604.0		=	=	1424.0	1348.0	1348.0	1424.0	1424.0	1348.0
Diff.			-20.0				-200.0	-276.0	-276.0	-200.0	-200.0	-276.0
Adv. Proc. ($M)	135.9	212.1	=	=	=	=	212.1	=	=	=	=	212.1
Qty. (Units)	569	720	=	=	=	=	720	665	665	=	=	720
Diff.								-55	-55			
Init. Spares ($M)	65.3	90.2	=	=	=	=	90.2	=	=	=	=	90.2

Note: HASC feels no further testing needed.

SASC directed a report by 1/30/82 on long-term evolutionary improvements. $577.2M may not be obligated until RAM-D testing of durability is certified by SECDEF.

9/23/81: DOD recommended reduction of procurement items by $276.0M (55 units), which delays a production rate increase by two years.

Authorization conferees feel same missile buy possible with $200M reduction because of savings from FY 81 contract negotiations.

SAC wants production maintained at 720 units.

TITLE: COMBAT TANK FT 105MM GUN M1 (ABRAMS)
PEN: 64620A

	HISTORY			AUTHORIZATION					APPROPRIATION					
				FY 83										
DOD Budget Activity	FY 81 Act	FY 82 Est	Initial FY 83 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf	Projected FY 84 Request
Procurement ($M)	1283.8	1361.8	1476.0	1376.4	1376.4	1330.8	1330.8	1360.4	=	1360.4	1211.8	=	1360.4	1950.4
Diff.				-99.6	-99.6	-145.2	-145.2	-115.6		-115.6	-264.2		-115.6	
Adv. Proc. ($M)	133.9	214.8	432.3	=	=	363.9	363.9	380.9	=			=		513.1
Diff.						-68.4	-68.4	-51.4						
Qty. (Units)	569	665	776	=	=	720	720	855	=	855	720	=	855	1080
Diff.						-56	-56	+79		+79	-56		+79	
Init. Spares ($M)	64.5	83.2	135.7	=	=	130.0	130.0	133.5	=	133.2	127.8	=	133.2	
Diff.						-5.7	-5.7	-2.2		-2.5	-7.9		-2.5	

Note: $10.1M MILCON requested for this program.

HASC did not feel the $126M FY 82 request for M1 tank surge capability was of sufficient priority. They denied the $80.6M requested to second source elements of the fire control system because multiyear contracting will now be used.

Because of favorable contract negotiations, conferees were able to authorize 79 more tanks for $96.6M less, by also allowing transfer of $198.2M from prior year authorizations.

SAC funding is based on transferring $140.9M of prior year savings from favorable negotiations to this program. Advance procurement is for 840 tanks in FY 84.

HAC thinks a second source for tank fire control components, for which $80.6M was requested, is a viable option to multiyear procurement and wants the Army to study both. They also want second sourcing of the AGT-1500 Gas Turbine Engine to be studied and reported by 5/1/83.

Conferees specified that production is not to exceed 60 per month until power train durability has been demonstrated and reported to the committees.

TITLE: DIVISION AIR DEFENSE GUN (DIVAD)
PEN: 64318A

	HISTORY			AUTHORIZATION					APPROPRIATION					
				HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf	
FY 81														
DOD Budget Activity	FY 80 Act	FY 81 Est	Initial FY 81 Request											
Adv. Proc. ($M)	0.0	129.1	-2.0	=	=	=	=	-2.0	=	=	=	=	-2.0	
FY 82														
DOD Budget Activity		FY 81 Est	Amended FY 82 Request											
Procurement ($M)		127.1	282.0	=	=	=	=	282.0	=	=	=	=	282.0	
Adv. Proc. ($M)		10.9	53.5	=	=	=	=	53.5	=	=	=	=	53.5	
Qty. (Units)		0	50	=	=	=	=	50	=	=	=	=	50	
Init. Spares ($M)			37.1					37.1					37.1	
FY 83														
DOD Budget Activity	FY 81 Act	FY 82 Est	Initial FY 83 Request											Projected FY 84 Request
Procurement ($M)	98.0	295.1	521.1	=	=	=	=	521.1	437.1	437.1	471.1	=	471.1	595.4
Diff.									-84.0	-84.0	-50.0		-50.0	
Adv. Proc. ($M)	40.0	54.1	74.4	=	=	=	=	74.4	=	=	=	=	74.4	66.9
Qty. (Units)	0	50	96	=	=	=	=	96	=	=	=	=	96	130
Init. Spares ($M)	0.0	37.0	78.4	=	=	=	=	78.4	=	=	=	=	78.4	

Note: $28.7M MILCON requested for this program.

The SAC reduction was to the management reserve.

HAC reduced funding for contingencies, which the GAO found to be excessive (which the Army did not refute).

U.S. Navy
Procurement vs. Category vs. Program Turbulence
(TOA, $ Millions)

	FY80	FY81			FY82			FY83
	(1)	(2)**	(3)**	(4)	(5)**	(6)**	(7)	(8)
Navy Procurement, TOA ($M)								
Current $	15375	19859	20337	19639	20950	28608	24934	38102
Constant FY83 $	19091	22766	23314	22513	23314	30554	26631	38102
Inflation Index *	80.53			87.23			93.63	100.0
Aircraft Procurement ($M)								
Current $	4332	6111	6254	6253	6960	9352	9140	11582
Constant FY83 $	5478	7084	7249	7249	7469	10036	9809	11582
Inflation Index *	79.08			86.27			93.18	100.0
Missile (Weapons) Procurement ($M)								
Current $	1993	2738	2738	2738	2718	3272	3215	3902
Constant FY83 $	2514	3169	3169	3169	2917	3511	3450	3902
Inflation Index *	79.28			86.40			93.19	100.0
Shipbuilding and Conversion ($M)								
Current $	6464	7484	7801	7617	6640	10291	8902	18648
Constant FY 83 $	7997	8568	8931	8720	7094	10994	9510	18648
Inflation Index *	80.83			87.35			93.60	100.0
Marine Corps Procurement ($M)								
Current $	275	489	506	506	1172	1828	1731	2301
Constant FY 83 $	344	563	583	583	1256	1960	1855	2301
Inflation Index *	79.94			86.79			93.31	100.0

U.S. Navy Aircraft
(TOA, $ Millions)
(Current Year $)

Selected Programs	FY80 (1)	FY81 (2)**	FY81 (3)**	FY81 (4)	FY82 (5)**	FY82 (6)**	FY82 (7)	FY83 (8)
A-6E	146.1	224.9	243.7	243.7	144.8	269.9 (277.4)*	270.1 (261.0)*	247.7
F-14A	573.5	700.9	719.6	719.6	725.2	888.7 (1071.2)*	890.1 (1117.7)*	915.3
F/A-18A	892.2	1590.1	1686.0	1681.0	1738.1	1890.1 (2082.8)*	1893.1 (2727.6)*	2443.9
AV-8	0.0	0.0	0.0	0.0	0.0	575.2 (631.1)*	576.1 (751.0)*	677.1
CH-53E	174.9	174.2	200.7	200.7	212.7	250.3 (243.3)*	240.8 (289.1)*	255.6
SH-60B	0.0	0.0	0.0	0.0	486.9	585.6 (696.6)	559.2 (995.4)*	858.4
P-3C	245.4	253.8	250.1	250.1	240.4	380.2 (430.9)*	376.5 (329.4)*	280.6

* Amounts in brackets include Procurement and Advance Procurement.

TITLE: A-6E (INTRUDER)
PEN: 24134N

	HISTORY			AUTHORIZATION					APPROPRIATION				
				HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf

FY 81

DOD Budget Activity	FY 80 Act	FY 81 Est	Supplem FY 81 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
Procurement ($M)	146.1	224.9	18.8	=	=	=	=	18.8	=	=	=	=	18.8
Diff.													
Adv. Proc. ($M)	0.0	12.0	-0.2	=	=	=	=	-0.2	=	=	=	=	-0.2
Diff.													
Qty. (Units)	6	12	0	=	=	=	=	0	=	=	=	=	0
Diff.													

FY 82

DOD Budget Activity	FY 81 Est	Amended FY 82 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
Procurement ($M)	243.7	269.9	=	=	=	=	269.9	=	=	=	=	269.9
Diff.												
Adv. Proc. ($M)	11.8	7.3	=	=	=	=	7.3	=	=	=	=	7.3
Diff.												
Qty. (Units)	12	12	=	=	=	=	12	=	=	=	=	12
Diff.												

TITLE: A-6E (INTRUDER)
PEN: 24134N

DOD Budget Activity	HISTORY: FY 81 Act	FY 82 Act	Initial FY 83 Request	AUTHORIZATION (FY 83): HASC	House	SASC	Senate	Conf	APPROPRIATION (FY 83): HAC	House	SAC	Senate	Conf	Projected FY 84 Request
Procurement ($M)	243.7	270.1	247.7	-	-	18.3	18.3	247.7	246.4	246.4	224.1	224.1	235.2	257.4
Diff.						-229.4	-229.4		-1.3	-1.3	-23.6	-23.6	-12.5	
Adv. Proc. ($M)	11.8	7.3	13.3	-	-	0.0	0.0	8.3	8.3	8.3	8.3	8.3	8.3	35.2
Diff.						-13.3	-13.3	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	
Qty. (Units)	12	12	8	-	-	0	0	8	-	-	-	-	-	8
Diff.						-8	-8							8

Note: Multiyear procurement (MYP) program.

SASC recommended deletion of $229.4M for procurement and deletion of $13.3M requested for advance procurement of 8 A-6Es in FY 84. $18.3M was recommended for production line termination costs. Funds denied for procurement of A-6E A/C will be applied to increase production of EA-6B A/C, for which a serious inventory shortfall exists.

HASC deleted $5M requested to initiate multiyear procurement.

SAC recommended funding reductions for 7 aircraft procurement lines based on FY 82 contract cost savings.

HAC reductions include $1.3M excess management reserve.

TITLE: F-14A (TOMCAT)
PEN: 25667N

	HISTORY			AUTHORIZATION HASC	House	SASC	Senate	Conf	APPROPRIATION HAC	House	SAC	Senate	Conf	
FY 81														
DOD Budget Activity	FY 80 Act	FY 81 Est	Supplem FY 81 Request											
Procurement ($M)	573.5	700.9	18.7	=	=	=	=	18.7	=	=	=	=	18.7	
Diff.														
Adv. Proc. ($M)	126.5	147.9	-2.1	=	=	=	=	-2.1	=	=	=	=	-2.1	
Diff.														
Qty. (Units)	30	30	0	=	=	=	=	0	=	=	=	=	0	
Diff.														
FY 82														
DOD Budget Activity		FY 81 Act	Amended FY 83 Request											
Procurement ($M)		719.6	888.6	=	=	=	=	888.6	=	=	=	=	888.6	
Diff.														
Adv. Proc. ($M)		145.8	159.1	202.0	202.0	=	=	180.6	180.6	=	=	=	180.6	
Diff.				+42.9	+42.9	=	=	+21.5	+21.5				+21.5	
Qty. (Units)		30	30	=	=	=	=	30	=	=	=	=	30	
Diff.														
FY 83														
DOD Budget Activity	FY 81 Act	FY 82 Est	Initial FY 83 Request											Projected FY 84 Request
Procurement ($M)	719.6	890.1	915.3	1087.8	=	=	=	915.3	901.7	901.7	819.3	819.3	875.0	1106.6
Diff.				+172.5					-13.6	-13.6	-96.0	-96.0	-40.3	
Adv. Proc. ($M)	145.8	181.1	202.4	=	=	=	=	202.4	=	=	=	=	202.4	228.0
Diff.														
Qty. (Units)	30	30	24	30	=	=	=	24	=	=	=	=	24	30
Diff.				+6				-6						

Note: HASC feels reducing the production rate in FY 83 would be counterproductive and cost $2.1M more per aircraft. Total cost for 845 A/C now forecast to be $42.2B.

The House deleted the HASC add-on to help meet the budget resolution funding reduction.

TITLE: F/A-18 (HORNET)
PEN: 24145N

FY 81

	HISTORY			AUTHORIZATION					APPROPRIATION				
DOD Budget Activity	FY 80 Act	FY 81 Est	Supplem FY 81 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
Procurement ($M)	892.2	1590.1	96.0	-	-	0.0	0	96.0	-	-	-	-	96.0
Diff.						-96.0	-96.0	+96.0					
Adv. Proc. ($M)	130.1	118.2	-1.7	-	-	0.0	-	-1.7	-	-	-	-	-1.7
Diff.													
Qty. (Units)	25	53	7	-	-	0		7	-	-	-	-	7
Diff.						-7		+7					

FY 82

DOD Budget Activity	FY 81 Est	Amended FY 82 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
Procurement ($M)	1686.0	1890.1	2321.8	2321.8	1738.1	1738.1	1890.1	-	-	-	-	1890.1
Diff.			+431.7	+431.7	-152.0	-152.0						
Adv. Proc. ($M)	116.5	236.4	251.1	251.1	241.3	241.3	236.4	189.2	189.2	-	-	189.2
Diff.			+14.7	+14.7	+4.9	+4.9		-47.2	-47.2			
Qty. (Units)	60	63	84	84	58	58	63	-	-	-	-	63
Diff.			+21	+21	-5	-5						

TITLE: F/A-18 (HORNET)
PEN: 24145N

DOD Budget Activity	HISTORY FY 81 Act	FY 82 Est	Initial FY 83 Request	AUTHORIZATION (FY 83) HASC	House	SASC	Senate	Conf	APPROPRIATION (FY 83) HAC	House	SAC	Senate	Conf	Projected FY 84 Request
Procurement ($M)	1681.0	1893.1	2443.9	=	=	=	=	2443.9	2136.1	2136.1	2233.9	2233.9	2136.1	2397.9
Diff.									-307.8	-307.8	-210.0	-210.0	-307.8	
Adv. Proc. ($M)	116.5	189.7	283.7	=	=	319.2	319.2	283.7	248.2	248.2	252.7	252.7	248.2	323.0
Diff.						+35.5	+35.5		-35.5	-35.5	-31.0	-31.0	-35.5	
Qty. (Units)	60	63	84	=	=	=	=	84	=	=	=	=	84	96
Diff.														

Note: $5.6M MILCON requested for this program.

SASC recommended an additional $35.5M in advance procurement funding in order to fund 108 A/C (vice 96) in FY 84.

AF will compete procurement between Lantirn (P.E. 64249F) and the F-18 FLIR, so HASC added RDT&E funds for each effort.

SASC added $22M to develop mods in the F-18 FLIR system to allow it to compete in the Lantirn program (P.E. 64249F).

Program estimate is $39.75B for 1366 aircraft.

SAC recommended funding reductions for 7 aircraft procurement lines based on FY 82 contract cost savings.

HAC reduced $39.2M for management reserve and other funding based on favorable contract negotiations. No advance procurement funds can be used for A-18s scheduled to replace present attack A/C until SECDEF certifies that the A-18 meets original attack mission requirements and goals. They also deleted $11.3M for ALR-67 Mods, $1M for SPARROW Mods, and $424K for tacts installation.

TITLE: AV-8B (HARRIER)
PEN: 64214N

DOD Budget Activity	HISTORY: FY 80 Act	HISTORY: FY 81 Est	HISTORY: Supplem FY 81 Request	AUTHORIZATION: HASC	AUTHORIZATION: House	AUTHORIZATION: SASC	AUTHORIZATION: Senate	AUTHORIZATION: Conf	APPROPRIATION: HAC	APPROPRIATION: House	APPROPRIATION: SAC	APPROPRIATION: Senate	APPROPRIATION: Conf
FY 81													
Procurement ($M)	0.0	0.0	0.0	-	-	-	-	0.0	-	-	-	-	0.0
Diff.													
Adv. Proc. ($M)	0.0	90.0	-1.3	-	-	-	-	-1.3	-	-	-	-	-1.3
Diff.													
Qty. (Units)	0	0	0	-	-	-	-	0	-	-	-	-	0
Diff.													

DOD Budget Activity	FY 81 Est	Amended FY 82 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
FY 82												
Procurement ($M)	0.0	575.2	-	-	-	-	575.2	-	-	-	-	575.2
Diff.												
Adv. Proc. ($M)	88.7	49.0	-	-	-	-	37.0	-	-	-	-	37.0
Diff.												
Qty. (Units)	0	12	-	-	-	-	12	-	-	-	-	12
Diff.												

Note: Conferees concerned about lack of results from V/STOL program (see 63257N, RD259N, RD260N) and expect Navy to restructure program.

TITLE: CH-53A (SUPER STALLION)
PEN: 64260N

DOD Budget Activity	HISTORY FY 81 Act	FY 82 Est	Initial FY 83 Request	AUTHORIZATION HASC	House	SASC	Senate	Conf	APPROPRIATION HAC	House	SAC	Senate	Conf
				FY 83									
Procurement ($M)	200.7	240.8	255.6	=	=	=	=	255.6	205.6	205.6	233.6	233.6	205.6
Diff.									-50.0	-50.0	-22.0	-22.0	-50.0
Adv. Proc. ($M)	1.9	2.5	33.5	2.9	2.9	=	=	2.9	=	=	=	=	2.9
Diff.				-30.6	-30.6			-30.6					
Qty. (Units)	14	14	11					11	=	=	=	=	11
Diff.													

Note: $0.8 MILCON requested for this multiyear procurement (MYP) program.

HASC deleted $39,6M requested to initiate multiyear procurent. Total buy to be 204 aircraft.

SAC recommended funding reductions for 7 aircraft procurement lines based on FY 82 contract cost savings.

HAC reductions reflect productivity savings and a $7.6M management reserve cut, plus authorization levels.

TITLE: ASW HELICOPTER SH-60B (SEAHAWK) LAMPS MK III
PEN: 64212N

FY 81

DOD Budget Activity	HISTORY: FY 80 Act	FY 81 Est	Supplem FY 81 Request	AUTHORIZATION: HASC	House	SASC	Senate	Conf	APPROPRIATION: HAC	House	SAC	Senate	Conf
Adv. Proc. ($M)	0.0	106.5	-1.5	=	=	=	=	-1.5	=	=	=	=	-1.5

FY 82

DOD Budget Activity	FY 81 Est	Amended FY 82 Request	AUTHORIZATION: HASC	House	SASC	Senate	Conf	APPROPRIATION: HAC	House	SAC	Senate	Conf
Procurement ($M)	0.0	585.6	=	=	=	=	585.6	558.6	558.6	=	=	558.6
Diff.								-27.0	-27.0			-27.0
Adv. Proc. ($M)	105.0	155.3	=	=	=	=	155.3	118.1	118.1	=	=	137.1
Diff.								-37.2	-37.2			-18.2
Qty. (Units)	0	18	=	=	=	=	18	=	=	=	=	18

Note: Restarts dormant production line.

SASC critical of major contractors' performance, cautioning against any future cost growth.

HAC decreased funding because of productivity improvements and because Army advance procurement requested for a similar airframe showed a lower unit cost.

SAC is strongly critical of the Navy's inability to control LAMPS MK III cost growth and urges pursuit of potential cost reduction/avoidance items outlined in their report to Congress.

TITLE: ASW HELICOPTER SH-60B (SEAHAWK) LAMPS MK III
PEN: 64212N

DOD Budget Activity	FY 81 Act	FY 82 Est	Initial FY 83 Request	FY 83										Projected FY 84 Request
Procurement ($M)	0.0	559.2	858.4	654.6	558.4	538.4	538.4	616.7	576.1	576.1	616.7	616.7	576.1	916.1
Diff.				-203.8	-300.0	-320.0	-320.0	-241.7	-282.3	-282.3	-241.7	-241.7	-282.3	
Adv. Proc. ($M)	105.0	137.4	137.0	=	=	67.0	67.0	102.0	58.0	58.0	102.0	102.0	58.0	145.6
Diff.						-70.0	-70.0	-35.0	-79.0	-79.0	-35.0	-35.0	-79.0	
Qty. (Units)	0	18	48	30	27	24	24	27	27	27	=	=	27	64
Diff.				-18	-21	-24	-24	-21	-21	-21			-21	

Note: $9.0M MILCON requested for this program.

HASC reduced funding because there will not be enough MK III ships to accommodate 48 A/C when they would be delivered.

The Senate reduction was based on a SECDEF recommendation, but the Navy advised that the ship deployment schedule could not be maintained at that level. The total reduction by the House will maintain that deployment schedule. Total buy to be 204 aircraft.

SAC recommended funding reductions for 7 aircraft procurement lines based on FY 82 contract cost savings.

HAC directed that $40.9M requested for management reserve be used to offset the increasd procurement funding. They reduced advance procurement in view of restructuring.

HAC cuts in light of program restructuring, plus $38.3M management reserve. Reprogramming will be considered if necessary to acquire the 27 A/C in FY 83.

TITLE: PATROL A/C P-3C (ORION)
PEN: 24251N

FY 81

	HISTORY FY 80 Act	FY 81 Est	Supplem FY 81 Request	AUTHORIZATION HASC	House	SASC	Senate	Conf	APPROPRIATION HAC	House	SAC	Senate	Conf
Procurement ($M)	245.4	253.8	-3.7	=	=	=	=	-3.7	=	=	=	=	-3.7
Adv. Proc. ($M)	50.0	47.6	-0.7	=	=	=	=	-0.7	=	=	=	=	-0.7
Qty. (Units)	12	12	0	=	=	=	=	0	=	=	=	=	0

FY 82

	FY 81 Est	Amended FY 82 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
Procurement ($M)	250.1	380.2	=	=	426.2	426.2	380.2	=	=	=	=	380.2
Diff.					+46.0	+46.0						
Adv. Proc. ($M)	46.9	84.3	=	=	=	=	54.3	=	=	54.3	=	54.3
Diff.							-30.0	=	=	-30.0	=	-30.0
Qty. (Units)	12	6	=	=	14	=	12	=	=	12	=	12
Diff.					+8	=	+6	=	=	+6	=	+6

Note: SASC added funds for Naval Reserve aircraft.

FY 83

	FY 81 Act	FY 82 Est	Initial FY 83 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf	Projected FY 84 Request
Procurement ($M)	250.1	376.5	280.6	=	=	=	=	280.6	242.6	242.6	253.9	253.9	242.6	241.8
Diff.									-38.0	-38.0	-26.7	-26.7	-38.0	
Adv. Proc. ($M)	46.9	54.4	48.8	=	=	=	=	48.8	=	=	=	=	48.8	52.3
Qty. (Units)	12	12	6	=	=	=	=	6	=	=	=	=	6	5

Note: HASC concerned about the Navy's inefficient acquisition strategy, trying to maintain 14 A/C types in production, 8 of which cost more than $30M apiece.

HAC cuts reflect savings and $1M management reserve.

U.S. Navy Weapons (Missiles)
($ Millions)
(Current Year Dollars)

Selected Programs	FY80 (1)	FY81 (2)**	FY81 (3)**	FY81 (4)	FY82 (5)**	FY82 (6)**	FY82 (7)	FY83 (8)
TOMAHAWK	19.5 (30.2)*	163.0 (177.1)	161.5 (175.5)	161.5 (175.5)	121.9 (121.9)	210.9 (224.9)	211.2 (225.2)	271.0 (292.2)
PHOENIX	99.8 (107.3)	153.0 (158.6)	151.6 157.2)	151.6 157.2)	135.2 (161.2)	140.8 (167.0)	141.0 (162.0)	222.1 (256.3)
SIDEWINDER	21.2	38.9	38.6	38.6	23.1	49.5	51.1	41.5
HARM	0.0	100.4	123.5	123.5	0.0	107.6	107.8	176.8

* Amounts in brackets include Procurement and Advance Procurement

7504e/543e

TITLE: SHIP LAUNCHED CRUISE MISSILE (SLCM)
BGM-109 (TOMAHAWK)

PEN: 64367N

FY 81

	HISTORY			AUTHORIZATION					APPROPRIATION				
	FY 80 Act	FY 81 Est	Supplem FY 81 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
Procurement ($M)	19.5	163.0	-1.5	=	=	=	=	-1.5	=	=	=	=	-1.5
Adv. Proc. ($M)	10.7	14.1	-0.1	41.1	41.1	=	=	-0.1	=	=	=	=	-0.1
Diff.				+41.2	+41.2								
Qty. (Units)	6	50	0	=	=	=	=	0	=	=	=	=	0

Note: The Senate receded to the House on requested items already authorized for FY 81; no lack of House support indicated.

FY 82

	FY 81 Est	Amended FY 82 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
Procurement ($M)	161.5	210.9	=	=	=	=	210.9	=	=	=	=	210.9
Adv. Proc. ($M)	14.0	14.0	=	=	=	=	14.0	=	=	=	=	14.0
Qty. (Units)	50	88	=	=	=	=	88	=	=	=	=	88

TITLE: SHIP LAUNCHED CRUISE MISSILE (SLCM)
BGM-109 (TOMAHAWK)

PEN: 64367N

	HISTORY			AUTHORIZATION					APPROPRIATION					
				HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf	
				FY 83										
	FY 81 Act	FY 82 Est	Initial FY 83 Request											Projected FY 84 Request
Procurement ($M)	161.5	211.2	271.0	-	-	-	-	271.0	237.3	237.3	173.0	173.0	229.8	576.8
Diff.									-33.7	-33.7	-98.0	-98.0	-41.2	
Adv. Proc. ($M)	14.0	14.0	21.2	-	-	-	-	21.2	19.0	19.0	6.7	6.7	6.7	23.2
Diff.									-2.2	-2.2	-14.5	-14.5	-14.5	
Qty. (Units)	50	88	120	-	-	-	-	120	109	109	71	71	100	312
Diff.									-11	-11	-49	-49	-20	

Note: Total cruise missile program estimate is $8B for 4348 units. Up from $6B for 3424 units.

SAC'S reduction reflects adjustment in out-year production rates as part of an indemnification program to encourage a second production source. Advance procurement reflects reduction in FY 84 program.

Program cost estimated at $11.8B for 3994 units.

HAC approves seeking a second source and cut $18M for 11 missiles because of poor test results. They also cut $15.7M management reserve and $1.9M advance procurement.

TITLE: TACTICAL AIR-TO-AIR MISSILE AIM-54A (PHOENIX)
PEN: 25565N

FY 81

DOD Budget Activity	FY 80 Act	FY 81 Est	Supplem FY 81 Request	AUTHORIZATION HASC	House	SASC	Senate	Conf	APPROPRIATION HAC	House	SAC	Senate	Conf
Procurement ($M)	99.8	153.0	-1.4	-	-	-	-	-1.4	-	-	-	-	-1.4
(No Adv. Proc listed in BUDGETTRACK)													
Qty. (Units)	60	210	0	-	-	-	-	0	-	-	-	-	0
Diff.													

FY 82

DOD Budget Activity	FY 81 Est	Amended FY 82 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
Procurement ($M)	151.6	140.8	-	-	-	-	140.8	-	-	-	-	140.8
Adv. Proc. ($M)	5.6	26.2	-	-	-	-	26.2	21.0	21.0	-	-	21.0
Diff.							-5.2	-5.2	-	-	-	
Qty. (Units)	210	72	-	-	-	-	72	-	-	-	-	72

Note: HAC finds advance procurement request to be overstated.

FY 83

DOD Budget Activity	FY 81 Act	FY 82 Est	Initial FY 83 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf	Projected FY 84 Request
Procurement ($M)	151.6	141.0	222.1	-	-	-	-	222.1	-	-	182.6	182.6	212.5	323.0
Diff.											-39.5	-39.5	-9.6	
Adv. Proc. ($M)	5.6	21.0	34.2	-	-	-	-	34.2	-	-	30.2	30.2	34.2	45.8
Diff.											-4.0	-4.0		
Qty. (Units)	210	72	108	-	-	-	-	108	-	-	90	90	108	360
Diff.											-18	-18		
Init. Spares ($M)	3.8	1.0	14.5	-	-	-	-	14.5	-	-	-	-	14.5	
Modification ($M)	4.1	7.8	6.6	-	-	-		6.6	-	-	-	-	6.6	54.6

Note: SAC's reduction reflects a concurrent dip in F-14A procurement and trims FY 84 advance procurement accordingly.

25603NR SAC reduced funding because program not properly costed by Navy.

TITLE: TACTICAL (SHORT-RANGE AIR-TO-AIR) MISSILE
AIM-9L/M (SIDEWINDER)

PEN: 25664N

FY 81

DOD Budget Activity	FY 80 Act	FY 81 Est	Supplem FY 81 Request	HISTORY AUTHORIZATION HASC	House	SASC	Senate	Conf	APPROPRIATION HAC	House	SAC	Senate	Conf
Procurement ($M)	21.2	38.9	-0.3	=	=	=	=	-0.3	=	=	=	=	-0.3
Qty. (Units)	320	220	0	=	=	=	=	0	=	=	=	=	0

FY 82

DOD Budget Activity	FY 81 Est	Amended FY 82 Request	HISTORY AUTHORIZATION HASC	House	SASC	Senate	Conf	APPROPRIATION HAC	House	SAC	Senate	Conf
Procurement ($M)	38.6	49.5	=	=	=	=	49.5	=	=	=	=	49.5
Qty. (Units)	220	910	=	=	=	=	910	=	=	=	=	910

Note: SASC concerned that shortfalls in the USAF and Navy reserve munitions be redressed as soon as praticable to ensure air-to-air combat capability.

FY 83

DOD Budget Activity	FY 81 Act	FY 82 Est	Initial FY 83 Request	HISTORY AUTHORIZATION HASC	House	SASC	Senate	Conf	APPROPRIATION HAC	House	SAC	Senate	Conf	Projected FY 84 Request
Procurement ($M)	38.6	51.1	41.5	=	=	=	=	41.5	212.5	212.5	=	=	40.8	33.3
Diff.									+171.0	+171.0			-0.7	
Qty. (Units)	220	700	500	=	=	=	=	500	=	=	=	=	500	450
Init. Spares ($M)	5.6	0.8	1.6	=	=	=	=	1.6	=	=	=	=	1.6	
Modification ($M)	0.0	20.5	46.2	=	=	=	=	46.2	=	=	=	=	46.2	40.6

TITLE: TACTICAL AIR-TO-GROUND ANTI-RADIATION MISSILE AGM-88A (HARM)
PEN: 64360N

FY 81

DOD Budget Activity	HISTORY FY 80 Act	HISTORY FY 81 Est	HISTORY Supplem FY 81 Request	AUTHORIZATION HASC	AUTHORIZATION House	AUTHORIZATION SASC	AUTHORIZATION Senate	AUTHORIZATION Conf	APPROPRIATION HAC	APPROPRIATION House	APPROPRIATION SAC	APPROPRIATION Senate	APPROPRIATION Conf
Procurement ($M)	0.0	100.4	23.1	-	-	-	-	23.1	-	-	-	-	23.1
Qty. (Units)	0	80	0	-	-	-	-	0	-	-	-	-	0

FY 82

DOD Budget Activity		HISTORY FY 81 Est	HISTORY Amended FY 82 Request	AUTHORIZATION HASC	AUTHORIZATION House	AUTHORIZATION SASC	AUTHORIZATION Senate	AUTHORIZATION Conf	APPROPRIATION HAC	APPROPRIATION House	APPROPRIATION SAC	APPROPRIATION Senate	APPROPRIATION Conf
Procurement ($M)		123.5	107.6	-	-	-	-	107.6	-	-	-	-	107.6
Qty. (Units)		80	134	-	-	-	-	134	-	-	-	-	134

FY 83

DOD Budget Activity	HISTORY FY 81 Act	HISTORY FY 82 Est	HISTORY Initial FY 83 Request	AUTHORIZATION HASC	AUTHORIZATION House	AUTHORIZATION SASC	AUTHORIZATION Senate	AUTHORIZATION Conf	APPROPRIATION HAC	APPROPRIATION House	APPROPRIATION SAC	APPROPRIATION Senate	APPROPRIATION Conf	Projected FY 84 Request
Procurement ($M)	123.5	107.8	176.8	-	-	95.8	95.8	176.8	127.1	127.1	-	-	127.1	155.3
Diff.						-81.0	-81.0		-49.7	-49.7			-49.7	
Quantity (Units)	80	118	208	-	-	-	-	208	120	120	118	118	120	250
Diff.									-88	-88	-90	-90	-88	

Note: SAC reduced funding to slow down production. Committee expects Navy to bring on a coproducer ASAP.

Because of rising costs in this joint program and concern over increasing production rates too quickly, HAC cut $47.3M procurement, set combined procduction at 20 per month, cut $2.4M management reserve, and urged the Navy to consider the ARP seeker and other steps to reduce unit costs.

Shipbuilding and Conversion
($ Millions)
(Current Year Dollars)

Selected Programs	FY80 (1)	FY81 (2)**	FY81 (3)**	FY81 (4)	FY82 (5)**	FY82 (6)**	FY82 (7)	FY83 (8)
TRIDENT (SSN)	1037.8	1051.7	1025.7	1050.2	1099.0	1060.8	0.0	2485.0 (3307) (A.P. only)
CVN	2094.0	0.0	0.0	0.0	0.0	0.0 (6580.0) (A.P. only)	0.0 (475.0) (A.P. only)	6795.3
SSN-688	726.6	824.7	798.5	802.9	547.6	1013.1	945.1 (1343.0)*	1027.4 (1443.3)*
LSD-41	0.0	340.7	340.7	0.0	0.0	0.0	297.8	379.2 (4170.0)*
CG-47	820.2	1768.7	1789.6	1782.9	2115.7	2925.6	2876.4	3112.2 (3134.4)*
FFG-7	1017.3	1510.0	1506.7	971.9	498.9	971.9	912.4	666.4

* Amounts includes Procurement plus Advance Procurement (A.P.)

TITLE: TRIDENT SUBMARINE (SSBN)
PEN: 11228N

	HISTORY			AUTHORIZATION					APPROPRIATION				
				HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
FY 81													
DOD Budget Activity	FY 80 Act	FY 81 Est	Supplem FY 81 Request										
Procurement ($M)	1037.8	1051.7	-26.0	=	=	=	=	-26.0	=	=	26.0	26.0	0.0
Diff.											+52.0	+52.0	+26.0
Qty. (Units)	1	1	0	=	=	=	=	0	=	=	=	=	0
Diff.													

				HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
FY 82													
DOD Budget Activity		FY 81 Est	Amended FY 82 Request										
Procurement ($M)		1025.7	1060.8	0.0	0.0	75.0	75.0	0.0	0.0	=	=	=	0.0
Diff.				-1060.8	-1060.8	-985.0	-985.0	-1060.8	-1060.8	=	=	=	-1060.8
Adv. Proc. ($M)		38.01	230.7	330.7	330.7	265.7	265.7	330.7	=	=	330.7	330.7	315.6
Diff.				+100.0	+100.0	+35.0	+35.0	+100.0			+100.0	+100.0	+84.9
Qty. (Units)		1	1	0	=	=	=	=			=	=	0
Diff.				-1	=	=	=	=			=	=	-1
Cost Growth ($M)	324.0	15.1	117.1	=	=	=	=	=	=	=	=	=	117.1
Outfitting ($M)	6.5	10.1	7.0	=	=	=	=	=	=	=	=	=	7.0
Post Delivery ($M)	0.0	19.7	5.4	=	=	=	=	=	=	=	=	=	5.4

TITLE: TRIDENT SUBMARINE (SSBN)
PEN: 11228N

FY 83

DOD Budget Activity	HISTORY: FY 81 Act	HISTORY: FY 82 Est*	Initial FY 83 Request*	HASC	AUTHORIZATION: House	AUTHORIZATION: SASC	AUTHORIZATION: Senate	AUTHORIZATION: Conf	HAC	APPROPRIATION: House	APPROPRIATION: SAC	APPROPRIATION: Senate	APPROPRIATION: Conf	Projected FY 84 Request
Procurement ($M)	1050.2	0.0	1504.0	=	1786.0	1941.5	1941.5	1504.0	1428.6	1428.6	1462.6	=	1462.6	1301.9
Diff.					+282.0	+437.5	+437.5		-75.4	-75.4	-41.4		-41.4	
Adv. Proc. ($M)	38	330.7	243.9	=	282.0	=	=	282.0	81.3	=	=	=	81.3	402.0
Diff.				=	+38.1	=	=	+38.1	-162.6				-162.6	
Qty. (Units)	1	0	2	=	1	=	=	1	1	1	1	1	1	1
Diff.					-1			-1	-1	-1	-1	-1	-1	
Cost Growth ($M)	8.5	98.5	223.6	=	=	=	=	223.6	=	=	=	=	223.6	
Outfitting ($M)	8.3	7.0	8.3	=	=	=	=	8.3	=	=	=	=	8.3	
Post Delivery ($M)	14.7	0.0	24.8	=	=	=	=	24.8	=	=	=	=	24.8	
Ship Design ($M)	0.0	0.0	24.0	=	=	=	=	24.0	=	=	=	=	24.0	

Note: $188.3M MILCON requested for this program. HASC approved $106.4 requested as FY 82 supplemental for changes.

The House reduced funding by $699M and authorized only one ship in order to afford changes necessary to carry the D-5 TRIDENT-II missile on that ship and still meet the funding cuts required by the budget resolution.

Conferees approved full funding for the tenth TRIDENT submarine to be equipped to carry the D-5 missile, and long lead funds for 11, 12, 13 also to carry the D-5. A total of 20 TRIDENT subs is planned, along with 12 POSEIDON subs which could be reconfigured to carry TRIDENT I missiles.

HAC reduction includes $17M reserve and $17M for future characteristic changes, unused FY 82 funds are to be used for advance procurement needs.

TITLE: NIMITZ CLASS CARRIER CVN
PEN: SH005N/24112N

DOD Budget Activity	HISTORY FY 80 Act	FY 81 Est	Amended FY 82 Request	AUTHORIZATION HASC	House	SASC	Senate	Conf	APPROPRIATION HAC	House	SAC	Senate	Conf
							FY 82						
Procurement ($M)	2094.0	0.0	0.0	=	=	=	=	0.0	=	=	=	=	0.0
Adv. Proc. ($M)	0.0	0.0	658.0	=	=	=	=	658.0	475.0	475.0	=	=	475.0
Diff.									-183.0	-183.0			-183.0
Qty. (Units)	1	0	0	=	=	=	=	0	=	=	=	=	0
Cost Growth ($M)	0.0	144.4	71.1	=	=	=	=	71.1	=	=	=	=	71.1
Outfitting ($M)	8.0	5.8	1.0	=	=	=	=	1.0	=	=	=	=	1.0
Post Delivery ($M)	0.0	0.0	19.5	=	=	=	=	19.5	=	=	=	=	19.5

Note: FYDP delays this item until FY 84; therefore, HAC denied advance procurement for non-nuclear components.

TITLE: NIMITZ CLASS CARRIER CVN
PEN: 24112N

DOD Budget Activity	HISTORY FY 81 Act	FY 82 Est	Initial FY 83 Request	AUTHORIZATION HASC	House	SASC	Senate	Conf	APPROPRIATION HAC	House	SAC	Senate	Conf
				FY 83									
Procurement ($M)	0.0	0.0	6795.3	=	=	=	=	6795.3	6559.5	6559.5	=	=	6559.5
Diff.									-235.8	-235.8			-235.8
Adv. Proc. ($M)	0.0	475.0	0.0	=	=	=	=	0.0	=	=	=	=	0.0
Qty. (Units)	0	0	2	=	=	=	=	2	=	=	=	=	2
Cost Growth ($M)	141.5	68.8	73.7	=	=	=	=	73.7	=	=	=	=	73.7
Outfitting ($M)	7.6	1.0	1.0	=	=	=	=	1.0	=	=	=	=	1.0
Post Delivery ($M)	0.0	19.4	0.0	=	=	=	=	0.0	=	=	=	=	0.0
Ship Design ($M)	0.0	0.0	1.0	=	=	=	=	1.0	=	=	=	=	1.0

Note: Ships intended to replace the USS CORAL SEA and USS MIDWAY, save about $750M through full funding, and be delivered 2 years before conventional procurement would allow.

TITLE: ATTACK SUBMARINE SSN 688 CLASS
PEN: 24281N

	HISTORY			AUTHORIZATION					APPROPRIATION				
				HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
FY 81													
DOD Budget Activity	FY 80 Act	FY 81 Est	Supplem FY 81 Request										
Procurement ($M)	726.6	824.7	-26.2	0.0	0.0	-21.8	=	0.0	=	=	=	=	0.0
Diff.				+26.2	+26.2	+4.4	=	+26.2				=	+26.2
Qty. (Units)	2	2	0	=	=	=	=	0	=	=	=	=	0
Cost Growth ($M)						21.0	21.0						
FY 82													
		FY 81 Est	Amended FY 82 Request										
Procurement ($M)		798.5	1013.1	1531.2	1513.2	=	=	953.1	953.1	=	=	=	953.1
Diff.				+518.1	+518.1			-60.0	-60.0				-60.0
Adv. Proc. ($M)		188.8	213.9	=	=	=	=	397.9	=	=	=	=	397.9
Diff.								+184.0					+184.0
Qty. (Units)		2	2	3	3	=	=	2	=	=	=	=	2
Diff.				+1	+1								
Cost Growth ($M)		79.7	130.2	=	=	=	=	130.2	90.2	90.2	=	=	130.2
Diff.									-40.0	-40.0			
Outfitting ($M)		5.8	12.2	=	=	=	=	12.2	=	=	=	=	12.2
Post Deliv. ($M)		39.7	54.0	=	=	=	=	54.0	=	=	=	=	54.0

Note: NASC thinks building rate of 3 or 4 per year needed to maintain planned force levels. SASC concerned about OHIO and L.A. Class construction problems and requests SECNAV study and report to avoid having to seek alternative solutions.

9/23/81: DOD recommended deletion of HASC add-on.

SAC provided $183.2M increase for 3 boats each in FY 83 and FY 84.

HAC deleted $40M in cost growth because contract not yet awarded.

TITLE: ATTACK SUBMARINE SSN-688 CLASS
PEN: 24281N

	HISTORY			AUTHORIZATION					APPROPRIATION					
				HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf	
				FY 83										
	FY 81 Act*	FY 82 Est*	Initial FY 83 Request*											Projected FY 84 Request
Procurement ($M)	802.9	945.1	1027.4	=	=	=	=	1027.4	1004.2	1004.2	=	=	1004.2	1677.8
Diff.									-23.2	-23.2	=		-23.2	
Adv. Proc. ($M)	188.8	397.9	416.0	=	=	=	=	416.0	=	=	=	=	416.0	336.0
Qty. (Units)	2	2	2	=	=	=	=	2	=	=	=	=	2	3
Cost Growth ($M)	83.0	195.2	226.1	=	=	=	=	226.1	=	=	=	=	226.1	
Outfitting ($M)	8.5	11.2	25.9	=	=	=	=	25.9	=	=	=	=	25.9	
Post Deliv. ($M)	38.7	43.2	35.0	=	=	=	=	35.0	=	=	=	=	35.0	
Ship Design ($M)	0.0	0.0	2.0	=	=	=	=	2.0	=	=	=	=	35.0	

Note: Total program estimate is $24.3B for 12 more units than the previous $14.6B estimate.

SAC added funds for engineering efforts for retention of capability on 637 Class submarines.

TITLE: LSD-41
PEN: SH018N/24412N

FY 81

DOD Budget Activity	FY 80 Act	FY 81 Est	Supplem FY 81 Request	Authorization HASC	Authorization House	Authorization SASC	Authorization Senate	Authorization Conf	Appropriation HAC	Appropriation House	Appropriation SAC	Appropriation Senate	Appropriation Conf
Adv. Proc. ($M)	41.0	16.0	21.8	0.0	0.0	15.2	15.2	0.0	0.0	0.0	=	=	0.0
Diff.				-21.8	-21.8	-6.6	-6.6	-21.8	-21.0	-21.8			-21.8

Note: Funding was denied because planned reprogramming was not accomplished by DoD.

FY 82

DOD Budget Activity	FY 81 Est	Amended FY 82 Request	Authorization HASC	Authorization House	Authorization SASC	Authorization Senate	Authorization Conf	Appropriation HAC	Appropriation House	Appropriation SAC	Appropriation Senate	Appropriation Conf
Procurement ($M)	340.7	0.0	354.0	354.0	301.0	=	301.0	=	=	=	=	301.0
Diff.			+354.0	+354.0	+301.0	=	+301.0	=	=	=	=	+301.0
Adv. Proc. ($M)	37.8	34.0	107.3	107.3	=	=	0.0	=	=	=	=	0.0
Diff.			+73.3	+73.3	=	=	-34.0	=	=	=	=	-34.0
Qty. (Units)	1	0	1	1	1	=	1	=	=	=	=	1
Diff.			+1	+1	+1	=	+1					+1
Cost Growth ($M)	0.0	8.9	=	=	=	=	8.9	=	=	=	=	8.9
Outfitting ($M)	0.0	0.5	=	=	=	=	0.5	=	=	=	=	0.5

Note: HASC added advance procurement for 1 ship in FY 83. Total of 9 needed.

Both House and Senate recognize urgent need to replace existing LSD-28s. SASC wants DOD to review 5-year plan for amphibious shipbuilding to reduce disparities between present levels and JCS requirements.

9/23/81: DOD recommended deletion of HASC add-on.

Congress desires starting the first ship in FY 82. 1 year earlier.

TITLE: LSD-41
PEN: SH018N/24412N

	HISTORY			AUTHORIZATION					APPROPRIATION					
				HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf	
				FY 83										
DOD Budget Activity	FY 81 Act	FY 82 Est	Initial FY 83 Request											Projected FY 84 Request
Procurement ($M)	340.7	297.8	379.2	=	=	=	=	379.2	377.8	=	=	=	377.8	344.4
Diff.									-19.4				-19.4	
Adv. Proc. ($M)	47.0	0.0	37.8	=	=	=	=	37.8	=	=	=	=	37.8	132.8
Diff.														
Qty. (Units)	1	1	1	=	=	=	=	1	=	=	=	=	1	1
Diff.														
Cost Growth ($M)	0.0	8.9	0.0	=	=	=	=	0.0	=	=	=	=	0.0	
Outfitting ($M)	0.0	0.5	4.0	=	=	=	=	4.0	=	=	=	=	4.0	
Ship Design ($M)	0.0	0.0	0.5	=	=	=	=	0.5	=	=	=	=	0.5	

TITLE: AEGIS CRUISER CG-47
PEN: SH016N/24291N

FY 81

DOD Budget Activity	HISTORY FY 80 Act	HISTORY FY 81 Est	HISTORY Supplem FY 81 Request	AUTHORIZATION HASC	AUTHORIZATION House	AUTHORIZATION SASC	AUTHORIZATION Senate	AUTHORIZATION Conf	APPROPRIATION HAC	APPROPRIATION House	APPROPRIATION SAC	APPROPRIATION Senate	APPROPRIATION Conf
Procurement ($M)	820.2	1768.7	20.9	=	=	=	=	20.9	=	=	23.4	23.4	23.4
Diff.											+2.5	+2.5	+2.5
Adv. Proc. ($M)	0.0	0.0	129.0	0.0	0.0	=	=	129.0	=	=	=	=	129.0
Diff.				-129.0	-129.0								
Qty. (Units)	1	2	0	=	=	=	=	0	=	=	=	=	0
Cost Growth ($M)	0.0	12.7	20.9	0.0	0.0	=	=	129.0	=	=	=	=	20.0
Diff.				-20.0	-20.0								

Note: The House wanted to fund the advance procurement by transfer of authorization from other programs and the cost growth by prior authorization.

FY 82

DOD Budget Activity	FY 81 Est	Amended FY 82 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
RDT&E ($M)	21.4	34.9	=	=	=	=	34.9	=	=	=	=	34.9
Procurement ($M)	1789.6	2925.6	=	=	=	=	2925.6	2908.6	2908.6	=	=	2908.6
Diff.								-17.0	-17.0			-17.0
Adv. Proc. ($M)	129.0	20.7	120.7	120.7	=	=	20.7	=	=	=	=	20.7
Diff.			+100.0	+100.0								
Qty. (Units)	2	3	=	=	=	=	3	=	=	=	=	3
Cost Growth ($M)	0.0	12.7	=	=	=	=	12.7	=	=	=	=	12.7
Outfitting ($M)	1.2	8.0	=	=	=	=	8.0	=	=	=	=	8.0

Note: 9/23/81: DOD recommended deletion of HASC add-on.

HAC denied $17M requested for SPS-49 radar as backup for AEGIS SPY-1 system.

TITLE: AEGIS CRUISER CG-47
PEN: SH016N/24291N

DOD Budget Activity	HISTORY: FY 81 Act	FY 82 Est	Initial FY 83 Request	AUTHORIZATION (FY 83): HASC	House	SASC	Senate	Conf	APPROPRIATION (FY 83): HAC	House	SAC	Senate	Conf	Projected FY 1984 Request
Procurement ($M)	129.0	20.7	3112.2	=	=	=	=	3112.2	2901.7	2901.7	3062.6	3062.6	2901.7	3316.1
Diff.								+2879.5	+2879.5	+2879.5	+3040.4	+3040.4		
Adv. Proc. ($M)	1782.9	2876.7	22.2	=	=	=	=	22.2	0.0	0.0	=	=	0.0	24.5
Diff.								-2112.2	-2112.2	-2112.2			-2112.2	
Qty. (Units)	2	3	3	=	=	=	=	3	=	=	=	=	3	3
Cost Growth ($M)	26.3	12.7	0.0	=	=	=	=	0.0	=	=	=	=	0.0	
Outfitting ($M)	2.3	6.1	10.5	=	=	=	=	10.5	=	=	=	=	10.5	
Post Deliv. ($M)	0.0	0.0	14.9	=	=	=	=	14.9	=	=	=	=	14.9	
Ship Design ($M)	0.0	0.0	3.1	=	=	=	=	3.1	=	=	=	=	3.1	

Note: Funding is for the eighth, ninth, and tenth ships and advance procurement for the vertical launch missile system.

HASC approved $80M requested as FY 82 supplemental for one-time costs associated with contracting an AEGIS ship in a second shipyard.

SAC deleted LAMPS III systems and high frequency sonars, TACTAS, from 3 cruisers.

HAC reductions included $84M management reserve and $101.5M for future characteristic changes, as well as the lamps mark III shipboard systems and the SPS-49 radar, they want the tactas and the helicopter recover system included, HAC denied advance procurement based on historical first year obligation rates.

TITLE: GUIDED MISSILE FRIGATE FFG-7
PEN: SH020N/24294N

FY 81

DOD Budget Activity	HISTORY FY 80 Act	HISTORY FY 81 Est	HISTORY Supplem FY 81 Request	AUTHORIZATION HASC	AUTHORIZATION House	AUTHORIZATION SASC	AUTHORIZATION Senate	AUTHORIZATION Conf	APPROPRIATION HAC	APPROPRIATION House	APPROPRIATION SAC	APPROPRIATION Senate	APPROPRIATION Conf
Procurement ($M)	1017.3	1510.0	-3.3	-	-	-	-	-3.3	-	-	3.3	3.3	0.0
Diff.													
Qty. (Units)	5	6	0	-	-	-	-	0	-	-	-	-	0
Cost Growth ($M)	0.0	43.7	57.1	0.0	0.0	-	-	0.0	-	-	-	-	57.1
Diff.				-57.1	-57.1			-57.1					

Note: The Senate receded to the House on requested items already authorized for FY 81; no lack of House support indicated.

FY 82

DOD Budget Activity	FY 81 Est	Amended FY 82 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
Procurement ($M)	1506.7	971.9	-	-	1671.9	1671.9	971.9	926.1	926.1	-	-	926.1
Diff.					+700.0	+700.0		-45.8	-45.8			-45.8
Qty. (Units)	6	3	-	-	6	6	3	-	-	-	-	3
Diff.					+3	+3						
Cost Growth ($M)	43.7	54.8	-	-	-	-	54.8	-	-	-	-	54.8
Outfitting ($M)	24.8	30.4	-	-	-	-	30.		-	-	-	30.4
Post Deliv. ($M)	43.2	46.8	-	-	-	-	46.8	-	-	-	-	46.8

Note: SASC did not accept Navy explanations for wanting to phase out FFG-7s in favor of an equal request for FFX guided missile frigates.

9/23/81: DOD recommended procurement reduction by $224.0M (1 Unit), which allows production in one shipyard on each coast rather than in two on the west coast and one on the east coast.

HAC denied $45.8M for FFG variants, but added $224M above the DOD September request. SAC added the same amount for the third ship, which will assure second source procurement and maintain the industrial base.

TITLE: GUIDED MISSILE FRIGATE FFG-7
PEN: SH020N/24294N

DOD Budget Activity	HISTORY FY 81 Act	FY 82 Est	Initial FY 83 Request	AUTHORIZATION HASC	House	SASC	Senate	Conf	APPROPRIATION HAC	House	SAC	Senate	Conf	Projected FY 84 Request
				FY 83										
Procurement ($M)	1510.0	917.4	666.4	706.4	706.4	=	=	706.4	=	=	631.4	631.4	646.3	774.8
Diff.				+40.0	+40.0			+40.0			-35.0	-35.0	-20.1	
Qty. (Units)	6	3	2	=	=	=	=	2	=	=	=	=	2	2
Cost Growth ($M)	20.8	12.2	0.0	=	=	=	=	0.0	=	=	=	=	0.0	
Outfitting ($M)	28.0	30.4	32.6	=	=	=	=	32.6	=	=	=	=	32.6	
Post Deliv. ($M)	43.2	41.6	50.4	=	=	=	=	50.4	=	=	=	=	50.4	

Note: HASC specified the RDT&E increase for X-band phased array radars to improve the missile fire control system.

Conferees approved the $40M addition, to be used only for an X-band phased array radar for improved missile fire control. 50 FFG-7 frigates are planned.

SAC reduction of $35M was made because program assumes a transfer of a like amount from prior year program.

HAC directed that $35M savings from FY 82 contracting plus any savings from FY 82 and $1.3 management reserve be used to offset the costs of adding an X-band phased array radar.

Procurement, Marine Corps
($ Millions)
(Current Year Dollars)

Selected Program	FY80 (1)	FY81 (2)**	FY81 (3)**	FY81 (4)	FY82 (5)**	FY82 (6)**	FY82 (7)	FY83 (8)
LVT 7A1	0.0	8.0	11.9	12.0	52.0	55.6	57.3	151.5

TITLE: ARMORED ASSAULT AMPHIBIAN (LVT7A1)
PEN: WV040M/WV049M

	HISTORY			AUTHORIZATION					APPROPRIATION					
				HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf	
FY 81														
	FY 80 Act	FY 81 Est	Supplem FY 81 Request											
Procurement ($M)	0.0	8.0	3.9	-	-	-	-	3.9	-	-	-	-	3.9	
FY 82														
	FY 80 Act	FY 81 Est	Amended FY 82 Request											
Procurement ($M)	0.0	11.9	55.6	-	-	-	-	55.6	-	-	-	-	55.6	
Qty. (Units)	0	0	30	-	-	-	-	30	-	-	-	-	30	
FY 83														
	FY 81 Act	FY 82 Est	Initial FY 83 Request											Projected FY 84 Request
Procurement ($M)	12.0	57.3	151.5	-	-	-	-	151.5	124.8	124.8	-	-	124.8	163.5
Diff.									-26.7	-26.7			-26.7	
Qty. (Units)	0	30	168	-	-	-	-	168	146	146	-	-	146	171
Diff.									-22	-22			-22	

U.S. Air Force

Procurment VS. Category VS. Program Turbulence

(TOA, $ Millions)

(Current and Constant FY 83 Dollars)

Selected Program	FY80 (1)	FY81 (2)**	(3)**	(4)	FY82 (5)**	(6)**	(7)	FY83 (8)
Air Force Procurement ($M)								
Current $	12832	15818	16907	16779	17794	24606	24003	30464
Constant FY83 $	16174	18272	19530	19382	19043	26333	25688	30464
Inflation Index*	79.34			86.57			93.44	100.0
Aircraft Procurement ($M)								
Current $	8018	9674	10415	10298	9470	14752	14022	17757
Constant FY 83 ($	10137	11211	12070	11934	10165	15835	15052	17757
Inflation Index*	80			86.29			93.16	100.0
Missile Procurement ($M)								
Current $	2159	3141	3350	3333	4275	4658	4574	6828
Constant FY 83 $	2746	3653	3896	3876	4595	5006	4916	6828
Inflation Index*	78.62			85.99			93.04	100.0

U.S. Air Force Aircraft
($ Millions)
(Current Year $)

Selected Programs	FY80 (1)	FY81 (2)**	FY81 (3)**	FY81 (4)	FY82 (5)**	FY82 (6)**	FY82 (7)	FY83 (8)
F-15	897.7	845.1	826.4	826.4	837.0	1101.8	977.9	1296.8
	(975.6)*	(935.3)	(956.4)	(951.5)	(837.0)	(1227.3)	(1103.0)	(1602.0)
F-16	1416.4	1706.1	1640.9	1658.3	1334.5	1388.3	1333.5	1735.4
	(1557.7)	(1872.9)	(1836.0)	(1853.1)	(1334.5)	(1657.0)	(1879.0)	(1959.0)
A-10	807.2	476.1	454.0	461.5	9.8	542.4	216.0	357.3
	(854.1)	(500.2)	(524.0)	(531.5)	(9.8)	(542.4)	(230.0)	(357.3)
E-3A	246.0	168.3	162.6	163.4	0.0	170.0	243.8	140.6
	(246.0)	(247.9)	(242.1)	(242.9)	(0.0)	(270.0)	(244.0)	(166.3)
LRCA (B1-B)	0.0	0.0	0.0		0.0	1632.0	1364.9	3393.1
						(1942.0)	(1621.9)	(3868.1)

*Numbers in brackets include Procurement and Advance Procurement

TITLE: TACTICAL FIGHTER F-15A/B/C/D (EAGLE)
PEN: 27130F

FY 81

HISTORY				AUTHORIZATION					APPROPRIATION				
DOD Budget Activity	FY 80 Act	FY 81 Est	Supplem FY 81 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
Procurement ($M)	897.7	845.1	-18.7	=	=	=	=	-18.7	=	=	=	=	-18.7
Adv. Proc. ($M)	77.9	90.2	40.0	=	=	=	=	40.0	20.0	20.0	=	=	30.0
Diff.									-20.0	-20.0	.		+10.0
Qty. (Units)	60	42	0	=	=	=	=	0	=	=	=	=	0

Note: The Senate receded to the House on requested items already authorized for FY 81; no lack of House support indicated.

FY 82

DOD Budget Activity	FY 81 Est	Amended FY 82 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
Procurement ($M)	826.4	1101.8	716.7	=	=	=	980.2	980.2	=	980.2	=	980.2
Diff.			-385.1	=			-121.6	-121.6	=	-121.6	=	-121.6
Adv. Proc. ($M)	130.0	125.4	94.3	=	=	=	100.4	100.4	=	100.4	=	100.4
Diff.			-31.1	=			-25.0	-25.0	=	-25.0	=	-25.0
Qty. (Units)	42	42	=	30	=	=	36	36	=	36	=	36
Diff.			=	-12			-6	-6	=	-6	=	-6

Note: HASC wants an administration policy for continental air defense and an estimate of total F-15s needed.

SASC deleted R&D funds for air-to-ground enhancement and requested AF cost analysis and complete justification.

9/23/81: DOD recommended reduction of advance procurement by $35.0M (12 units in FY 83).

Advance procurement authorization is for 30 A/C in FY 83. $27.3M for F-15E interdiction A/C deleted, pending a comprehensive plan from the USAF on its air-to-ground requirements. Future fighter mission analysis P.E. created (RD345F).

TITLE: TACTICAL FIGHTER F-15A/B/C/D (EAGLE)
PEN: 27130F

DOD Budget Activity	HISTORY: FY 81 Act	HISTORY: FY 82 Est	HISTORY: Initial FY 83 Request	AUTHORIZATION (FY 83): HASC	AUTHORIZATION (FY 83): House	AUTHORIZATION (FY 83): SASC	AUTHORIZATION (FY 83): Senate	AUTHORIZATION (FY 83): Conf	APPROPRIATION (FY 83): HAC	APPROPRIATION (FY 83): House	APPROPRIATION (FY 83): SAC	APPROPRIATION (FY 83): Senate	APPROPRIATION (FY 83): Conf	Projected FY 84 Request
Procurement ($M)	826.4	977.9	1296.8	1079.4	982.2	1405.2	1405.2	1240.4	=	=	=	=	1240.4	1791.4
Diff.				-217.4	-314.6	+108.4	+108.4	-56.4					-56.4	
Adv. Proc. ($M)	125.1	125.4	305.4	142.1	142.1	202.5	202.5	162.0	=	=	=	=	162.0	259.9
Diff.				-163.3	-163.3	-102.9	-102.9	-143.4					-143.4	
Qty. (Units)	42	36	42	30	30	48	48	39	=	=	=	=	39	60
Diff.				-12	-12	+6	+6	-3					-3	

Note: Total program estimate is $40.6B for 1395 units, up from $25.2B for 729 units.

HASC denied $26.3M RDT&E requested for the F-15E air-to-ground derivative development. They recommended a level production rate of 30 per year through FY 85, restraining expansion until well-defined plans (U.S. air defense, tactical improvements) are fully costed and explored.

SASC recommended an additional $108.4M to buy 48 vice 42 F-15 A/C in FY 83. SASC stated that new production A/C will not be assigned to the Air Defense Command (ADC). F-15s assigned to ADC are to be older F-15A/Bs drawn from current tactical inventory. New production F-15C/Ds are not to be assigned to ADC units. $12.3M was deleted from RDT&E since only one F-15E will be used for development ($25.3M requested).

The House deferred funding for 5 NORAD sets and 7 RDF sets of test and avionics shop equipment ($97.2M of $299M for PSE).

HAC noted the change in inventory objectives from 656 to 1286 in one year and reduced what it considered an excessive request in view of relative priorities among high-cost systems.

TITLE: MULTI-MISSION FIGHTER F-16A/B (FALCON)
PEN: 27133F

FY 81

DOD Budget Activity	FY 80 Act	FY 81 Est	Supplem FY 81 Request	AUTHORIZATION HASC	House	SASC	Senate	Conf	APPROPRIATION HAC	House	SAC	Senate	Conf
Procurement ($M)	1416.4	1706.1	-65.2	93.7	93.7	=	=	65.7	=	=	=	=	-65.2
Diff.				+158.9	+158.9			+130.9	=				
Adv. Proc. ($M)	141.3	166.8	28.0	93.7	93.7	=	=	93.7	=	=	=	=	93.7
Diff.				+65.7	+65.7			+65.7	=	=			+65.7
Qty. (Units)	175	180	0	=	=	=	=	0	=	=	=	=	0

Note: The House action was to sustain a production rate of 180 a year. Authorization conferees agreed to the economy of higher production, with $14.6M derived from prior authorization.

FY 82

DOD Budget Activity	FY 81 Est	Amended FY 82 Request	AUTHORIZATION HASC	House	SASC	Senate	Conf	APPROPRIATION HAC	House	SAC	Senate	Conf
Procurement ($M)	1640.9	1388.3	1671.2	=	=	=	1270.8	=	=	=	=	1270.8
Diff.			+282.9	=			-117.5	=	=	=	=	-117.5
Adv. Proc. ($M)	166.8	268.6	315.0	=	=	=	546.8	=	=	=	=	546.8
Diff.			+46.4	=			+278.2	=	=	=	=	+278.2
Qty. (Units)	180	120	160	=	=	=	120	=	=	=	=	120
Diff.			+40	=								

TITLE: MULTI-MISSION FIGHTER F-16A/B (FALCON)
PEN: 27133F

FY 83

DOD Budget Activity	HISTORY FY 81 Act	FY 82 Est	Initial FY 83 Request	AUTHORIZATION HASC	House	SASC	Senate	Conf	APPROPRIATION HAC	House	SAC	Senate	Conf	Projected FY 84 Request
Procurement ($M)	1658.3	1333.5	1735.4	1976.0	=	=	=	1711.6	=	=	=	=	1711.6	1726.3
Diff.				+240.6				-23.8					-23.8	
Adv. Proc. ($M)	194.8	545.5	223.3	253.3	=	390.6	390.6	323.3	=	=	=	=	223.3	265.7
Diff.				+30.0		+167.3	+167.3	+100.0						
Qty. (Units)	180	120	120	140	=	=	=	120	=	=	=	=	120	120
Diff.				+20										

Note: Total program estimate is $40.9B for 1985 units, up from $20.3B for 1388 units.

HASC added 20 A/C for the Air National Guard and endorsed 20 more for FY 84. $23.7M intended for Seek Talk (canceled by HASC) is to be used for increased procurement, as are multiyear procurement (MYP) funds from FY 82 which have not been obligated.

HASC reduced RDT&E by $23.1M because the MSIP estimate more than doubled from $66M to $151.6M to complete, so they reduced the $65.1M request to the previous $42M estimate for FY 83. They also denied the $21M RDT&E reqeust for developing the F-16E air-to-ground derivative.

SASC recommended an additional $167.3M for advance procurement of 180 A/C in FY 84 and FY 85. It expects the Air Force to achieve and maintain a production rate of 180 F-16 A/C per year until inventory requirements are met. This increased production rate should permit modernization of Air Guard and Reserve forces with older F-16A/B A/C as new F-16C/D models come into the active inventory. $10M of the $21M request for F-16E was deleted because only one A/C is required.

The House deleted the HASC add-on for the Air National Guard to help meet the budget resolution funding reduction.

The conference reduction of $23.8M deletes authorization for Seek Talk Mods. The increase of 30 A/C in FY 84 and FY 85 can be accomplished either by MYP contract modification or by separate contract, whichever is more economical.

Program inflation cost was adjusted downward, for a total of $41.98B.

HAC deleted $23.8M for Seek Talk Mods because the advanced Comm. Architecture is being restructured.

TITLE: CLOSE AIR SUPPORT A/C A-10A/B (THUNDERBOLT II)
PEN: 27131F

FY 81

DOD Budget Activity	HISTORY: FY 80 Act	HISTORY: FY 81 Est	HISTORY: Supplem FY 81 Request	AUTHORIZATION: HASC	AUTHORIZATION: House	AUTHORIZATION: SASC	AUTHORIZATION: Senate	AUTHORIZATION: Conf	APPROPRIATION: HAC	APPROPRIATION: House	APPROPRIATION: SAC	APPROPRIATION: Senate	APPROPRIATION: Conf
Procurement ($M)	807.2	476.1	-22.1	=	=	=	=	-22.1	=	=	=	=	-22.1
Adv. Proc. ($M)	46.9	24.1	45.9	=	=	=	=	45.9	=	=	=	=	45.9
Qty. (Units)	144	60	0	=	=	=	=	0	=	=	=	=	0

FY 82

DOD Budget Activity	HISTORY: FY 81 Est	HISTORY: Amended FY 82 Request	AUTHORIZATION: HASC	AUTHORIZATION: House	AUTHORIZATION: SASC	AUTHORIZATION: Senate	AUTHORIZATION: Conf	APPROPRIATION: HAC	APPROPRIATION: House	APPROPRIATION: SAC	APPROPRIATION: Senate	APPROPRIATION: Conf
Procurement ($M)	454.0	542.4	509.4	=	=	=	229.7	209.7	209.7	229.7	229.7	209.7
Diff.			-33.0	=			-312.7	-332.7	-332.7	-312.7	-312.7	-332.7
Adv. Proc. ($M)	81.1	0.0	63.1	=	=	=	0.0	20.0	=	=	=	20.0
Diff.			+63.1	=				+20.0	=			+20.0
Qty. (Units)	60	60	=	=	=	=	20	20	=	=	=	20
Diff.							-40	-40	=	=	=	-40

Note: HASC deleted $33.0M requested for production line closure and authorized $63.1M for procurement of 40 A/C in FY 83, a net increase of $30.1M. SASC encouraged AF reconsideration of future tactical aircraft needs and the advisability of production termination.

9/23/81: DOD recommended procurement reduction by $275.0M (40 units slated for Reserve/Guard training) and termination after FY 83.

Authorization decreased because AF decided to produce only single-seat A-10A in FY 82 and because of large advance procurement appropriated in FY 81.

HAC added $20M advance procurement for a continuing production rate of 20 A/C in FY 83.

TITLE: CLOSE AIR SUPPORT A/C A-10A/B (THUNDERBOLT II)
PEN: 27131F

	HISTORY			AUTHORIZATION					APPROPRIATION					
DOD Budget Activity	FY 81 Act	FY 82 Est	Initial FY 83 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf	
							FY 83							
RDT&E	34.8	13.9	6.5	5.0	5.0	=	=	5.0	=	=	=	=	5.0	4.8
Diff.				-1.5	-1.5			-1.5					-1.5	
Procurement ($M)	461.5	216.0	357.3	329.3	329.3	29.0	=	29.0	=	=	=	=	357.3	
Diff.				-28.0	-28.0	-328.3		-328.3						
Adv. Proc. ($M)	70.0	13.7	0.0	28.0	28.0	=	=	0.0	=	=	=	=	0.0	
				+28.0	+28.0									
Qty. (Units)	60	20	20	30	30	0	0	0	=	=	=	=	20	
Diff.				+10	+10	-20	-20	-20						

Note: $8.9M MILCON requested for this program.

HASC transferred $56.M prior year funding and $31.7M for peculiar GSE to provide funding for 10 more A/C in FY 83 because there is no follow-on close support aircraft. They also transferred $28M requested for line shut down ("tail up") costs to provide advance procurement for 20 A/C in FY 84.

SASC feels the production rate is inefficient and that the USAF has all the A-10s it needs.

SAC approved the request despite the lack of FY 83 authorization in the hope that subsequent authorization will enhance foreign sales and offset NGT costs for Fairchild.

HAC approval subject to subsequent authorization, which the HASC supports.

12/20/82: The second continuing resolution approved the SAC and HAC recommendations for appropriation subject to authorization.

TITLE: TACTICAL AIRBORNE A/C SYSTEM (AWACS) E-3A (SENTRY)
PEN: 27417F

FY 81

DOD Budget Activity	FY 80 Act	FY 81 Est	Supplem FY 81 Request	Authorization HASC	Authorization House	Authorization SASC	Authorization Senate	Authorization Conf	Appropriation HAC	Appropriation House	Appropriation SAC	Appropriation Senate	Appropriation Conf
Procurement ($M)	246.0	168.3	-5.7	=	=	=	=	-5.7	=	=	=	=	-5.7
Qty. (Units) Diff.	3	2	0	=	=	=	=	0	=	=	=	=	0

FY 82

DOD Budget Activity	FY 81 Est*	Amended FY 82 Request*	Authorization HASC	Authorization House	Authorization SASC	Authorization Senate	Authorization Conf	Appropriation HAC	Appropriation House	Appropriation SAC	Appropriation Senate	Appropriation Conf
Procurement ($M)	162.6	170.0	=	=	=	=	170.0	=	=	=	=	170.0
Adv. Proc. ($M)	79.5	100.0	=	=	=	=	100.0	=	=	=	=	100.0
Qty. (Units)	2	2	=	=	=	=	2	=	=	=	=	2

Note: HASC wants maximum use of similar services to reduce TAFIIS deficiencies and cost and to promote standardization and interoperability.

TITLE: TACTICAL AIRBORNE A/C SYSTEM (AWACS) E-3A (SENTRY)
PEN: 27417F

DOD Budget Activity	HISTORY: FY 81 Est	HISTORY: FY 82 Est	HISTORY: Initial FY 83 Request	AUTHORIZATION: HASC	AUTHORIZATION: House	AUTHORIZATION: SASC	AUTHORIZATION: Senate	AUTHORIZATION: Conf	APPROPRIATION: HAC	APPROPRIATION: House	APPROPRIATION: SAC	APPROPRIATION: Senate	APPROPRIATION: Conf	Projected FY 84 Request
				FY 83										
Procurement ($M)	163.4	169.5	140.6	132.9	62.6	=	=	140.6	=	=	=	=	140.6	104.9
Diff.				-7.7	-78.0									
Adv. Proc. ($M)	79.5	74.3	25.7	=	=	=	=	25.7	=	=	=	=	25.7	95.3
Qty. (Units)	2	2	2	=	1	=	=	2	=	=	=	=	2	1
Diff.					-1									

Note: HASC reduced procurement because of the offset of the full $100M advance procurement appropriated in FY 82. No rationale given for the RDT&E cut.

The House action defers one AWACS to FY 84 to help meet budget resolution funding reductions.

SAC deferred mission simulator improvement, command and control improvements, and depot ground equipment upgrades.

The NATO AWACS will be designated the E-3A; the first 24 U.S. AWACS will be the E-3B; the next 9 plus #3 and #12 will be the E-3C; each model a different configuration.

TITLE: LONG RANGE COMBAT A/C (LRCA)/B1-B
PEN: 11126F

FY 81

DOD Budget Activity	FY 80 Act	FY 81 Est	Amended FY 82 Request	Authorization: HASC	Authorization: House	Authorization: SASC	Authorization: Senate	Authorization: Conf	Appropriation: HAC	Appropriation: House	Appropriation: SAC	Appropriation: Senate	Appropriation: Conf
RDT&E(1)	0.0	261.0	-0.9	-	-	-	-	-0.9	-	-	-	-	-0.9

FY 82

DOD Budget Activity	FY 81 Est	Amended FY 82 Request	Authorization: HASC	Authorization: House	Authorization: SASC	Authorization: Senate	Authorization: Conf	Appropriation: HAC	Appropriation: House	Appropriation: SAC	Appropriation: Senate	Appropriation: Conf
RDT&E ($M)(1)	260.1	302.0	-	-	-	-	302.0	291.9	291.9	471.1	471.1	291.9
								-10.1	-10.1	+169.1	+169.1	-10.1
Procurement ($M)	0.0	1632.0	-	-	-	-	1574.0	1574.0	1574.0	1724.2	1724.2	1574.0
Diff.							-58.0	-58.0	-58.0	+92.2	+92.2	-58.0
Adv. Proc. ($M)	0.0	310.0	-	-	-	-	227.0	227.0	227.0	233.8	233.8	227.0
Diff.							-83.0	-83.0	-83.0	-76.2	-76.2	-83.0
Qty. (Units)	0	5	-	-	-	-	0	2	2	2	2	2
Diff.							-5	-3	-3	-3	-3	-3

Note: HASC recommends use of LRCA funds for procurement of B-1B. DOD directed to continue R&D of an advanced technology bomber, with transfer of B-1 funds if President and Congress agree. Congressional research study finds bombers needed for non-strategic roles such as anti-Warsaw Pact or Middle East protection. Study says 1992 earliest possible IOC for an advanced technology (Stealth) bomber. If Stealth A/C used as penetrator, other bomber still needed to replace B-52.

The President advised that LRCA funds would be used for a B-1B, of which 100 would be produced as an interim B-52 replacement while Stealth technology is being developed. The bomber decision is subject to congressional resolutions of disapproval and subsequent appropriation actions. Stealth competition won by Northrop flying wing design.

The President requested $1674M for the first 2 B-1Bs. There was no resolution of disapproval in either house of congress. Both the authorization conference and the HAC denied the $51M spares request as premature. The HAC reduced R&D funding by the amount of unobligated FY 81 funds, but the SAC approved the amount requested by the President. The SAC increased the procurement amounts by 3% for annual cost growth and approved the requested spares account.

SAC added funds to maintain the full-scale development schedule and to prevent out-year inflation increases.

Congress requires that the President certify that the B-1B program can be accomplished for $20.5B.

TITLE: LONG RANGE COMBAT A/C (LRCA)/B1-B
PEN: 11126F

	HISTORY			AUTHORIZATION					APPROPRIATION					
				HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf	
							FY 83							
DOD Budget Activity	FY 81 Act*	FY 82 Est*	Supplem FY 83 Request*											Projected FY 84 Request
RDT&E ($M)(1)	260.1	471.0	753.5	=	=	=	=	753.5	=	=	=	=	753.5	717.9
Procurement ($M)	0.0	1364.9	3393.1	=	=	=	=	3393.1	=	=	=	=	3393.1	5340.8
Adv. Proc. ($M)	0.0	257.0	475.0	=	=	=	=	475.0	=	=	=	=	475.0	
Qty. (Units)	0	1	7	=	=	=	=	7	=	=	=	=	7	10

Note: *See note (2), page
(1) Refer to page for additional RDT&E line item information.

HAC expects prompt notification from SECDEF of any revisions to program structure after hearing from GAO that the CAIG cost estimate was $26.7B in FY 81 dollars and from the CBO SAC and HAC recommendations for appropriation.

U.S. Air Force Missiles
($ Millions)
(Current Year Dollars)

Selected Programs	FY80 (1)	FY81 (2)**	FY81 (3)**	FY81 (4)	FY82 (5)**	FY82 (6)**	FY82 (7)	FY83 (8)
ALCM	364.7	550.7	541.3	541.3	595.4	588.7	586.5	621.5
GLCM	0.0	75.3	134.5	134.5		299.4	298.1	490.3
SPARROW	125.1	139.9	177.0	177.0	144.4	227.0	210.6	198.6
SIDEWINDER	86.8	44.1	101.7	101.7	53.7	132.5	132.0	114.7
MAVERICK	0.0	0.0	0.0	0.0	200.0	232.2	231.2	342.6
MINUTEMAN II/III	82.3	84.6	83.5	84.6	34.3	34.3	56.4	0.0
ICBM M-X	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1446.4
DSCS III	6.8	33.5	32.8	32.4	0.0	130.0	129.6	192.9

TITLE: STRATEGIC AIR LAUNCHED CRUISE MISSILE (ALCM) AGM-86B
PEN: 11122F

FY 81

HISTORY				AUTHORIZATION					APPROPRIATION				
DOD Budget Activity	FY 80 Act	FY 81 Est	Supplem FY 81 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
Procurement ($M)	364.7	550.7	-9.4	=	=	=	=	-9.4	=	=	=	=	-9.4
Qty. (Units)	225	480	0	=	=	=	=	0	=	=	=	=	0

FY 82

HISTORY			AUTHORIZATION					APPROPRIATION				
DOD Budget Activity	FY 81 Est	Amended FY 82 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
Procurement ($M)	541.3	588.7	=	=	=	=	588.7	=	=	=	=	588.7
Adv. Proc. ($M)	1.0	1.2	=	=	=	=	1.2	=	=	=	=	1.2
Qty. (Units)	480	440	=	=	=	=	440	=	=	=	=	440

FY 83

HISTORY				AUTHORIZATION					APPROPRIATION					
DOD Budget Activity	FY 81 Act	FY 82 Est	Initial FY 83 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf	Projected FY 84 Request
Procurement ($M)	541.3	586.4	621.5	=	=	=	=	621.5	509.5	509.5	496.5	496.5	509.5	829.0
Diff.									-112.0	-112.0	-125.0	-125.0	-112.0	
Adv. Proc. ($M)	1.0	1.2	43.0	=	=	=	=	43.0	38.7	38.7	=	=	38.7	12.8
Diff.									-4.3	-4.3			-4.3	
Qty. (Units)	480	440	440	=	=	=	=	440	330	330	350	350	30	440
Diff.									-110	-110	-90	-90	-110	

Note: Total cruise missile program estimate is $8B for 4348 units, up from $6B for 3424 units.

HASC recommended the $50.8M for have rust be deferred since no decision has been made to proceed with the program.

SAC cut to gear procurement to B-52 modifications.

Program cost now estimated at $8.5B.

HAC wants an orderly phase-down of ALCM-B production; accordingly, they reduced $4.3M of the $12.3M advance procurement for ALCM-B (the $30.7M balance is for improved ALCM) and deleted the $50.8M Class V Mod funding.

TITLE: GROUND LAUNCHED CRUISE MISSILE (GLCM)
PEN: 27314F

FY 81

DOD Budget Activity	HISTORY: FY 80 Act*	FY 81 Est*	Supplem FY 81 Request*	AUTHORIZATION: HASC	House	SASC	Senate	Conf	APPROPRIATION: HAC	House	SAC	Senate	Conf
Procurement ($M)	0.0	75.3	59.2	=	=	=	=	59.2	18.0	18.0	=	=	59.2
Diff.									-41.2	-41.2			+41.2
Adv. Proc. ($M)	8.2	14.1	-0.2	=	=	=	=	-0.2	=	=	=	=	-0.2
Qty. (Units)	0	11	0	=	=	=	=	0	=	=	=	=	0

Note: No funds authorized are to be obligated until the SECDEF provides both committees a complete justification plus a plan to bring development costs under control.

FY 82

DOD Budget Activity	FY 81 Est	Amended FY 82 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
Procurement ($M)	134.5	299.4	=	=	=	=	299.4	=	=	=	=	299.4
Adv. Proc. ($M)	13.9	29.8	=	=	=	=	29.8	=	=	=	=	29.8
Qty. (Units)	11	54	=	=	=	=	54	=	=	=	=	54

Note: SASC requests a more suitable site in Italy and a written report before $57M obligated for construction.

SASC believes this program deserves the highest priority.

TITLE: GROUND LAUNCHED CRUISE MISSILE (GLCM)
PEN: 27314F

FY 83

DOD Budget Activity	HISTORY FY 81 Act	FY 82 Est	Initial FY 83 Request	AUTHORIZATION HASC	House	SASC	Senate	Conf	APPROPRIATION HAC	House	SAC	Senate	Conf	Projected FY 84 Request
Procurement ($M)	134.5	298.1	490.3	-	-	-	-	490.3	416.8	416.8	432.3	432.3	431.5	433.6
Diff.									-73.5	-73.5	-58.0	-58.0	-58.8	
Adv. Proc. ($M)	13.9	29.8	29.6	-	-	-	-	29.6	18.5	18.5	24.6	24.6	1.5	31.4
Diff.									-11.1	-11.1	-5.0	-5.0	-8.1	
Qty. (Units)	11	54	120	-	-	-	-	120	75	75	100	100	84	120
Diff.									-45	-45	-20	-20	-36	

Note: $85.4M MILCON requested for this program. Program now estimated to cost $3.79B.

SAC's cuts are tied to DOD's revision of production, including a possible second production contractor.

HAC wants the present contractor held to the current production rate and a second source qualified. The cut is to be applied to missiles only, fully funding the TELs and LCCs.

TITLE: RADAR-GUIDED AIR-TO-AIR MISSILE AIM-7F/M (SPARROW)
PEN: MP008F

FY 81

DOD Budget Activity	FY 80 Act	FY 81 Est	Supplem FY 81 Request	AUTHORIZATION HASC	AUTHORIZATION House	AUTHORIZATION SASC	AUTHORIZATION Senate	AUTHORIZATION Conf	APPROPRIATION HAC	APPROPRIATION House	APPROPRIATION SAC	APPROPRIATION Senate	APPROPRIATION Conf
Procurement ($M)	125.1	139.9	37.1	-	-	-	-	37.1	-	-	-	-	37.1
Qty. (Units)	1320	910	295	-	-	-	-	295	-	-	-	-	295

FY 82

DOD Budget Activity	FY 81 Est	Amended FY 82 Request	AUTHORIZATION HASC	AUTHORIZATION House	AUTHORIZATION SASC	AUTHORIZATION Senate	AUTHORIZATION Conf	APPROPRIATION HAC	APPROPRIATION House	APPROPRIATION SAC	APPROPRIATION Senate	APPROPRIATION Conf
Procurement ($M)	177.0	227.0	-	-	-	-	227.0	195.5	195.5	-	-	211.5
Diff.								-31.5	-31.5			-15.5
Qty. (Units)	1205	1560	-	-	-	-	1560	1344	1344	-	-	1452
Diff.								-216	-216			-108

Note: SASC concerned with shortfalls in air-to-air missiles.

HAC reduced funding because of technical problems in production.

FY 83

DOD Budget Activity	FY 81 Act	FY 82 Est	Initial FY 83 Request	AUTHORIZATION HASC	AUTHORIZATION House	AUTHORIZATION SASC	AUTHORIZATION Senate	AUTHORIZATION Conf	APPROPRIATION HAC	APPROPRIATION House	APPROPRIATION SAC	APPROPRIATION Senate	APPROPRIATION Conf	Projected FY 84 Request
Procurement ($M)	177.0	210.6	198.6	-	-	-	-	198.6	-	-	-	-	198.6	300.7
Qty. (Units)	1050	1025	1300	-	-	-	-	1300	-	-	-	-	1300	2075

TITLE: IR AIR-TO-AIR MISSILE AIM-9L/M (SIDEWINDER)
PEN: 27161F

FY 81

DOD Budget Activity	HISTORY FY 80 Act	FY 81 Est	Supplem FY 81 Request	AUTHORIZATION HASC	House	SASC	Senate	Conf	APPROPRIATION HAC	House	SAC	Senate	Conf
Procurement ($M)	86.8	44.1	57.6	-	-	-	-	57.6			-		
Qty. (Units)	2050	260	1020	-	-	-	-	1020			-		

FY 82

	FY 81 Est	Amended FY 82 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
Procurement ($M)	101.7	132.5	-	-	-	-	132.5	-	-	-	-	132.5
Qty. (Units)	1280	1800	-	-	-	-	1800	-	-	-	-	1800

Note: SASC concerned with shortfalls in air-to-air missiles.

FY 83

	FY 81 Act	FY 82 Est	Initial FY 83 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf	Projected FY 1984 Request
Procurement ($M)	101.7	132.0	114.7	-	-	-	-	11[illegible]		-	-	-	114.7	101.1
Qty. (Units)	1280	1800	1920	-	-	-	-	1920	-	-	-	-	1920	1700
Init. Spares	4.2	6.0	1.0	-	-	-		1.0	-	-	-	-	1.0	

TITLE: AIR-TO-GROUND MISSILE AGM-65D (IR MAVERICK)
PEN: 27313F

	HISTORY			AUTHORIZATION					APPROPRIATION				
				HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf

FY 82

DOD Budget Activity	FY 80 Act	FY 81 Est	Amended FY 82 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
RDT&E ($M)	50.9	36.3	10.9	=	=	=	=	10.9	=	=	=	=	10.9
Procurement ($M)*	0.0	0.0	232.2	=	=	=	=	232.2	=	=	=	=	232.2
Qty. (Units)	0	0	490	=	=	=	=	490	=	=	=	=	490

Note: Military Posture (1 of 6) p.436 lists Carter request for FY 82 of 490 missiles for $200M.

FY 83

DOD Budget Activity	FY 81 Act	FY 82 Est	Initial FY 83 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf	Projected FY 84 Request
RDT&E ($M)	46.8	24.9	5.4	=	=	=	=	5.4	=	=	=	=	5.4	0.6
Procurement ($M)	0.0	231.2	342.6	270.6	=	=	=	=	0.0	0.0	244.9	244.9	244.9	465.5
Diff.				-72.0	=	=	=	=	-241.6	-342.6	-97.7	-97.7	-97.7	
Qty. (Units)	0	490	2560	1335		=	=	=	0	0	1355	=	1355	4600
Diff.				-1225					-2560	-2560	-1205	=	-1205	

Note: 2/23/82: DOD delayed the procurement decision scheduled for the summer of 1982 until about March of 1984 because of problems encountered in the test program. The potential buy of 61,000 missiles is estimated to be about $5B.

HASC reduced funds the AF advised would not be needed because of the extended OT&E caused by reliability problems. USAF has restructured the IIR program and delayed full-scale production.

SASC wants the $36.2M carryover from FY 82 to be applied to FY 83. They believe IRR technology should continue to be developed, but that second-source and full-scale production decisions should be postponed.

The program has been restructured, with production stretched out, and is now estimated at $6.17B.

HAC notes that results of the restructure test and evauation program to correct deficiencies will not be available until 1984; 200 missiles from FY 82 are to be used in testing.

TITLE: ICBM LGM-30F/G (MINUTEMAN II/III)
PEN: 11213F

FY 81

DOD Budget Activity	FY 80 Act	FY 81 Est	Supplem FY 81 Request	Authorization: HASC	Authorization: House	Authorization: SASC	Authorization: Senate	Authorization: Conf	Appropriation: HAC	Appropriation: House	Appropriation: SAC	Appropriation: Senate	Appropriation: Conf
Procurement ($M)	82.3	84.6	-1.1	-	-	-	-	-1.1	-	-	3.9	3.9	-1.1
Diff.											+5.0	+5.0	

FY 82

DOD Budget Activity	FY 81 Est	Amended FY 82 Request	Authorization: HASC	Authorization: House	Authorization: SASC	Authorization: Senate	Authorization: Conf	Appropriation: HAC	Appropriation: House	Appropriation: SAC	Appropriation: Senate	Appropriation: Conf
Procurement ($M)	83.5	34.3	78.9	78.9	92.0	92.0	34.3	78.9	78.9	39.3	39.3	61.6
Diff.			+44.6	+44.6	+57.7	+57.7		+44.6	+44.6	+5.0	+5.0	+27.3
Adv. Proc. ($M)	3.6	0.0	-	-	-	-	0.0	-	-	-	-	0.0

Note: The Senate added $13M to convert 50 MINUTEMAN IIs to IIIs, increasing reentry vehicles by 100. They added $44.7M for 510 MK 12A reentry vehicles for 150 additional MINUTEMAN III retrofits and $9M for warhead mods. HASC added funds to increase MK 12A procurement to $78.9M, which is not be be construed as support in the ABRV competition. They recommended deferral of the lithium battery for silo mods.

9/23/81: DOD recommended deletion of HASC/SASC add-ons.

Authorization conferees deleted $9M for MK 12A mods. They recommend that AF and DOD reevaluate their MK 12A needs and submit either a reprogramming request or a supplemental to maintain cost-effective production. $22.5M from prior year authorizations was recommended for missile mods.

HAC provided $44.6M for continued MK 12A procurement. Both HAC and SAC approved $35M for the MSEP modification. SAC added $5M to procurement for first year deployment of 50 MINUTEMAN IIIs to replace IIs.

Conferees agreed to $5.0M for upgrade and expansion as well as $22.3 M for MK 12A procurement, and they directed the AF to reprogram as necessary to maintain production.

TITLE: ICBM LGM-30F/G (MINUTEMAN II/III)
PEN: 11213F

DOD Budget Activity	FY 81 Act	FY 82 Est	Initial FY 83 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf	Projected FY 84 Request
	HISTORY			AUTHORIZATION (FY 83)					APPROPRIATION (FY 83)					
Procurement ($M)	84.6	56.4	0.0	=	=	=	=	0.0	=	=	15.0	15.0	0.0	
Diff.											+15.0	+15.0		
Adv. Proc. ($M)	3.6	0.0	0.0	=	=	=	=	0.0	=	=	=	=	0.0	

Note: The House amendment deleted $5.5M from MESP (lithium batteries) and $20M for deployment of additional MINUTEMAN III missiles.

Conferees approved the $35.5M for lithium batteries but denied the House transfer of $5M from FY 82 and the $15M of Class IV mod funding for deployment of additional missiles (can be provided from O&M accounts).

SAC provided that requisite authorization must be enacted before funding is available for 50 more MINUTEMAN IIIs.

TITLE: MOBILE ICBM M-X
PEN: 64312F

	HISTORY			AUTHORIZATION					APPROPRIATION				
DOD Budget Activity	FY 80 Act	FY 81 Est	Supplem FY 81 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
								FY 81					
RDT&E ($M)	670.0	1491.0	5.0	0.0	0.0	=	=	0.0	=	=	=	=	5.0
Diff.				-5.0	-5.0			-5.0					

Note: The Senate receded to the House on requested items already authorized for FY 81; no lack of House support indicated.

DOD Budget Activity	FY 80 Act	FY 81 Est	Amended FY 82 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
								FY 82					
RDT&E ($M)	670.0	1491.6	2423.2	=	=	=	=	2423.2	1913.2	1913.2	2008.7	2008.7	1913.2
Diff.									-510.0	-510.0	-414.5	-414.5	-510.0

Note: SASC prohibits use of $366M construction funds until current review completed and Congress has a 60-day review period of the decisions. House floor amendment also blocked funds for MPS basing until the administration decisions are reviewed by Congress. SASC expects AF to seriously examine the use of one main operating base instead of the two requested. MX air mobile and A/C ground alert proposals are being evaluated by a DOD Blue Ribbon (Townes) panel. Boeing proposes a long-endurance A/C for ICBM concept called Airmobile Patrol Force. 50 A/C, each carrying one MX, would perform 48-hr. patrols from East and West Coast bases (1990 IOC). Use of 100 (new) C-5's on ground alert is proposed by Lockheed as an interim MX basing solution.

In addition to establishing 11/18/81 as the deadline for Congressional resolutions of disapproval for the President's MX-basing mode decisions of 10/2/81, the conferees agreed that no FY 82 authorization funds could be used for R&D of an aircraft launching mode for the MX missile.

The SAC funding increase above the $1913.2 requested as a part of the President's strategic decisions includes a 3% realistic cost growth. Funding includes: $1575M for missile development; $354M for basing planning and design (which excludes MPS); and $10M each for the long-term continuous air patrol and deep underground basing options.

Senate floor amendment denies the use of RDT&E appropriation for the administration proposal to super-harden existing TITAN/MINUTEMAN silos for interim MX basing.

The appropriation conference approved the Cohen Amendment, which limits preliminary work on super-hardening of silos to $20M and divides the rest of the $354M requested for placing the MX in hardened silos among the other options (ballistic missile defense and position location uncertainty among multiple silos). A decision on a permanent basing mode is required by 7/1/83, which could delay IOC by up to a year.

DOD estimates $5.6B for hardening 40 existing MINUTEMAN silos or $7.8B for hardening 36 existing TITAN silos.

TITLE: MOBILE ICBM M-X
PEN: 64312F

DOD Budget Activity	HISTORY FY 81 Act	FY 82 Est	Initial FY 83 Request	FY 83 AUTHORIZATION HASC	House	SASC	Senate	Conf	APPROPRIATION HAC	House	SAC	Senate	Conf	Projected FY 84 Request
RDT&E ($M)	1491.6	1963.2	2759.3	2609.3	2609.3	2277.3	2277.3	2509.3	2509.3	=	2449.3	2509.3	2509.3	2651.5
Diff.				-150.0	-150.0	-482.0	-482.0	-250.0	-250.0	=	-310.0	-250.0	-250.0	
Procurement ($M)	0.0	0.0	1446.4	1141.9	1141.9	0.0	0.0	988.0	988.0	0.0	988.0	0.0	0.0	3041.2
Diff.				-304.5	-304.5	-1446.4	-1446.4	-458.4	-458.4	-1446.4	-458.4	-1446.4	-1446.4	
Qty. (Units)	0	0	9	=	=	0	0	5	5	0	5	0	0	53
Diff.						-9	-9	-4	-4	9	-4	-9	-9	

Note: $207.0M MILCON requested for this program.

HASC reduced $74M for the continuous patrol aircraft (CPA) option and $76M for the defending basing option from the $310M RDT&E requested for alternate basing studies. They recommended deferral of $282.2M of the $564.4 requested for basing and deployment and $50.6M requested for spares. The net authorization for procurement of the first 9 missiles includes $22.3M transferred from FY 82 MINUTEMAN III funds. This $22.3M was an addition for the MK 12A RV, which is not needed since the ABRV was approved for the MX. HASC recommends that the AF investigate dual sources for critical ABRV components, for both FSED and procurement.

SASC deferred all procurement without prejudice to coincide with the new IOC and denied $715M RDT&E for interim silo basing. They added $255M RDT&E to bring about the earliest possible IOC, but they reduced the $419M requested for the ABRV by $22M and denied the $57 M FY 82 supplement requested by the ABRV.

The House limited use of $260M of the authorization pending Congressional review of the Administration's basing plan, which is required by 12/1/82.

Conferees approved $830M for 5 missiles, but restricted the $158M to support basing and deployment until acceptance of the President's basing plan due 12/1/82. $715M of RDT&E funding was similarly restricted, but they gave full approval for missile and ABRV development.

SAC deleted $458.4M for basing and support equipment, consistent with authorization restrictions that require review of the president's basing decision before fund obligation.

11/22/82: The President announced his selection of the dense pack closely spaced basing (CSB) option and the name PEACEKEEPER in his required report to Congress. $26.4B for 100 MX missiles in the dense pack basing at Warren AFB, Cheyenne, Wyoming is the current estimate for the program.

After narrowly missing cutting procurement in both subcommittee and full committee, the HAC stipulated that procurement funds can not be obligated until 3/15/83, following a written timetable from SECDEF on 3/1/83 on monthly schedules, planned testing, and assurance that no missiles would require temporary storage prior to completion of permanent basing silos. They also transferred $15M from other missile procurement, to remain available until 8/30/85.

After avoiding cuts in the HAC, procurement was deleted by a House floor amendment, 245 to 176, largely because of the dense pack basing mode.

12/20/82: The second continuing resolution deleted the production funds, subject to congressional approval of basing plans folowing review of options and alternative viability by a presidential Blue-Ribbon commission. The authorization level of RDT&E was approved, except for $560M withheld unitl a basing mode is accepted.

TITLE: DEFENSE SATELLITE COMM. SYS. (DSCS)
PEN: 33110F

FY 81

DOD Budget Activity	HISTORY: FY 80 Act	HISTORY: FY 81 Est	HISTORY: Supplem FY 81 Request	AUTHORIZATION: HASC	AUTHORIZATION: House	AUTHORIZATION: SASC	AUTHORIZATION: Senate	AUTHORIZATION: Conf	APPROPRIATION: HAC	APPROPRIATION: House	APPROPRIATION: SAC	APPROPRIATION: Senate	APPROPRIATION: Conf
RDT&E ($M)	24.0	33.2	-0.1	=	=	=	=	-0.1	=	=	=	=	-0.1
Procurement ($M)	6.8	33.5	-0.7	=	=	=	=	-0.7	=	=	=	=	-0.7
Adv. Proc. ($M)	10.5	48.1	-0.4	=	=	=	=	-0.4	=	=	=	=	-0.4

FY 82

DOD Budget Activity	FY 81 Est	Amended FY 82 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf
RDT&E ($M)	33.1	40.3	=	=	=	=	40.3	=	=	=	=	40.3
Procurement ($M)	32.8	130.0	=	=	=	=	130.0	=	=	=	=	130.0
Adv. Proc. ($M)	47.7	0.0	=	=	=	=	0.0	=	=	=	=	0.0

Note: HAC says $15M may be expended on the development of multi-channel transponders for the DSCS III program.

FY 83

DOD Budget Activity	FY 81 Act	FY 82 Est	Initial FY 83 Request	HASC	House	SASC	Senate	Conf	HAC	House	SAC	Senate	Conf	Projected FY 84 Request
Procurement ($M)	32.4	129.6	192.9	=	=	167.9	167.9	182.9	=	=	=	=	182.9	14.0
Diff.						-25.0	-25.0	-10.0					-10.0	
Adv. Proc. ($M)	48.1	0.0	0.0	=	=	=	=	0.0	=	=	=	=	0.0	75.9
Qty. (Units)	1	2	2	=	=	=	=	2	=	=	=	=	2	

Note: SASC reduced funding because of significant cost growth.

Total Obligation Authority (TOA)
Summary and Inflation Indices
($ Millions, Current and Constant FY 83 $)

	FY 64	FY 65	FY 66	FY 67	FY 68	FY 69	FY 70	FY 71	FY 72	FY 73
Procurement										
Current $	15,028	14,112	22,014	23,281	22,528	22,247	19,161	17,335	18,526	18,198
Constant $	52,539	47,618	68,707	70,271	63,881	60,185	50,811	43,416	43,865	40,151
Inflation Index	28.6	29.6	32.0	33.1	35.2	36.9	37.8	39.9	42.1	45.3
Total TOA										
Current $	49,547	49,561	64,532	71,592	74,965	77,755	75,517	72,815	76,502	78,924
Constant $	189,829	184,095	224,025	238,551	238,866	235,999	214,295	193,360	187,531	177,685
Inflation Index	26.1	26.9	28.8	30.0	31.4	33.0	35.2	37.6	40.8	44.4

	FY 74	FY 75	FY 76	FY 77	FY 78	FY 79	FY 80	FY 81	FY 82	FY 83
Procurement										
Current $	17,426	17,307	21,033	27,381	30,087	31,267	35,309	47,768	65,362	89,587
Constant $	36,250	33,489	37,995	44,908	45,214	42,775	44,055	54,828	69,792	89,587
Inflation Index	47.9	51.6	55.3	61.0	66.6	73.1	80.0	87.2	93.7	100.0
Total TOA										
Current $	81,682	86,154	95,699	107,876	116,268	124,671	142,211	176,094	214,235	257,983
Constant $	169,752	165,581	171,646	179,671	179,209	177,996	182,364	202,159	227,813	257,983
Inflation Index	48.1	52.0	55.8	60.0	64.9	70.1	78.0	87.1	94.0	100.0

Source: National Defense Budget Estimates for FY 83, OSD Comptroller
Inflation Indices calculated for report purposes only

APPENDIX F
Bibliography

F.1 Literature Survey Results

This study effort called for a literature survey of responses to DOD budget turbulence. The keyword search strategy for reference selection was based on the following list of key search words:

- Acquisition Improvement
- Acquisition Policy
- Acquisition Process
- Cost analysis
- Cost control
- Cost effectiveness
- Cost growth
- Cost indexes
- Cost overruns
- Cost reduction
- Defense Appropriations
- Defense Economics
- Design to cost
- DOD budgets
- DOD budget estimates
- Defense Spending
- DOD decision
- Defense procurement policy/procedures
- Defense Productivity/production
- Federal budgets
- Federal budget policy
- Fiscal policy
- Government procurement
- Inflation
- Industrial Base
- Life-Cycle Costs
- Material acquisition
- Material Balance
- Multi-year contracting/procurement
- Planning, Programming and Budgeting System (PPBS)
- Price Index
- Program budgeting (DOD)
- Procurement Management
- Program Management
- Selected Acquisition Reports (SARs)
- Systems Acquisition
- Systems Acquisition Management
- Weapons System Acquisition
- Weapon System Cost Growth
- Zero Base Budgeting

F.2 Data Bases

A list od data bases searched and citing per data base was compiled and is depeicted below:

DATA BASES SEARCHED	REFERENCES
• Brookings Institution	8
• Center for Naval Analysis (CNA)	11
• Congressional Budget Office (CBO)	35
• Defense Logistics Studies Information Exchange (DLSIE), Ft. Lee, Virginia	18
• Defense Technical Information Center (DTIC), Cameron Station, Alexandria, Virginia	26
• General Accounting Office (GAO)	18
• Joint Economic Committee (JEC)	19
• Office of Management and Budget (OMB)	2
• RAND Corporation	10
• Defense Systems Management College: "Concepts"	16
• Other	56
• Congressional Hearings	13
• Data Resources, Inc.	6
• Office of the Secretary of Defense	2
	240

Based on the results of the literature survey an alphabetized biblography of more than 200 references has been compiled as is listed herein.

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