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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, D.C.



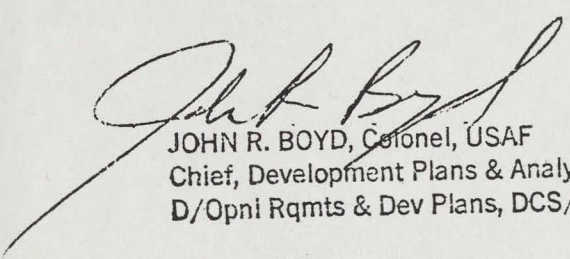
9 AUG 1974

TO: RDQL
ATTN OF:

SUBJECT: Development Planning Interim Report

TO: AF/RDQ

1. An Interim Report on our current planning effort is submitted here per your direction.
2. The report itself is quite brief, though it has several extensive attachments.
3. This report was written with five goals in mind: (1) To provide the decision-makers with an understanding of the planning process; (2) To identify the crucial steps of the planning process; (3) To explain how current planning is not fiscally pragmatic; (4) To show the progress we have made towards producing planning options; and, (5) To show what remains to be done and what support is required.
4. Since our current project is still incomplete, it is important to understand that some of what is submitted may change in subsequent iterations.


JOHN R. BOYD, Colonel, USAF
Chief, Development Plans & Analysis Group
D/Opnl Rqmts & Dev Plans, DCS/R&D

1 Atch
Development Planning (Interim
Report - August 1974) (U)
w/5 Appendices (S)

Classified by: Development Plans & Analysis Group
SUBJECT TO GENERAL
DECLASSIFICATION SCHEDULE
OF EXECUTIVE ORDER 11652
AUTOMATICALLY DOWNGRADED
AT TWO YEAR INTERVALS.
DECLASSIFIED ON 1982
31 DECEMBER

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, D.C.



1 NOV 1974

APPLY TO
ATTN OF:

RDQ

GDS

SUBJECT: Development Planning

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TO: AF/IN AF/LGY AF/RDP AF/XOX
AF/SA AF/PRC AF/RDR
AF/ACB AF/PRP AF/RDS
AF/ACM AF/RDG AF/XOD
AF/LGX AF/RDM AF/XOO

1. The attached report documents RDQ's recommendations regarding the implementation of an Air Staff Development Planning process. It is the result of fifteen months effort on the part of RDQ, RDR, and RDS personnel. The report itself is quite brief but it contains several extensive appendices.
2. The objective of the proposed Development Planning process is to improve Air Staff research, development, and acquisition decision-making. Since the implementation of our proposal will profoundly affect our current decision-making posture, it is important that our proposal be reviewed by all affected directorates.
3. A briefing of our proposal can be arranged by contacting AF/RDQL/77007. Please review the attached report and submit your comments to AF/RDQL by 6 Dec 74.

Alton D. Slay

ALTON D. SLAY, Maj Gen, USAF
Director of Operational Requirements
& Development Plans, DCS/R&D

1 Atch
Development Planning Interim
Report (S)

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~~SECRET~~DEVELOPMENT PLANNING ~~(THIS PAGE IS UNCLASSIFIED)~~
(Interim Report - August 1974)1. INTRODUCTION

The purpose of Air Force development planning is to provide decision-makers with information necessary to make choices that increase force effectiveness for available resources. Though planning seems to be related to the future, it is actually concerned with the future consequences of current decisions.

There are two crucial steps to development planning:

- (1) Identify alternatives that address the threat; and,
- (2) Choose sets of alternatives that are consistent with the available resources. These crucial steps emerged during iterations of the approach to planning which are documented in Appendix 1.

This study will show that, although the Air Force has been generating many alternatives, it has not been doing an adequate job of choosing within expected resources. In other words, our planning is characterized by "wish lists" that do not appear to be fiscally pragmatic. Since this was suspected at the outset, a budget analysis was performed to gain an understanding of the dollar constraints facing the Air Force. Appendix 2 clearly shows that by not properly considering the fiscal realities, the Air Force has effectively mortgaged its future through the mid-1980's. That is, to procure what is programmed through FY 79, the resources expected through FY 83 must be expended. With this incentive to perform more realistic planning, this study effort was chartered.

2. THE STUDY EFFORT

The study was approached in a heuristic manner, and the methodology evolved as detailed in Appendix 1. Once the two crucial steps were identified, it followed that the decision-maker must base his planning on his understanding of the constraints and alternatives facing him. Hence, it is the development planner's role to provide him with objective understanding of these constraints and alternatives in the form of planning options. The decision-maker can then combine this with his subjective judgement when selecting from among the options. The objective analyses of constraints, alternatives and the production of planning options are now summarized.

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2.1. Constraints

Money, vested interests, treaties, and available technology are some of the constraints facing decision-makers. Constraints limit the decision-maker's options by defining his perception of the real world. Since a decision-maker must base his choice upon his perception of reality, the specification of these constraints becomes strategically important.

In today's environment, the principle constraint facing Air Force decision-makers is a limited budget. Air Force programs must conform to budget realities. The budget analysis in Appendix 2 clearly reveals two fundamental aspects of the budget's behavior.

First, unless the historic budget growth rate significantly increases during the period of the current FYDP, even the most optimistic projection of that level indicates that the programmed force structure cannot be procured. Therefore, to assume that this force structure can be procured, there must be reason to believe that Congress will reverse this trend. Unfortunately, it is also shown that this is not likely to occur.

Secondly, it is not possible to project the budget with certainty; however, it is possible to subjectively estimate its upper and lower bounds. This leads to the idea of providing decision-makers with a flexible set of options designed to meet the emerging budget reality. To be viable such options must satisfy two criteria: they must be fiscally pragmatic, and they must adequately address the threat.

2.2. Alternatives

The first step of development planning (identifying alternatives) is driven by the threat, which is adequately analyzed and documented by the DoD intelligence community. They are now beginning to furnish both quantities and production rates of Soviet weapons. Appendix 3 provides ancillary information on Soviet weapon inventories, R&D programs, and production rates. High production rates of new weapons can be used either to replace or to add to the older weapons in their current inventory. Clearly, warm production lines can be used to improve bargaining power in the negotiations to extend the SALT agreements. These facts must be addressed when planning for both strategic forces and general purpose forces.

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The threat can be addressed by a series of prioritized combat tasks; however, the uncertainty surrounding the threat projections makes rigid prioritization impossible. Therefore, to perform realistic development planning, it is essential that the planner first list the combat tasks without judging their relative importance, and then establish the priorities with the understanding that they may change.

Note that it is imperative that combat tasks, not hardware options, be directly related to the threat, because the tasks provide the guidelines for judging the quality of the hardware. The tasks specifically describe the ends, whereas the hardware represents the means for achieving those ends. So, tasks must be identified before hardware becomes meaningful.

It therefore follows that, if the combat tasks are to be of use to the planners, they should be listed in a manner easily related to the hardware they may require. A compendium of such Air Force combat tasks, as predicted today for the threat estimated through 1990, is listed in Appendix 4. It was recognized that in any combat situation, be it at the highest level of command or at the lowest, it appears that a three step process occurs. First, the individuals orient themselves to gain a proper understanding of the situation. Secondly, they make a decision to direct their action (or inaction). And, thirdly, they take action.

The combat tasks are organized along the lines of Orientation, Decision, and Action, and the classical mission areas are distributed among them. For example, Intelligence is part of Orientation, Command and Control is part of Decision, and Strategic Offense is part of Action. Within this structure the tasks are subdivided until they become quite specific. (For example, Action is divided into Direct Action and Support; Direct Action is divided into Strategic Offense, Strategic Defense, and General Purpose; Strategic Offense is broken into Anti-Surface, Anti-Air and Anti-Space Operations; and finally, Anti-Surface lists about twenty types of targets.) One combat task, under "Action, Direct, Strategic Offense, Anti-Surface," is to neutralize Soviet missile silos. Note that value judgements are excluded to the point where the term neutralize is used rather than destroy. The Direct Action combat tasks are target-oriented in every case; most of the others are function-oriented (e.g. Provide airlift support).

The hardware options that may address the tasks do so with varied degrees of success. That is, a particular option may address a particular task, though it may be unreliable or

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insufficient. The existing Air Force hardware addresses the threat, but deficiencies exist. These deficiencies, to a degree, determine what is currently planned for procurement. (Even with what is programmed, portions of the threat are not adequately countered; therefore, the deficiencies remaining tend to drive the current direction of R&D. And, in some cases, portions of the threat can be so formidable that even a generous budget cannot effectively counter them. (For example, a Soviet command and control center that directs the launch of ICBMs cannot be effectively neutralized before it can successfully function -- it can always launch on warning.) These latter deficiencies are called continuing limitations, and they tend to drive strategies.

Appendix 5 is a compilation of hardware options that are matched to the combat tasks listed in Appendix 4. The current and programmed forces, as they exist in either the inventory or the FYDP are listed, then the remaining deficiencies are noted. (For example, present deficiencies in air-to-air missiles include poor reliability, poor probability of kill, dependence on aircraft avionics, excessive weight and drag, heavy aircrew tasking for launch, etc.) Concepts that can potentially eliminate the deficiencies are then listed, and the continuing limitations are compiled. The planner needs to have such hardware options, deficiencies, and limitations updated on a continual basis to properly perform his function.

Beyond what is listed in Appendix 5, the planner requires other vital information, such as, when the conceptual systems are expected to become operational and what they will cost. Information on both time schedules and costs remain undone in this effort.

Once the hardware options are costed out (at several production rates), each costed hardware option matched to a combat task is considered an alternative. These alternatives, the building blocks of development planning, once identified, complete the first crucial step of development planning, i.e., identify the alternatives that address the threat.

Note that the set of alternatives is actually a comprehensive "wish list" more extensive than any previously generated. As such, if the effort is terminated at this point, planners and decision-makers cannot help but to become confused and frustrated because the "wish-list" is longer yet the constraints are the same. With a detailed analysis of tasks, options, and costs, viable sets of the

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alternatives (planning options) can be synthesized consistent with the constraints.

2.3. The Production of Planning Options

As previously stated, viable planning options must satisfy two criteria: They must be fiscally pragmatic and they must adequately address the threat. The uncertainty surrounding the expected budget level suggests that Planning Options be generated for various levels to provide decision-makers with a consistent fallback strategy. Such a strategy would minimize the adverse impact of emerging budget restrictions on the outyear force structure.

The combined effects of the uncertain threat projections, the large number of hardware options, and the virtual certainty of a restrictive budget (whatever its level) suggest that Planning Options be constructed for various prioritizations of the combat tasks. Prioritization of the combat tasks is a fundamental policy decision related to the conflicts that arise from the pursuit of the national goal -- the search for independent action in a highly interdependent world. As shown in Appendix 1 (Atch 2), the uncertainty associated with nuclear exchange and its possible outcomes imply that the national goal should be pursued without resorting to nuclear exchange. The discussion further suggests that there is a minimum acceptable strategic deterrent that must be maintained (even at the expense of the general purpose force), which in turn suggests an absolute minimum funding level.

In this context, it is reasonable to assume that the proportional allocation of strategic and general purpose forces will change as a result of the changing nature of the threat and the resources available.

Therefore, the fund allocation between strategic and general purpose forces seems to provide a key to linking development planning to the prioritization scheme. This prioritization must be done in conjunction with the force planners, the Force Structure Committee, etc.; and, it probably will produce a priority list based on the best available intelligence information. The details of alternative prioritizations will be developed at future meetings between the development planners and the force planners.

These thoughts suggest that a matrix of Planning Options, generated by varying budget levels and strategic/general purpose splits, can be used to systematically analyze the consequences of the uncertainties facing the decision-maker. For

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example, three budget levels (high, most likely, low) and three strategic/general purpose splits (35/65, 30/70, 25/75) could be postulated. Nine Planning Options, which can be produced with existing computer programs developed by the Air Force programmers, will each consist of the current fiscal year plus ten or more subsequent years. The planning options will be presented to the decision-makers with an explanation of how they differ. The decision-makers can subjectively evaluate the nine options and they can choose to either adopt one of the high-budget level options with its two fallback options (medium-and low-budget levels) or direct the planners to generate additional options with some new guidance. Once a specific prioritization is determined, multiple options (for many intermediate budget levels between the high and low) can be generated so that day-to-day deviations in the expected budget for the next fiscal year can be handled with a proper appreciation for the out-year impacts.

3. SUPPORT REQUIRED

This entire effort revolves around two steps: identifying alternatives and choosing from among them. The first step is complete except for the formulation of the production schedules and the costing of the systems. These tasks must be supported by experts in the field of costing from Hq USAF (SA, ACB, and RDGB) and AFSC. The amount of support required cannot be determined until meetings with their representatives have been held. However, without their support, this effort cannot proceed.

Extensive cooperation is further required from Hq USAF (SA, XOX, XOD, and PRP) and the Force Structure Committee of the Air Force Board to develop the planning options. Preliminary meetings with XOX staff officers indicate that they consider this effort timely and in their best interest.

4. RECOMMENDATIONS

4.1. That one officer from each RDQ division, from RDR, and from RDS be appointed to the Development Planning working group, and that they be held responsible for the constant update of hardware options as given in Appendix 5.

4.2. That action be taken to solicit support from Hq USAF (RD, XO, PR, AC, and SA) and AFSC to enable the effort to be completed.

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4.3. That this interim report be transmitted to all appropriate Air Force organizations, and that all key decision-makers be made aware of its existence.

5. CONCLUDING REMARKS

5.1. Although efforts to date have been primarily concerned with making procurement desires conform to the budget reality, Development Planning will also be used as input guidance to technology planning. It is currently felt that the alternatives included in the Planning Options combined with prioritization of the combat tasks will be the principle inputs to the technical community. It is also recognized that technology planning and development planning flow in both directions: the technical community's generation of hardware options is essential to development planning. While these relationships between technology planning and development planning are clear, many of the details must still be determined.

5.2. It is imperative that support commitments be made from across the Air Staff and from Air Force Systems Command in order to complete this effort. Unless XO, PR, AC, SA and AFSC now join with RD to cost the alternatives, produce the production schedules, and develop the planning options, this effort cannot proceed.

5.3. It cannot be overemphasized that efforts to identify alternatives (e.g. PROJECT FORECAST, Roadmaps, this effort at this point, etc.) satisfy only one of the two crucial steps of development planning, and that unless comparable progress is made in learning how to choose from among the alternatives, the decision-makers are merely faced with a larger "wish list." This larger "wish list," without additional guidance on how to choose from among them, cannot help but lead to confusion and frustration among the decision-makers.

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A P P E N D I C E S

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Contents

- Appendix 1: Plannings Evolving Approach (U)
- Appendix 2: Budget Analysis (S)
- Appendix 3: Soviet Weapon Potential (S)
- Appendix 4: Combat Tasks (S)
- Appendix 5: Matching Hardware Options to the Combat Tasks (S)

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PLANNING'S EVOLVING APPROACH

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Planning's Evolving Approach ~~THIS PAGE IS UNCLASSIFIED~~

In large organizations, planning is recognized as an ever-changing process. Since planning has this dynamic quality, the planners, to a certain extent, must be unconstrained. Establishing a rigid a priori approach to planning is tantamount to having an a priori knowledge of the plan. Of course, if the plan is known, planning is unnecessary. From the budget implications, it is clear that previous planning has not been adequate.

Since planning is dynamic, the approach to USAF Development Planning is an evolving process. And, since recently this planning has not been functionally adequate, it may be invalid to base any new approach to planning on the old ones. Therefore, the development of the approach described here is an iterative process based on the need implied by the budget analysis, the experiences of the planners, and common sense.

After the budget analysis was performed, a Development Planning working group was formed on 5 November 1973. Membership included people from several Air Staff Directorates with various backgrounds. Whenever the group found a "hole" in their cumulative knowledge, an expert was added to the group to fill the gap. Resources were made available through informal agreements among the various directors.

From the start it was clear that effective planning demanded some detailed analyses. Specific hardware needed to be considered both on an effectiveness bases and on a cost basis. In order to consider effectiveness, it is essential to determine what tasks the Air Force is required to perform. Therefore, the working group agreed, as a first step, to identify the potential USAF Combat Tasks. By 21 November 1973 a good first-cut compilation of the combat tasks was completed. The group then generated a six phase "Plan of Attack" that represents the first formal iteration of the approach. (See Figure 1.) All further iterations of the approach evolved from this.

To solidify support for the effort, to disseminate the information already uncovered, and to begin to implement the idea of planning in a creative manner, the Development Planning effort was briefed to many people. (See Figure 2.) As a result

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of conversations during the first few briefings, the approach to planning underwent a second iteration. (See Figure 3.) Since the emphasis was on a three-way match (tasks-hardware-costs), and since it was constantly stated that the planning options needed to be generated in light of the budget constraints, this more functional outline was devised. The link between the tasks-hardware-costs and the planning options was called "employment strategies." (The tasks-hardware-costs could be generated without value judgements -- the employment strategies would then incorporate all the necessary value judgements to produce the planning options.) The multiple options produced were to be built to three different budget levels (the expected amount, somewhat more, and somewhat less) -- all determined by an extension of the first budget analysis. It is envisioned that the alternative planning options at various budget levels would be for internal Air Force use to arrive at an official Air Force position.

Further discussions among the group and feedback from people briefed prompted a very apropos question -- Is there some general goal towards which all our endeavors should be directed?

Much discussion culminated with a statement of, not only the U.S. National Goal, but also a general goal towards which every nation aspires: To maintain or increase their capacity for independent action. (See Atch 1) Since the goal is multi-national, confrontations are natural in our extremely inter-dependent world. These confrontations can occur in any of several arenas (political, military, economic, etc.) The fact that confrontations are possible (with many precedences), establishes the need for a military organization and related planning activities for its employment. (See Atch 2).

The discussions of the goal, confrontations, etc. prompted still another iteration of the approach to planning. (See Figure 4.)

"Employment Concepts" (or "Employment Strategies") remained elusive -- many abortive attempts were organized -- so the Development Planning working group addressed itself to matching hardware options to the combat tasks. Though it took two months and several iterations, the match was accomplished.

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While hardware options were matched to the combat tasks, another iteration of planning's approach was generated. This latest iteration (See Figure 5) has two basic advantages over previous attempts: (1) The outline is organized to easily distinguish between completed tasks and incompletable tasks (at least a first cut has been made on each line item through III.1.C.); and, (2) Four basic questions are addressed (Where do we start: Where are we now? What needs to be done? How do we do what's needed?)

Before explaining some of the concepts relative to the most current iteration of the approach to planning, the progress (through June 1974) is reported based on the outline shown in Figure 5.

I.1. See Attachment 1.

I.2. See Attachment 2.

I.3. "Identifiable Political Aberrations" mean taking things like the SALT considerations into account. Viable planning options must be flexible enough to survive contingencies over which the USAF has no control.

II.1. and II.2. are compiled other publications. (e.g. The USAF Management Summary books.)

II.3. The budget analysis will need to be updated. The first cut is complete.

II.4. The DIPP is the primary source for the threat. Other required information has been compiled (e.g. production capability of aircraft and missiles) and any additional information will be generated as needed.

II.5. The need for planning is emphasized by the budget analysis.

III.1.A. The Combat Tasks have gone through several iterations -- one final format review will be needed at the end of the project, and occasionally a new target is added.

III.1.B. and III.1.C. The task/hardware match, the limitations, and the deficiencies* have been completed, and

*A deficiency here is defined as the inability to adequately perform a task because additional or better equipment is needed.

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a second iteration of each has been accomplished.

III.1.D. No costing has been done. This task will begin in the late summer of 1974.

III.2. (Employment Strategies) This area has received many man-hours of attention without much success. The current idea is to use the Strategic/General Purpose split rather than General War, etc. Preliminary discussions with XOX and XOD have taken place and it is anticipated that their assistance will be useful in the future.

III.3. The options cannot be produced until Sections III.1. and III.2. are completed.

IV. Implementation is a continuous subjective process that will be culminated with a high-level directive, after the fact.

In summary two general tasks remain to be accomplished, neither of which RDQ can do alone. The hardware options need to be costed out in several ways (help is required from SA, ACB, RDGB, and AFSC), and the planning options must be generated in light of macroscopic strategies (help is required from SA, XOX, XOD, SAC, TAC, and MAC).

The most recent ideas regarding the approach to planning are quite different than those already mentioned; however, the subtasks are the same so no effort has been wasted.

Planning is concerned with the futurity of current decisions. This is to say, one plans to determine the out-year consequences of today's decisions. Thus Development Planning can be viewed as a continual process consisting of two crucial steps: (1) identifying alternatives that address the threat; and (2) choosing from among the alternatives consistent with the constraints. It follows from this that decision-making also has two crucial elements: (1) alternatives, and (2) constraints. Therefore, functionally a decision consists of three inputs (understanding, constraints, and alternative) and one output (selected option(s)). A functional representation of a decision is shown in Figure 6. Note how everything feeds back to "understanding" -- to have a proper understanding for decisions the most current constraints,

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alternatives, and selected options must be considered.

The Development Planning effort can be pictured in much the same way. Constraints may include things like available technology, available money, current forces, the current program, the national goal, "sacred cows," etc. Whereas the alternatives are built on the hardware options, combat tasks, threat, goal, technology, etc.

In the Development Planning effort the alternatives can be thought of as the individual systems (B-1, F-15, A-10, etc.), whereas the selected option(s) are programs built from the alternatives (e.g. the POM is an option -- it's the aggregation of many systems).

Once the staff level people generate these viable options consistent with the given constraints the corporate "board of directors" adds the final constraint -- the current politics -- to determine which option is marked for implementation, which is programmed, which are rejected. The "board" also has the option of asking for additional options to choose from.

Figure 7 illustrates this last concept. Though it is still in the formative stage, the idea appears to have the potential to re-shape planning's approach.

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21 NOV 1973

Development Plan of Attack

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Phase 1 Develop and coordinate a list of combat tasks

1. Straw man list of tasks - (Working Group)
2. Show it to XOD - (RDQL)
3. Show it to XOO and XOX - (Team Leaders)
Show it to IN - (RDQL)
4. Show it to AFSC/XR - (RDQL)
Show it to MAJCOMs - (Team Leaders)

Phase 2 Formal Communication to initiate project

Phase 3 Hardware Options (Match with tasks)

- Phase 4
1. Cost Hardware Options
 2. Apply Budget Constraints

Phase 5 RDT&E and Procurement Options (develop outyear numbers)

Phase 6 Impact and Institutionalize

FIG 1

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DP BRIEFING AUDIENCES THIS PAGE IS UNCLASSIFIED

LRDP WORKING GROUP	5 NOV 73
GEN HODNETTE (RDR)	23 NOV 73
XOD WORKERS	29 NOV 73
COL DAVIS (RDQRT)	30 NOV 73
GEN CONFER (RDQS) & COL MUNSEY (RDQSM)	4 DEC 73
GEN SMITH (XOD)	4 DEC 73
GEN CROSS (RDQ)	5 DEC 73
COL HUNT (RDQP) & COL BOND (RDQR)	5 DEC 73
GEN STELLING (RDS)	5 DEC 73
DR. YARYMOVYCH (CCN)	7 DEC 73
GEN EVANS (RD)	18 DEC 73
COL ANDERSON (INA)	7 DEC 73
COL CAUDLE (XOXFT)	11 DEC 73
COL DUNN (AFSC/XR)	13 DEC 73
GEN GREENLEAF & PROGRAM REVIEW COMMITTEE	20 DEC 73
COL LEONARD (XOXFS)	21 DEC 73
SECRETARY LaBERGE (SAFRD)	28 DEC 73
SECRETARY PLUMMER (SAFUS)	11 MAR 74
COL BEE (RDG)	22 JAN 74
XOO WORKERS	3 JAN 74
COL MORRIS (RDQE)	28 DEC 73
ANSER'S TACTICAL DIVISION	9 JAN 74
HEADQUARTERS SAC	10 JAN 74
HEADQUARTERS NORAD	11 JAN 74
AF/RDG WORKERS	29 JAN 74
RAND WORKERS	22 FEB 74
COL JACKOMIS (RDGC)	27 FEB 74
GEN BENNETT (XOX)	6 MAR 74
GEN MORGAN AND KIRTLAND AFB JOC	13 MAR 74
AFA FACULTY	14 MAR 74
AFA CADETS	14 MAR 74
FIGHTER MODERNIZATION PANEL (WP AFB)	25 MAR 74
NEW MEMBERS LRDP WORKING GROUP	2 APR 74
THE CHIEF'S SPECIAL PANEL OF PLANNERS	10 APR 74
COL HUNT (RDQP), COL HANSEN (RDQPS), COL DAVIES (RDQRT)	11 APR 74
COL LARSON (INY)	9 MAY 74
INY WORKERS	31 MAY 74

FIG 2

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APPROACH

BUDGET ANALYSIS

COMBAT TASKS

HARDWARE OPTIONS

HARDWARE COSTS

EMPLOYMENT STRATEGIES

DEVELOP PLANNING OPTIONS CONSISTANT WITH

BUDGET CONSTRAINT

EMPLOYMENT STRATEGIES

FIG 3

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PLANNING OUTLINE

PRESENT STATUS

BUDGET ANALYSIS
THREAT ANALYSIS
NEED FOR PLANNING

NATIONAL GOAL

CONFRONTATION DYNAMICS

EMPLOYMENT STRATEGIES

STRATEGIC
GENERAL PURPOSE

COMBAT TASKS/HARDWARE OPTIONS

STRATEGIC
GENERAL PURPOSE
SUPPORT

PRODUCE RDT&E AND INVESTMENT PLANNING OPTIONS

FIG 4

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DEVELOPMENT PLANNING OUTLINE

11 April 1974

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I. BASES FOR PLANNING (Where do we start ?)

1. National Goal
 2. Confrontation Dynamics
 3. Identifiable Political Aberrations

II. PRESENT STATUS (Where are we now ?)

1. Current Force Structure
 2. Current Program
 3. Budget Analysis
 4. Threat Analysis
 5. Need for Planning

III. PRODUCE PLANNING OPTIONS (What needs to be done ?)

1. Generate the Building Blocks of LRDP
 A. Define Functional Combat Tasks
 B. Match Tasks with Hardware Options
 C. Compile Deficiencies and Limitations
 D. Generate Costs of Options
 2. Employment Strategies
 A. General War
 B. Limited War
 C. Counter-Insurgency
 D. Peace
 3. Produce Planning Options Based on
 A. Present Status
 B. Building Blocks of LRDP
 C. Employment Strategies

AS FAR AS TA - goes.

IV. IMPLEMENTATION (How do we do what's needed ?)

1. Employ a Cross Section of the Air Force in the Effort
 2. Keep a Cross Section of the Air Force Informed of Progress
 3. Brief Findings to Key Decision Makers
 4. Maintain a Blue Suit Dialogue

FIG 5

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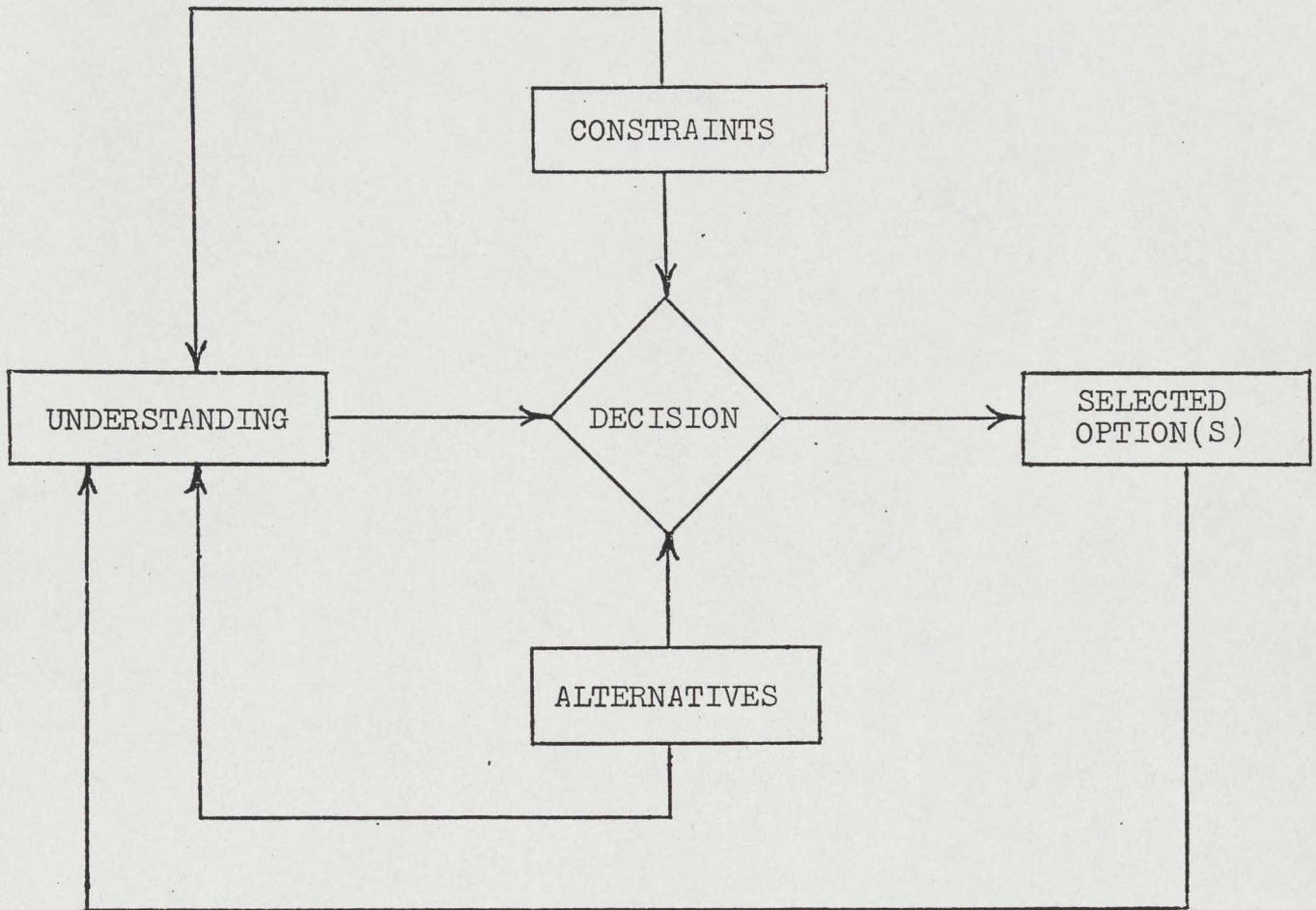
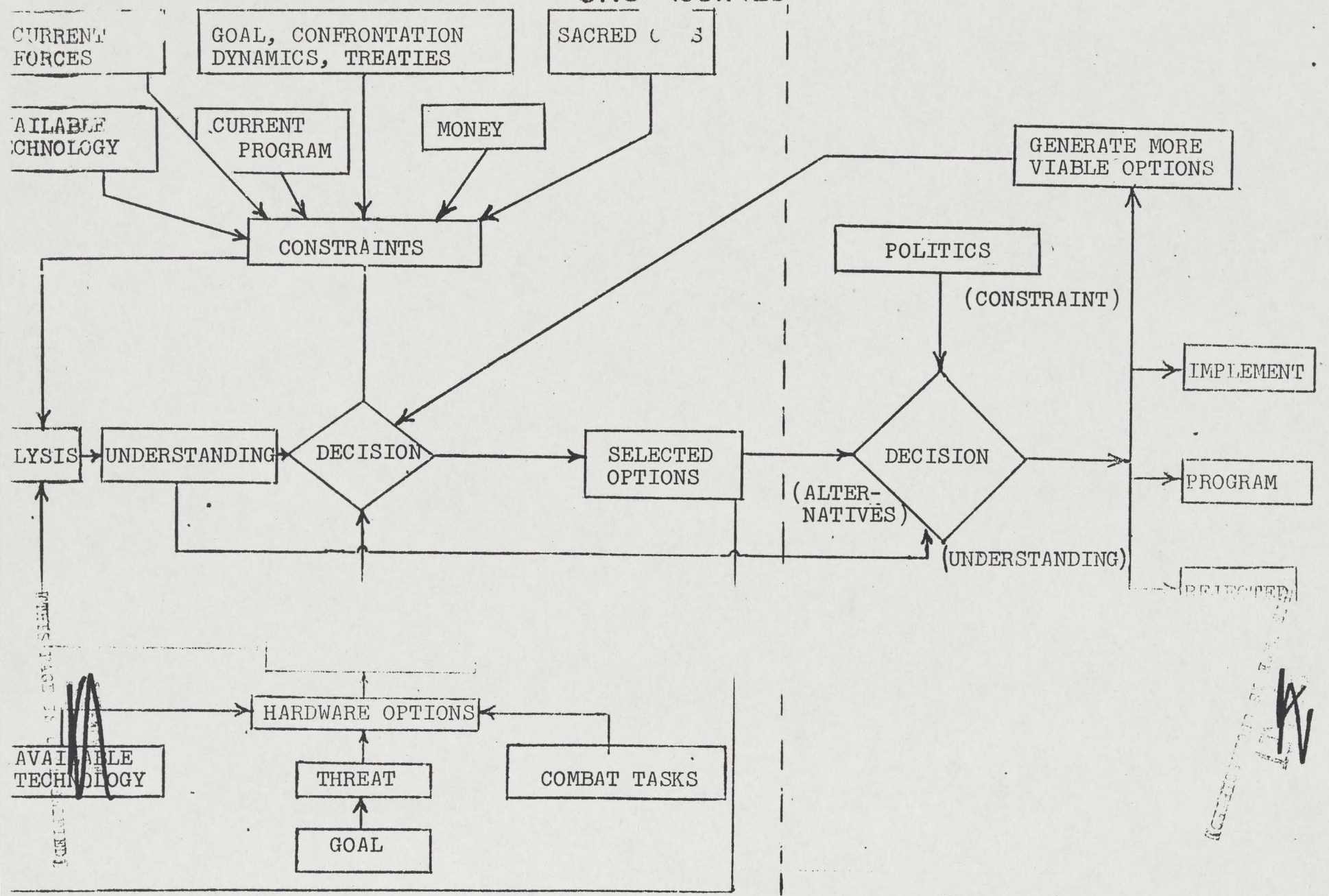


FIG 6

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USAF STAFF FUNCTIONS

USAF "BOARD OF DIRECTORS" FUNCTIONS

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- Giving up the goal
- Striving for that goal, independent of nuclear exchange, or
- Striving for dominance, so that the United States has the capacity to destroy the Soviet Union yet survive to influence the rest of the world.

Giving up the goal implies that the U.S. is willing to become a satellite of another power (or a coalition of other powers). Such a result would be inconsistent with the social contract that exists between the government and its citizens (whereby the government provides for security and protection, while the citizens agree to constraints upon their individual freedom in exchange for that security and protection). Current political, economic and military actions by the U.S. do not support this option.

Striving for dominance presumes that dominance is possible, and that the U.S. is willing to incur the necessary political and economic costs in terms of more numerous and severe constraints upon political freedom and quality of life. Recent and projected U.S. policy (exemplified by "detente") do not support this option either.

Hence the implied rejection of options 1 and 3 suggests that the U.S. is striving to maintain or improve her capacity for independent action independent of nuclear exchange. In today's world this means the U.S. will maintain a credible nuclear deterrent--to preclude (or minimize) a nuclear exchange.

Pursuit of this option implies that the U.S. must maintain a credible Strategic Strike potential to counter a nuclear strike, yet maintain sufficient General Purpose forces to counter other threats as well. Clearly it follows that the overall Air Force planning task then is to develop and procure an appropriate Strategic and General Purpose force mix constrained by technological and economic resources available.

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CONFRONTATION DYNAMICS

With the national goal as stated, the idea occurs that the U.S. should consider both military threats and related confrontation dynamics. The most serious of these possibilities involve limited or massive (nuclear) strikes by the Soviet Union against U.S. military or societal targets. In such cases, as basic options the U.S. may:

- Attempt to negotiate and not respond
- Respond in limited fashion, with concurrent negotiation; or
- Respond massively to destroy the Soviet Union as a nation.

If the United States attempts to negotiate and not respond, the Soviet Union and other nations will probably interpret this course as weakness, and recognize the Soviet Union as the dominant power. Such an appraisal together with follow-on political and economic actions by these countries could constrain future U.S. initiatives that would be inconsistent with the U.S. goal as previously stated. Therefore, the U.S. will more likely respond with a limited or massive strike, whichever is considered to be more consistent with her goal. Against a limited strike, the U.S. may choose a limited response within a context of negotiation. However, it is not clear whether negotiations will succeed or whether the Soviets would strike again. The uncertainties related to Soviet perception of U.S. strength and resolve, and vice versa, make it difficult to determine whether additional strikes are required or negotiations are chosen as more consistent with each nation's goal of trying to improve its capacity for independent action--at the others expense. Under these circumstances, realizing that additional Soviet strikes are possible, The United States may elect to respond massively. However, such a response could lead to nuclear catastrophe, and unacceptable loss of independent action for the U.S. relative to the rest of the world.

Against a massive Soviet strike, anything less than a massive response appears inconsistent with the U.S. goal; on the other hand, a massive response, as we have just shown, can also be inconsistent with the U.S. goal. This leaves the United States the prevailing options of:

ATCH 2

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U.S. GOAL

Fundamentally, national planning is related to survival, more importantly, survival without undue interference by others. Such comments imply that the United States must be able to act relatively free or independent of external influence. Noting that other nations have these same views, together with the reality that today nations are highly dependent upon one another, it is clear that striving for independence places these nations in continuous conflict, since one nation's gain in this endeavor can be another nation's loss.

Unless the United States and other nations can learn to work in harmony, each working for the common interest, the U.S. must strive to maintain or improve its capacity to act relatively free or independent of external influence. Inability to precisely determine whether a nation can maintain such a status quo, over the long run, makes it prudent to strive for improvement.

Therefore, stated formally, the U.S. goal is:

TO IMPROVE OUR CAPACITY FOR INDEPENDENT ACTION.

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In summary two points are emphasized:

First, the current USAF Procurement Plan is a "No-Plan" (i.e., it cannot be implemented). We do not argue that the Air Force should ask for only what is likely to be appropriated, but we do feel the need for well-planned, fall-back positions.

Secondly, any long-range planning that ignores realistic budget constraints is itself a "No-Plan" since it confuses desires with reality.

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SUMMARY

TRENDS AND PROJECTIONS INDICATE

- THE USAF INVESTMENT PLAN IS A "NO-PLAN"
- LONG RANGE PLANNING MUST ADDRESS THE BUDGET CONSTRAINTS

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This chart is constructed in constant FY 74 dollars, and the middle of the planning wedge is used to indicate the funding level expected. The unfunded programs are fitted into the out-years dollar-for-dollar. The point here is that the Air Force cannot begin to think about any new programs (e.g., IMI, RF-X, KC-X, AMST, Space Shuttle, etc.) until at least FY 83, if the programs currently included in the procurement plan are bought.

This chart was prepared with the assumption that no program cost growth would occur during the next ten years. If there are any "hidden costs" or "overruns" in programs like the F-15, A-10, B-1, etc., no new programs may be looked at until the mid-80's.

Furthermore, if the "unfunded" dollars in the chart cannot be fitted into the out-years dollar-for-dollar (a likely supposition) we can then conclude that the Air Force's future is mortgaged to the mid-80's or later.

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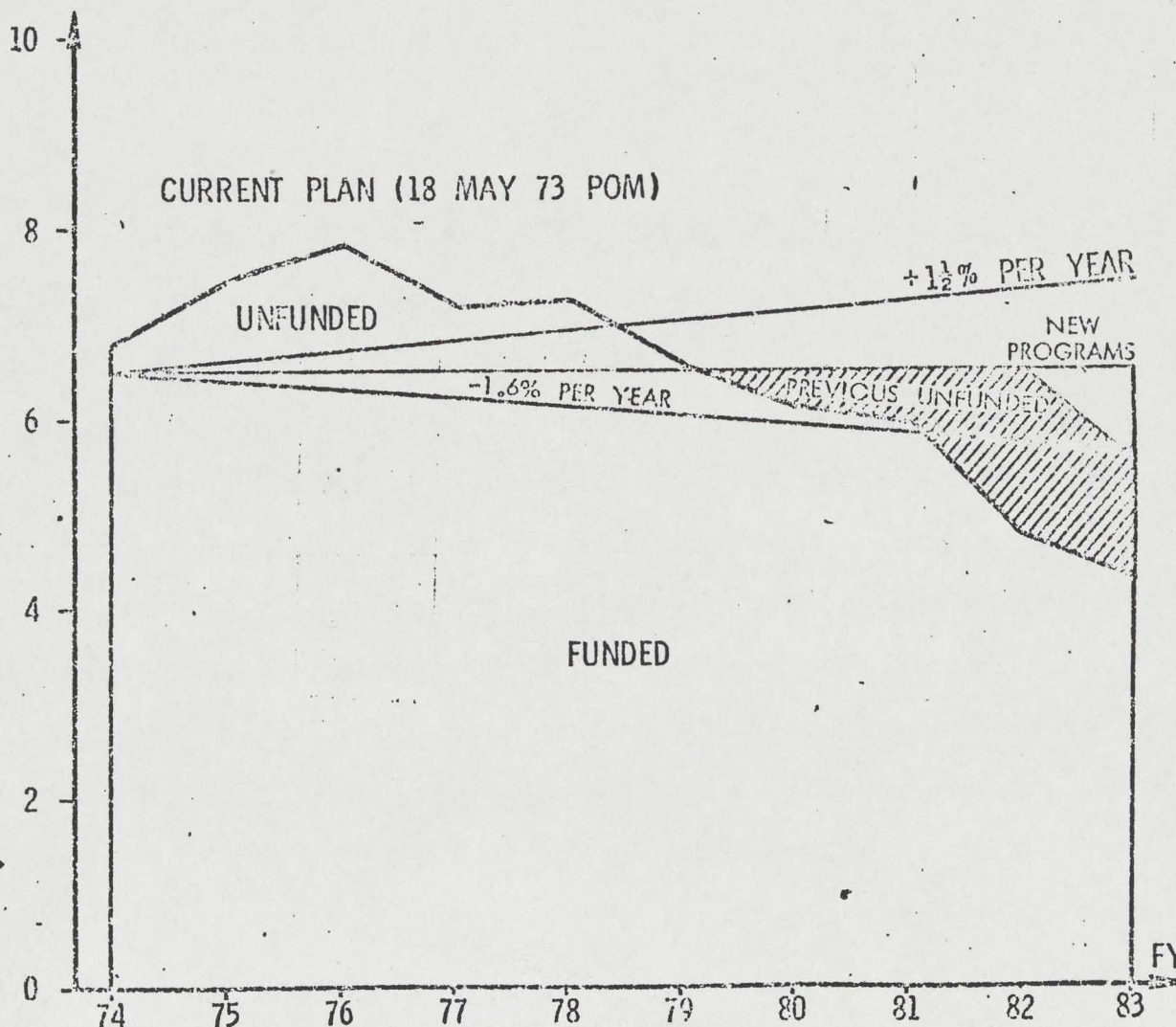
USAF INVESTMENT BUDGET AND PLANNING WEDGE

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(FY 74 DOLLARS)

\$ BILLION



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Now let's apply our planning wedge to the last chart to gain an appreciation for what the Air Force is likely to receive. The top of the wedge represents +1.5% real growth, and the bottom -1.6%. When this wedge is applied several assumptions are implied: (1) the dollars appropriated in the out-years are likely to fall between the historical growth rate (since FY 55) and the recent growth rate (since FY 71); (2) the procurement portion of the budget immediately ceases to suffer at the expense of DoD people costs and operating costs; (3) the retired pay appropriation is independent of the rest of the DoD appropriation; and (4) the dollars programmed in the out-years are accurate. (The last three assumptions are probably optimistic - - so, in reality the wedge should be lower. Nevertheless, the wedge, as drawn, serves to emphasize the point that needs to be made - - just bear in mind that it tends to be optimistic.)

Note how much of what we have programmed falls above even the top of the wedge. The implications of programming the out-years as we do are shown in the next chart.

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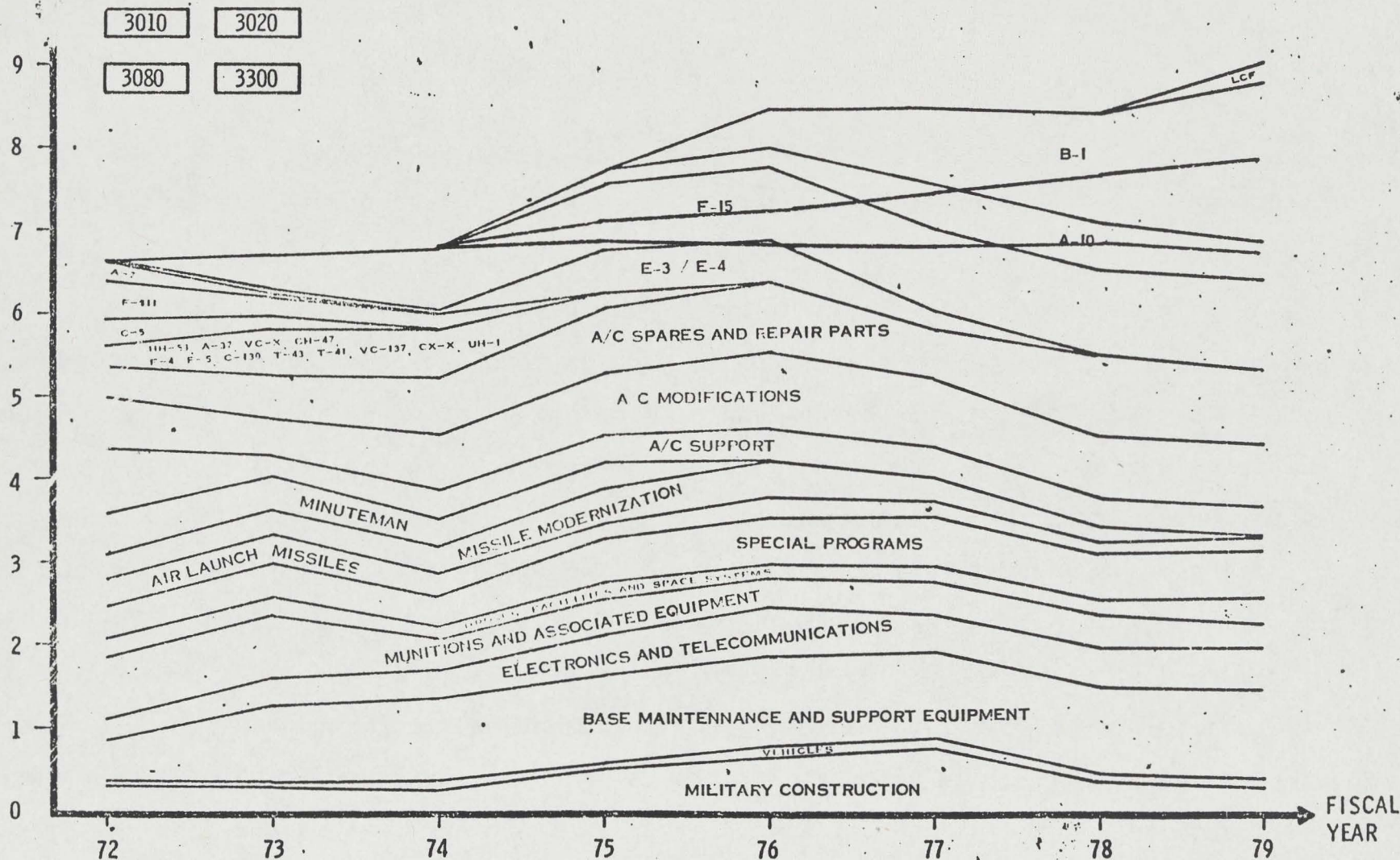
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USAF INVESTMENT BUDGET - 29 JANUARY 1974 FYDP



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This chart shows the same budget categories as the last with a finer breakdown of what is programmed.

It was just stated that the out-year dollars in this chart would be increased if inflation runs higher than 1 to 2 percent annually, but there are other reasons that the "hump" in this "hump-chart" may be deceiving. First, the unit costs of the aircraft we have programmed tend to be estimated low. For example, this chart includes \$10.6M F-15's and \$56.4M B-1's, and since 29 January 1974 the estimates have climbed to \$12.4M and \$61.5M respectively. So, if the size of the buy for each system is not changed, the dollars programmed will have to increase in order to afford the number of airplanes programmed. Secondly, Congress has recently been adding aircraft to the Air Force program that were unsolicited (e.g. F-111's, A-7's, F-5's, etc). Unfortunately, these aircraft are added at the expense of programmed systems. People in the know expected the Air Force to receive about \$6M in the Investment Budget without F-111's in FY 74 - - we ended up with F-111 money and no A-10 money that was programmed. (Remember that for FY 74 this chart includes the FY 74 Readiness Supplemental that still hasn't been appropriated - - the appropriation bill included only \$5.9 for the USAF Investment Categories.)

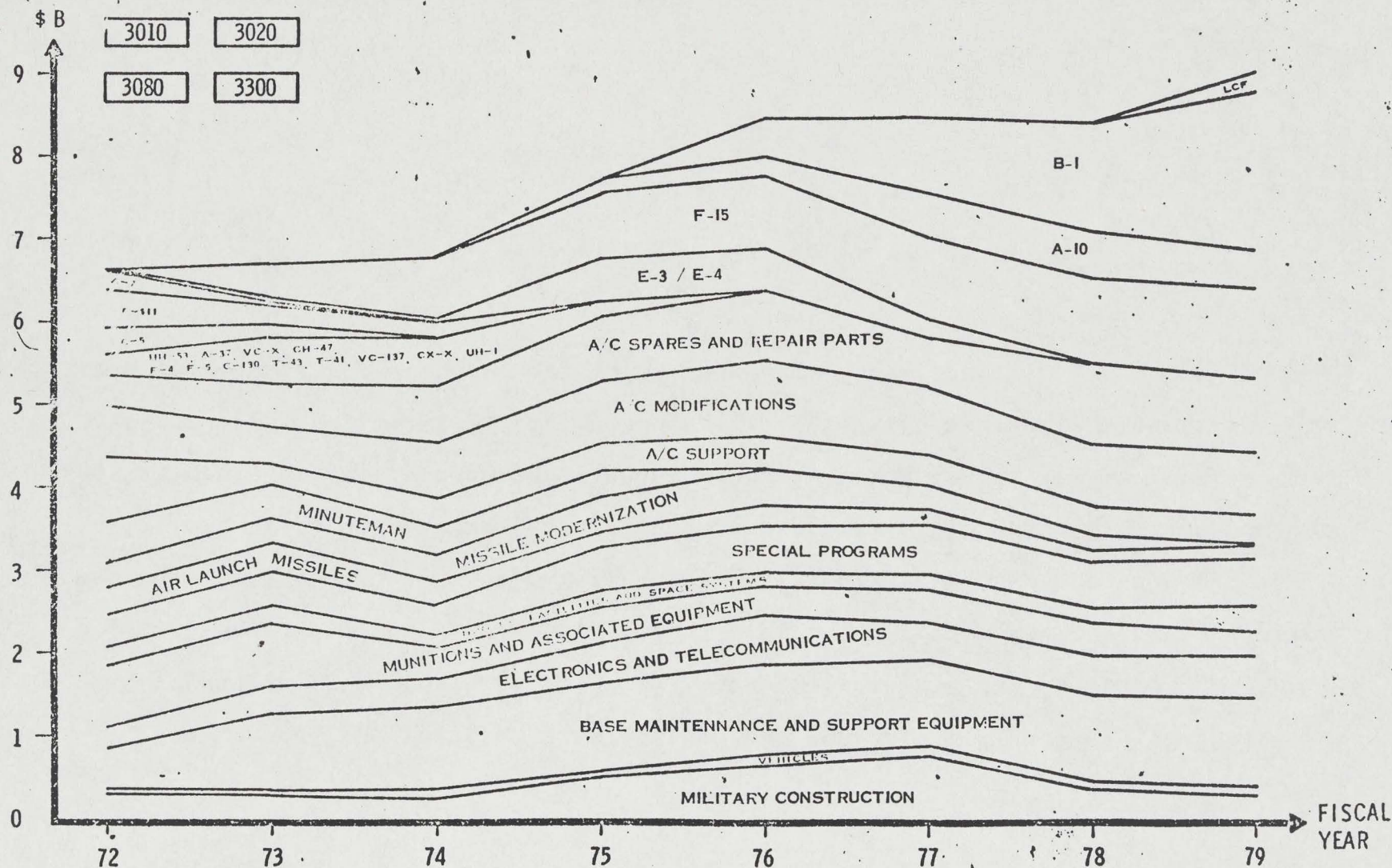
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USAF INVESTMENT BUDGET - 29 JANUARY 1974 FYDP



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Even though the increase from what we had appropriated in FY 74 (\$5.9B) to what we have programmed in FY 75 (\$7.7B) shows more than a 30% increase in dollars, even more money is needed to buy everything programmed because inflation has been included at too low a rate. For FY 75 only 1.97% has been added for inflation. Each subsequent year included less until FY 79 where 0.92% is included. Inflation is currently running at about 11 or 12 percent and even the most optimistic reports put it at 7% for the year. If inflation averages 5% over the next five years, the top of the chart would become as shown here.

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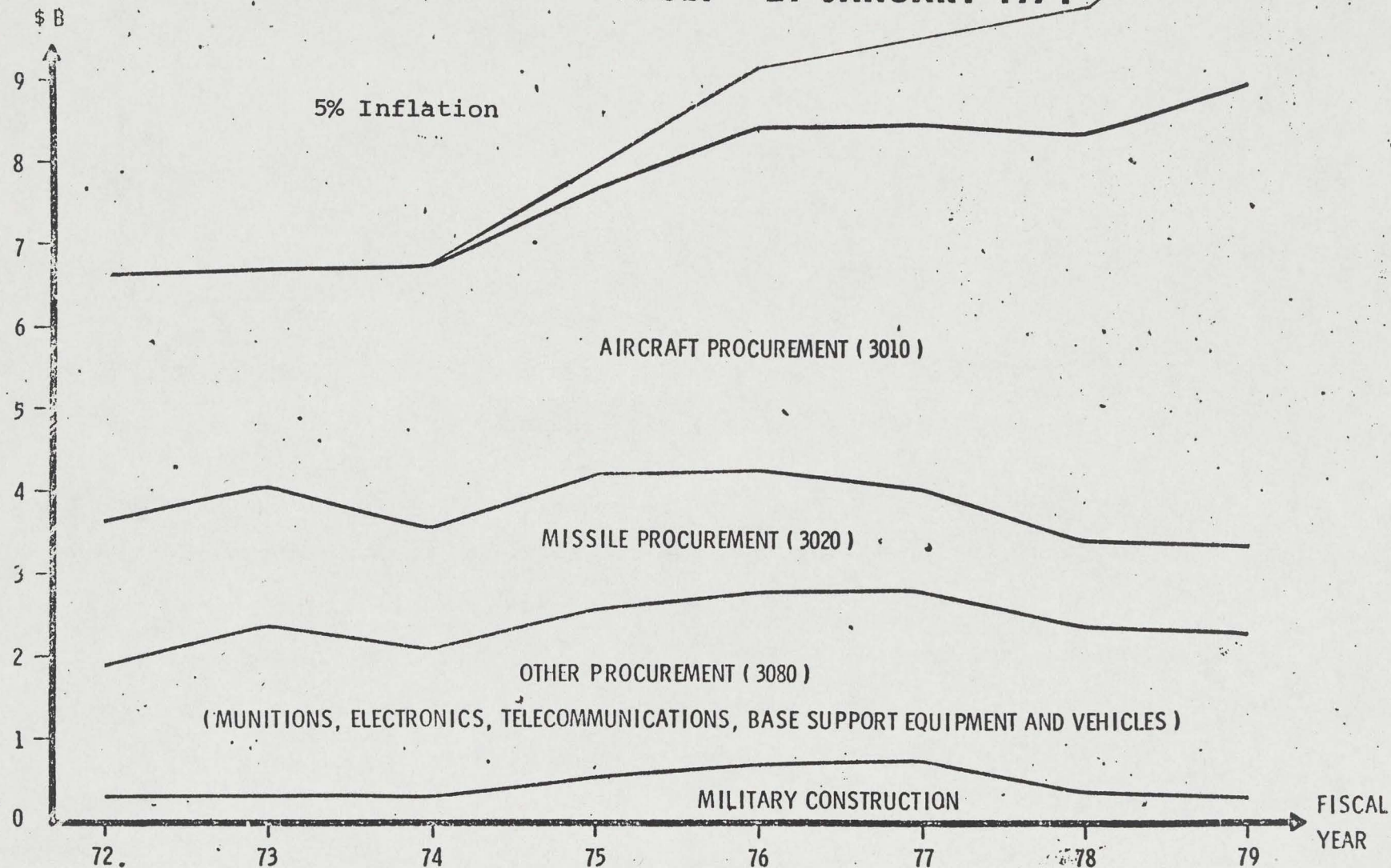
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USAF INVESTMENT BUDGET - 29 JANUARY 1974



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The analysis is now directed towards the USAF Investment Budget. The four appropriation categories shown here are considered the USAF Investment Categories. The data plotted for FY 72 and FY 73 are the actual dollars appropriated. The FY 74 figures include the dollars in the December 1973 appropriation bill plus the Readiness Supplemental that has not yet been appropriated. (Without the supplemental the FY 74 total was \$5.9B.)

The out-year data represents the Five Year Defense Program. The "Hump" shown here in the out-years is always there, however, it's becoming larger.

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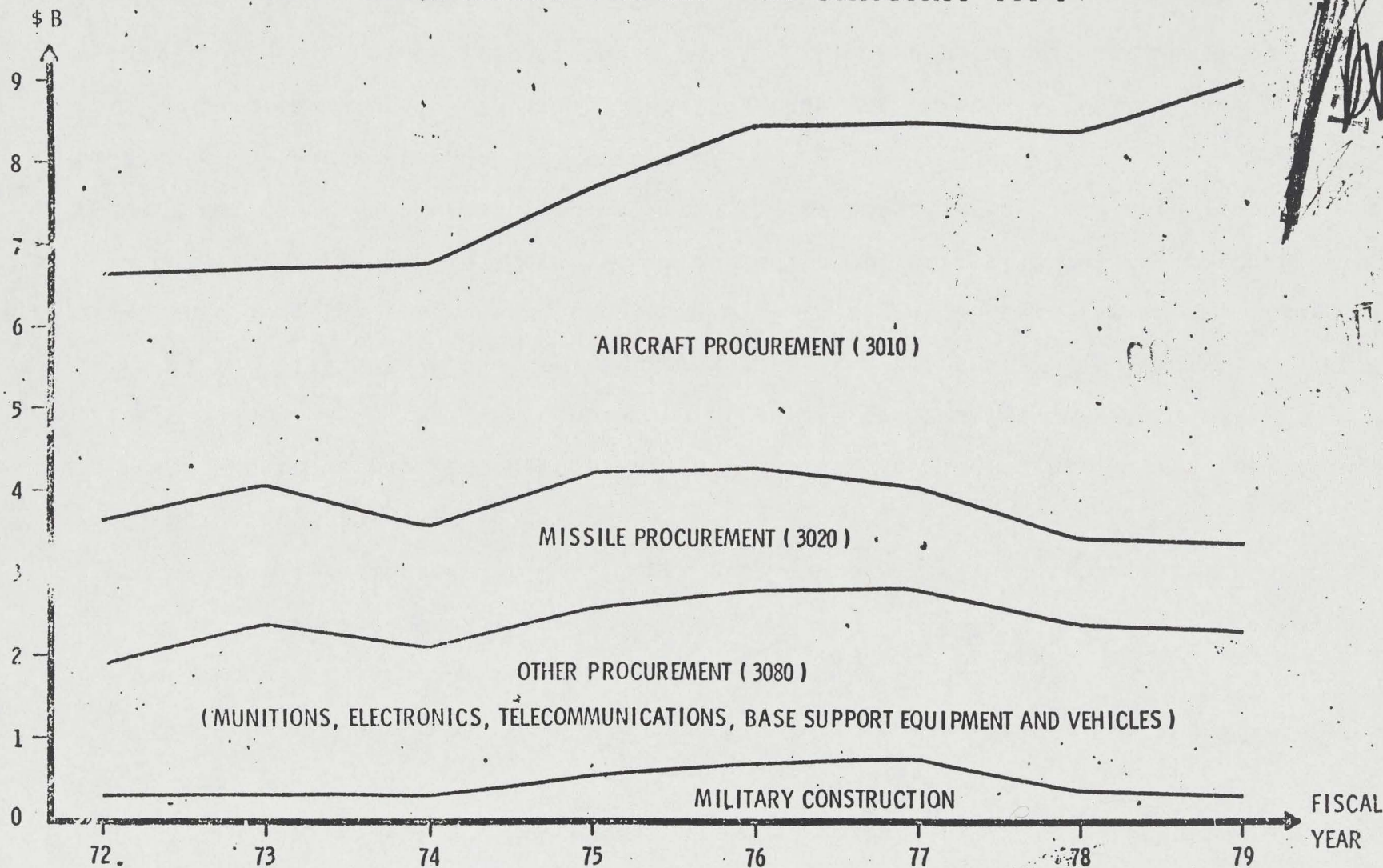
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USAF INVESTMENT BUDGET - 29 JANUARY 1974



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Since retired pay is projected to exert undue pressure on the other budget categories and since there is a possibility that it will be taken out of the DoD budget, the analysis of the DoD budget was re-done here by first subtracting out the retired pay portion.

This chart shows considerably more variance than the earlier DoD budget chart for two reasons: (1) the ordinate is expanded considerably; and (2) there is more variance. Using the non-war years (FY 55-FY 65 and FY 71-FY 74) to fit the straight line, we have a real growth of +1.5% per year and coefficient of correlation of 86% (indicating good correlation).

This chart is plotted in constant 1970 dollars, so it roughly represents buying power. Note that in the last couple years, buying power shows a steady decline. In fact, for FY 71-FY 74 the decline represents 1.6% per year.

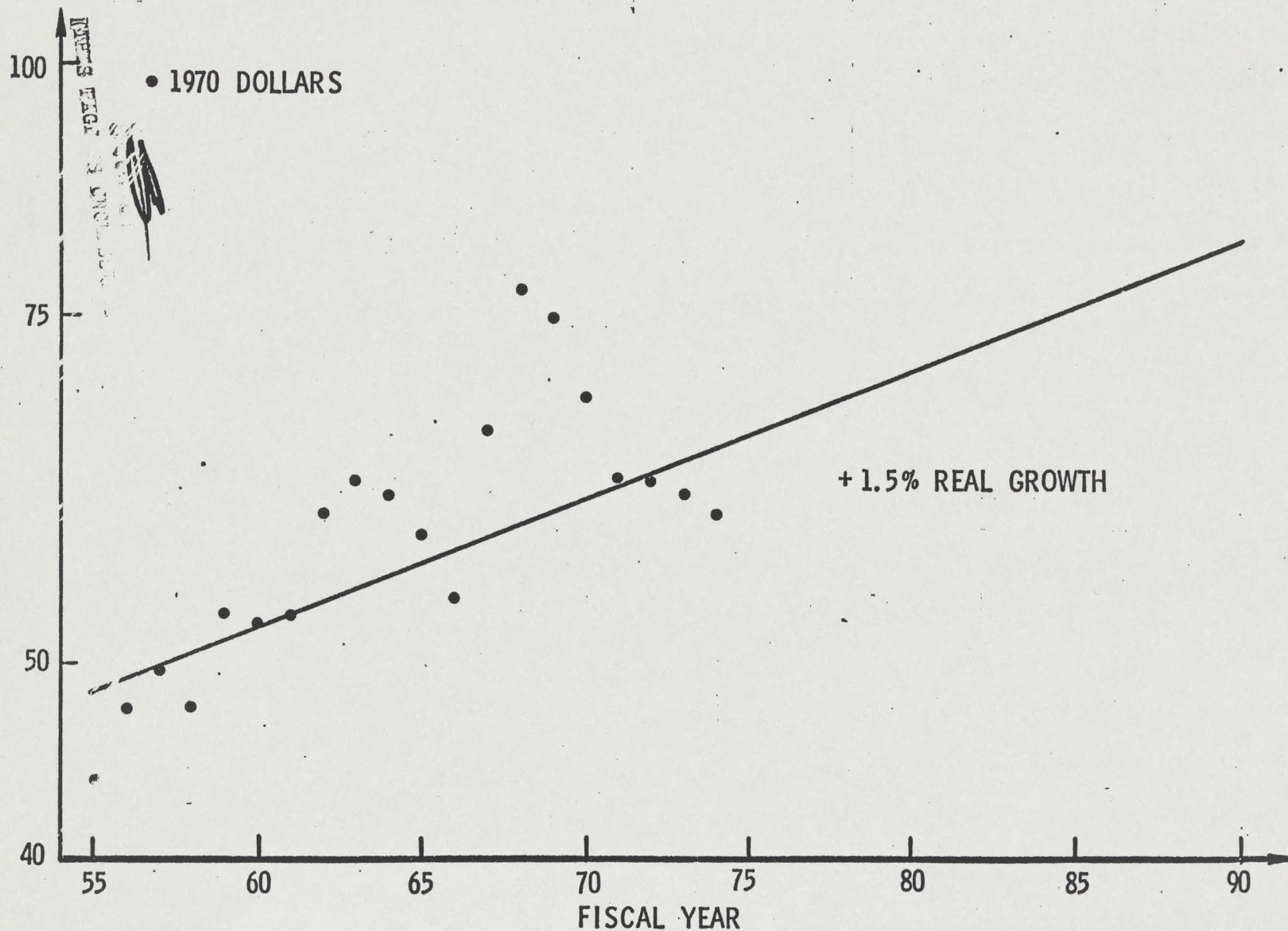
Therefore, the recent real growth is -1.6% per year whereas the overall real growth is +1.5% per year. These two rates led to our definition of the planning wedge. For the remainder of this analysis the planning wedge shows a real growth between +1.5% per year and -1.6% per year.

Note: Other ways for developing a planning wedge can be equally valid. The +1.5%/-1.6% wedge merely illustrates a point. The same point is made with any reasonable (about +5% real growth maximum) wedge.

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**DOD BUDGET (LESS RETIREMENT COSTS) FY 55 TO FY 74
AND PEACETIME PROJECTIONS TO FY 90**

\$ BILLION



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With a general feeling for some of the macroscopic pressures on the DOD Budget, the next obvious question is, "How does DOD spend the money?" This chart shows where the dollars actually went from FY 62 through FY 72. The top of the chart represents 100% of the budget for each year. The highs and lows of the categories are noted. Note that in general the O&M and Personnel portions have been increasing at the expense of the R&D and Procurement portions. Since this shift in emphasis cannot be accurately quantified, when bounds in the procurement budget are later developed, to be safe, it will be assumed that this trend will level off.

This chart, though accurate, has a "sleeper" in it. The "Retired Pay" category is the only area that increased every single year. It was less than 2% in FY 62 and 5% in FY 72. The actual dollar growth is such that it doubles every five years. If this trend continues, by FY 90 the "Retired Pay" portion of the DOD budget will increase to about 20%.

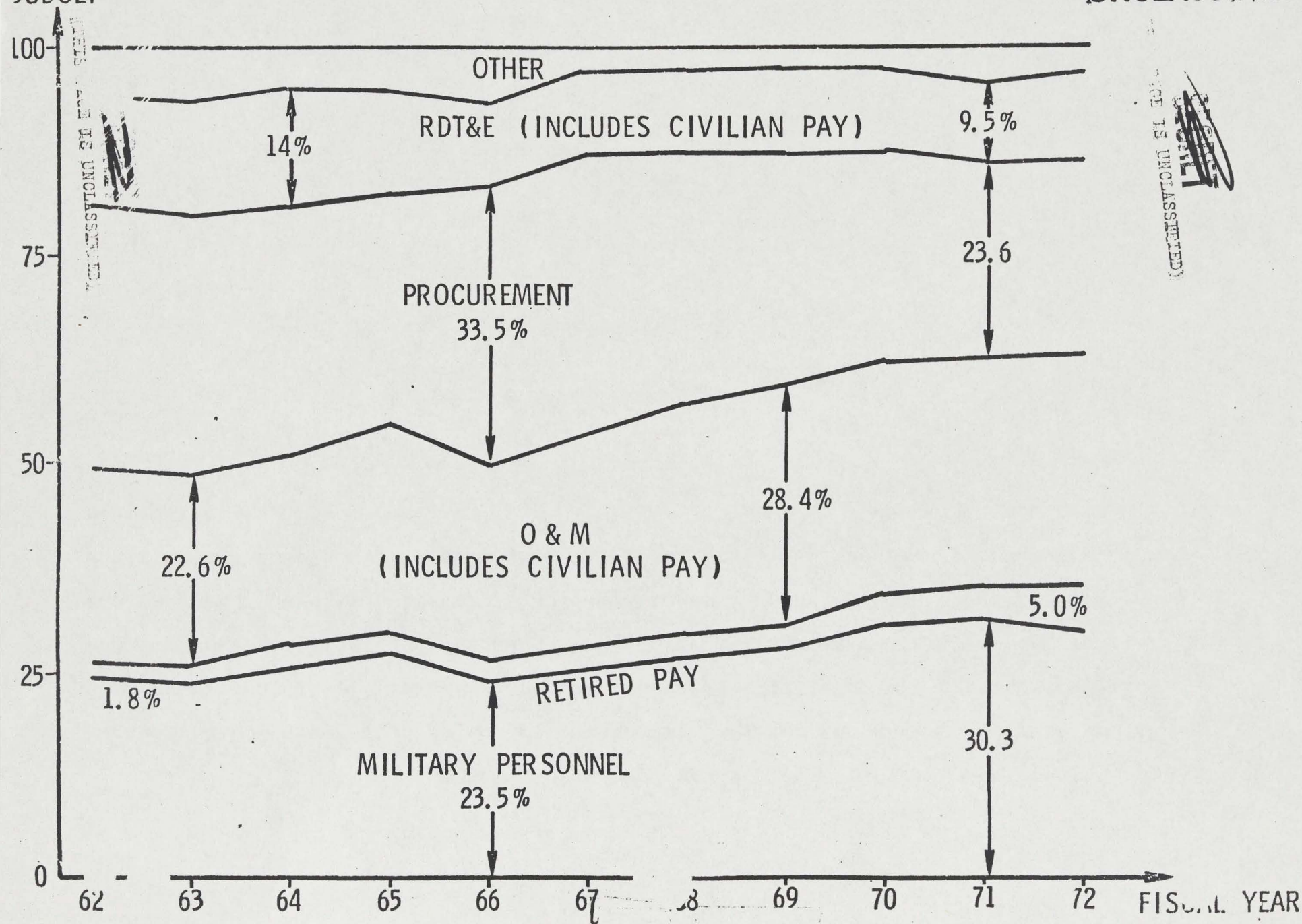
This being the case, there is a possibility that before long, OSD and Congress will jointly agree to appropriate this money separate from the DOD budget -- either as a separate bill or possibly as a part of the HEW appropriation bill. There is ample precedence for such an action (e.g. the VA, AEC, etc.) and it's also likely that the members of Congress would prefer this, as opposed to defending a DOD appropriation bill with 20, 30 or 40 billion dollars annually going to people who provide no services. If the "Retired Pay" money remains in the DOD Budget, the projections, shown later, become optimistic.

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DOD BUDGET BREAKDOWN FY 02 TO FY 72

PERCENT OF BUDGET

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To summarize the last three charts, an important point must be made. Though the DOD grows at a slower rate than the GNP, and though the DOD receives a smaller percentage of the GNP each year, there is still economic pressure to hold the DOD appropriations down because the Federal Appropriations are growing faster than the GNP, and there is pressure to hold all federal spending down. The federal spending won't be slowed by cutting only the "butter programs" -- the "gun programs" must be slowed too.

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SUMMARY OF TRENDS

	DOLLAR GROWTH	REAL GROWTH
GROSS NATIONAL PRODUCT	6.4%	3.9%
FEDERAL APPROPRIATIONS	7.7%	5.0%
DOD BUDGET	6.0%	3.3%

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With an idea of how the GNP and Federal Appropriations behave, the DoD Budget is analyzed. The DoD appropriations from Congress are plotted. However, the analysis is slightly different. Since projections based on a peacetime future are the goal (if we have a war, the Congress will respond), the data points in the late 60's must be corrected to subtract the SEA war costs. Though OSD has such data, they are not compatible with the data here; therefore, base data from FY 55 to FY 65 were used.

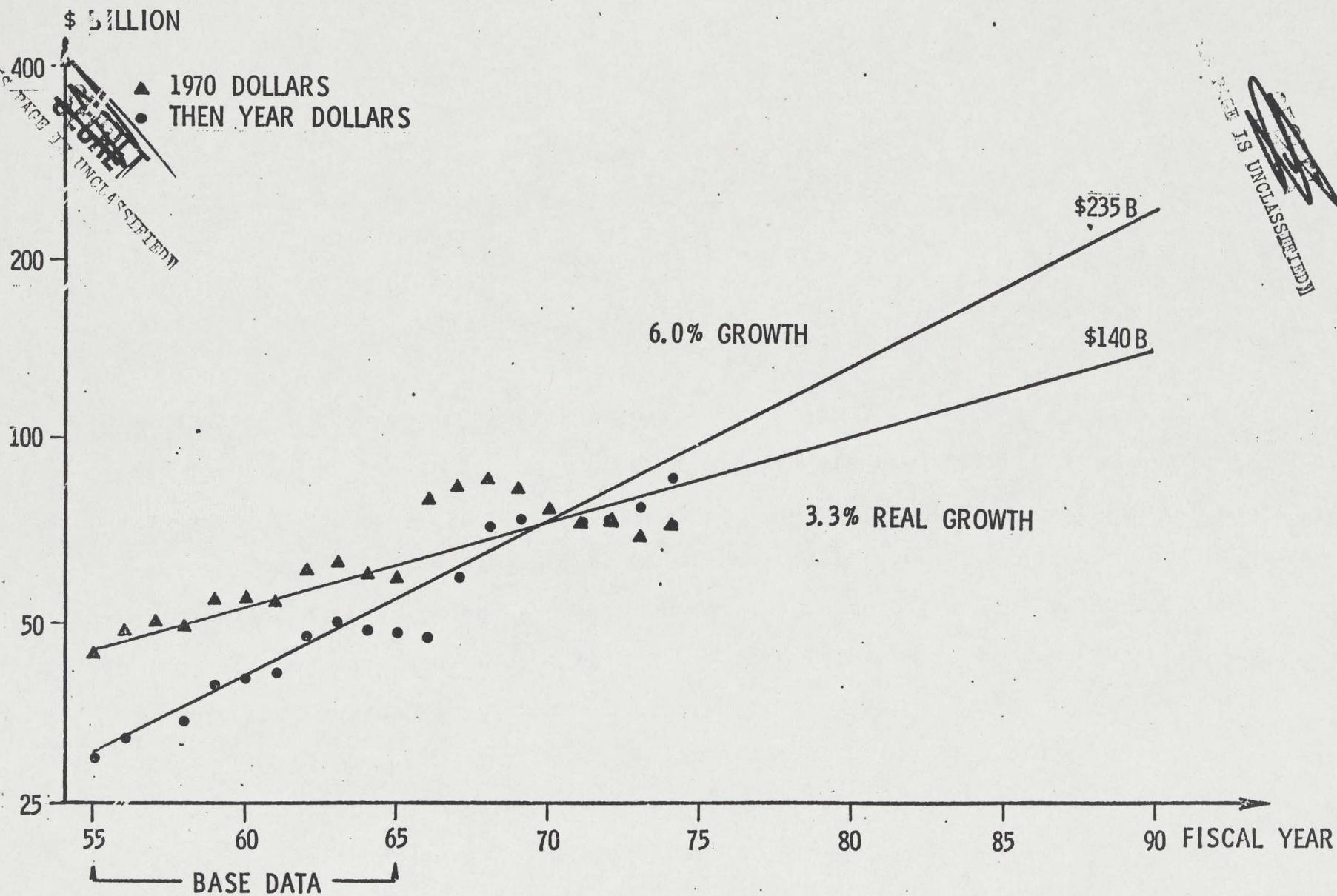
(Note: Data from FY 55-FY 65 and FY 71-FY 74 will form a better base. This change will be incorporated when this analysis is updated.)

The significant figure to note here is the DoD real growth based on FY 55 to FY 65 data - - +3.3% annually. This is lower than the GNP growth; therefore, the DoD receives a smaller percentage of the GNP year by year. The current percentage is approximately 6%.

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DOD BUDGET PROJECTION BASED ON HISTORICAL BUDGET DATA FY 55 TO FY 65



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After establishing the GNP growth rate, the next question was how the federal appropriations behaved. This chart shows the dollars appropriated by the Congress in the same manner as the GNP was shown in the last chart.

Note that while the real growth of the GNP was less than 4%, the federal appropriations have been growing at 5%. If both rates continue, we could project a date when the Federal budget equals the GNP. Pressure from the private sector leads us to believe this will not be permitted. So, either the federal appropriations must taper off, or the GNP must grow faster. The latter doesn't seem likely. (In fact, in light of the current oil crisis, experts are projecting that the GNP real growth will drop to about 1% for the next year or so.)

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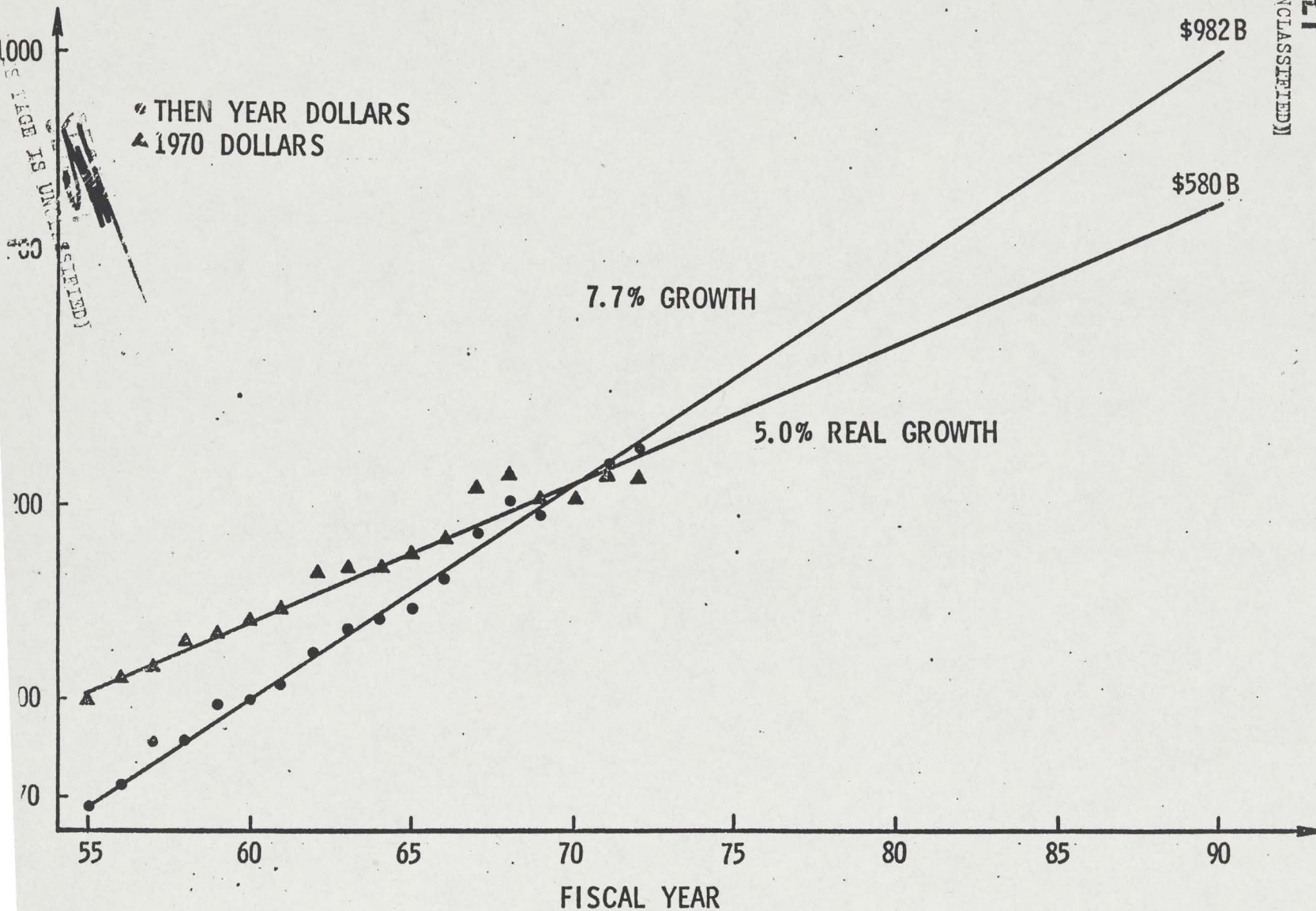
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FEDERAL APPROPRIATIONS FY 55 TO FY 72 AND PROJECTIONS TO FY 90

\$ BILLION



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This chart shows plots of the U.S. GNP two different ways:

- (1) The dots represent the GNP in actual dollars ("then-year" dollars).
- (2) The triangles plot the same data converted to 1970 dollars.

A semilog plot (the ordinate is logarithmic and the abscissa is linear) is used because any straight line on the chart has a useful characteristic -- its slope represents the compound rate of growth.

The two lines on this chart were generated by using a linear regression routine that fit the best (least-squares) straight line through the sets of data.

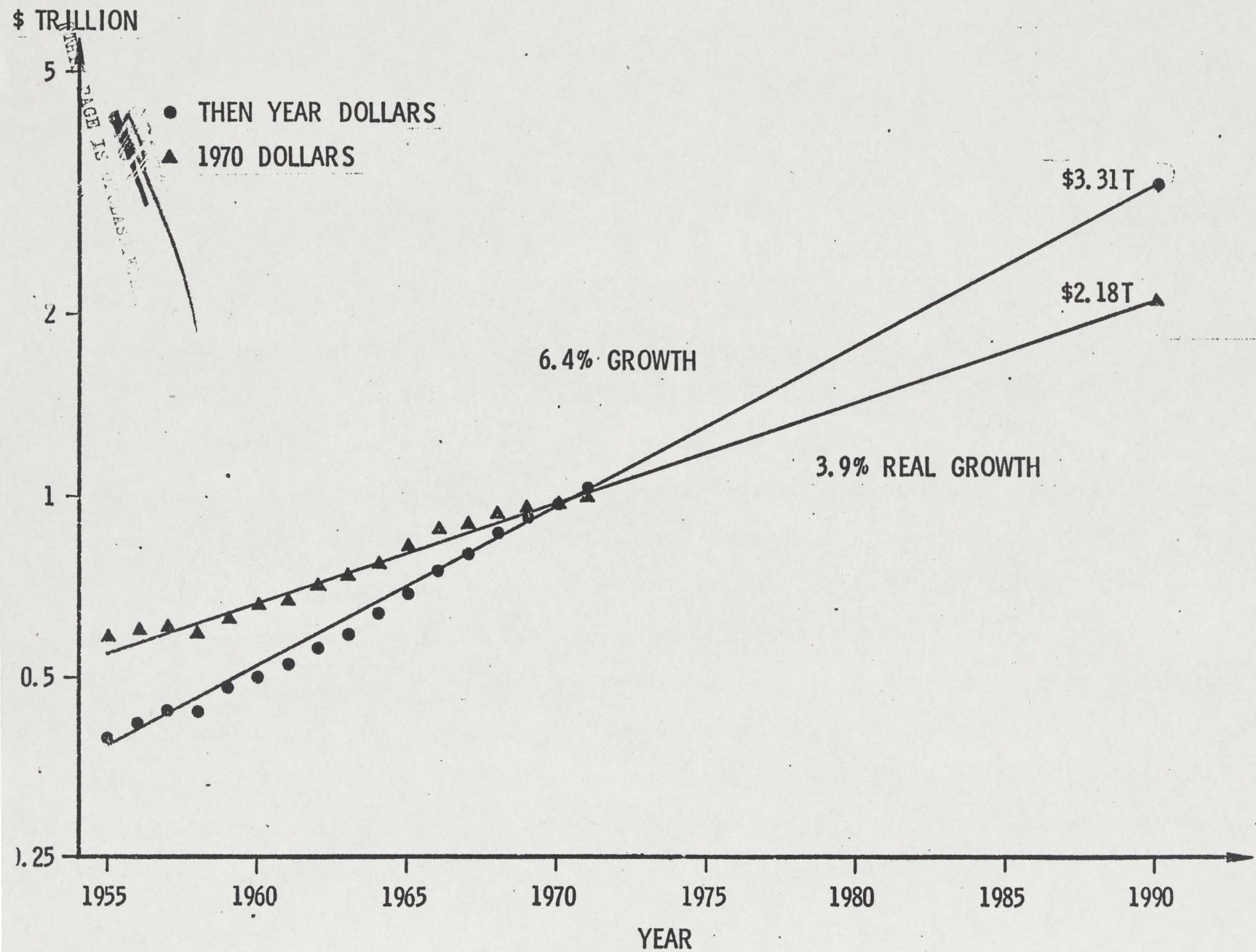
The coefficient of correlation for each line was greater than 0.99.

Therefore, it's shown that given the 1955-1971 data base (the returns for 1972 are still being tabulated) the GNP dollar growth is increasing at 6.4% (compounded annually), while the real growth is 3.9% per year.

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In trying to identify future budget constraints, we must ask ourselves several questions. First, where do we get our money? ANSWER: Our money is appropriated by the Congress. Secondly, how does the Congress appropriate the money? They merely respond to the political and economic pressures in the country.

It is difficult to project the country's political pressures; however, we can, based on historical data, project the economic trends.

After identifying several macroscopic economic trends, the way DoD spends its money will be examined. A "planning wedge" will then be defined to project major categories of the DoD budget. And, finally, since it's of major interest to DCS/R&D, the wedge will be applied to the USAF Investment Budget.

(Note that the data used in this analysis were current as of January 1974. Since that time many changes have occurred that alter some of the numbers in this appendix; however, the points made remain valid.)

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OUTLINE

- ECONOMIC PRESSURES
- DOD HISTORICAL EXPENDITURES
- PLANNING WEDGE
- APPLICATION TO USAF INVESTMENT BUDGET

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This analysis of the budget considers trends and projections. The trends are based on historical data, and the projections are based on the trends. The projections should not be misconstrued - - they do not tell what the future will bring (no one can do that) - - they do, however, show the implications associated with a continuation of these trends. In other words, if these trends continue, they answer what's likely to happen. It should be kept in mind that budget trends on the order of billions of dollars have considerable momentum, and positive action is required to alter the trends. The bureaucracy, being what it is, tends to dampen sharp changes in trends, so not only is positive action required, but it must be planned over a long period of time.

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BUDGET ANALYSIS

- IDENTIFY TRENDS
- DEVELOP PROJECTIONS

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PURPOSE: TO IDENTIFY EXPECTED BUDGET CONSTRAINTS
FOR LONG RANGE DEVELOPMENT PLANNING

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BUDGET TRENDS AND PROJECTIONS

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BUDGET ANALYSIS

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SOVIET WEAPON POTENTIAL

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SOVIET WEAPON POTENTIAL

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Today, and for the foreseeable future, the major military threat facing the US is the forces of the SU. Over the past decade the SU has developed and deployed formidable strategic and general purpose forces.

In the strategic area they have concentrated heavily on ICBMs. The SU Strategic Rocket Forces have some 1600 operational ICBMs, with 12 million pounds of throw weight, carrying an estimated 1900 reentry vehicles.

The SU is working to develop MIRV Technology. In addition, a vigorous R&D program with three new small missiles, similar to our Minuteman, and a new large missile, like Titan, is underway. These programs, if successful, will increase ICBM force quality, through accuracy improvements, and quantity, through introduction of MIRVs.

The SU has demonstrated the capability to produce and deploy both large and small ICBMs in significant numbers. Production rates for these missiles are estimated at 75 large ICBMs and 150 small ICBMs increasing to 240 small ICBMs per year.

The story is practically identical in the SSBN/SLBM area. The SU has a large operational force of missiles carrying submarines and an active R&D program that we expect will produce a new submarine and possibly two new SLBMs. They are capable of producing 6-7 SSBNs and approximately 300 SLBMs per year.

The SU does not possess a large strategic bomber inventory. The bulk of their aircraft production capability is dedicated to providing general purpose systems to support the homeland defense (PVO) and tactical aviation (TAF) forces.

The SU/s operational aircraft inventory includes approximately 145 bombers capable of striking US targets on two-way missions when refueled or on one-way missions, unrefueled and an estimated 4700 tactical aircraft. Their R&D program reflects a design team approach which supports a continuing prototype development program. They have developed over 20 fighter aircraft prototypes since 1950. They have the capability to produce up to 50 bombers and over 900 fighter aircraft per year along with continued transport and helicopter production at current levels.

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From the discussion so far it seems obvious that the SU has a significant capability in their inventory and the R&D and production base to improve and increase that capability. Projections of SU posture are clouded by possible further arms limitation agreements to include general purpose as well as strategic forces and by possible unilateral abrogation of existing agreements. If the SU decides to abrogate existing treaties they have the warm production lines to increase their military forces. Existing R&D efforts are within present agreements and would allow them to modernize and increase the capability of present forces if they desire. (See the Defense Intelligence Projection for detailed threat information.)

US planners must consider SU capabilities in determining R&D and acquisition strategies. "Worst case" projections of the threat lead to identification of deficiencies in US capabilities. Unfortunately, this conservative approach identifies more deficiencies than our resources are able to provide solutions for. This increases the planner's and decision maker's uncertainty and makes the selection process more difficult.

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SU ICBMs

● OPERATIONAL TODAY 1600

- 1900 Reentry Vehicles (No MIRVs)
- 12 Million Lbs Throw-weight

● VIGOROUS R&D PROGRAM

- Three Small Missiles (One Mobile)
- One Large Missile
- MIRV Technology

● ESTABLISHED PRODUCTION BASE

- 75 Large ICBMs Per Year
- 150 Small ICBMs Per Year - Increasing

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SU SSBNS/SLBMs

● OPERATIONAL TODAY 67 SUBS

- 33 YANKEE With 16 SLBMs
- 7 DELTA With 12 SLBMs
- 28 GOLF/HOTEL 3 SLBMs

● R&D PROGRAM

- New Class Submarine (IOC 1976, 16 SLBMs)
- Two New Missiles

● PRODUCTION BASE

- 6 or 7 SSBNS Per Year
- 300 SLBMs Per Year - Increasing

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SU AIRCRAFT

● OPERATIONAL TODAY

- 145 Long Range Bombers
- 4700 Tactical Aircraft

● R&D PROGRAM

- New Bomber (BACKFIRE) About to Reach IOC
- Continuing Prototype Development

● PRODUCTION BASE

- 24 Bombers Per Year - Increasing
- 900 Tactical Aircraft Per Year - Decreasing

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1980 PROJECTION (SALT AGREEMENT)

ICBMs

- 1400-1700 Operational Missiles
- 3800-9900 Re Entry Vehicles
- 12 Million Lbs Throw Weight

SSBNs/SLBMs

- 62 Operational SSBNs
- 948 SLBMs

AIRCRAFT

- 100- 235 Bombers
- 4700-5020 Tactical Aircraft

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COMBAT TASKS

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COMBAT TASKS

Development Planning starts with the identification of all the potential USAF combat tasks. In this case, a planning horizon to 1990 has arbitrarily been chosen. The uncertainties associated with this time-frame preclude the assignment of task priorities. Therefore, a compendium of USAF combat task was generated by a working group representing a cross section of the Air Force.

The combat tasks are organized in two ways. First a detailed list of tasks was organized in a functional manner, then a generalization of the tasks was compiled. Both sets of tasks are attached.

The functional (specific) list of tasks was produced by considering alternative methods of categorization (e.g. Strategic vs General Purpose, Offensive vs Defensive, Nuclear vs Non-nuclear, etc.) Finally it was decided that the tasks would be more functional if they were first broken down in a more abstract sense -- no matter if you are at the highest level of command in the Air Force, or at the lowest, there is always a three step process that addresses tasks: Orientation, Decision, Action. Within these steps the tasks organize well according to classical mission areas. "Orientation" includes the Surveillance/Warning/Assessment and Strategic Reconnaissance mission areas, while command, control, and communications (C³) was somewhat arbitrarily included in "Decision." The "Action" step was organized slightly differently. "Action" was separated into two sub-steps: "Direct Action" and "Support Action." "Direct Action" included the Strategic Offense, Strategic Defense, and General Purpose mission areas, while "Support Action" included Combat Support (Airlift, Rescue, Tactical Reconnaissance, etc) and Mission Support (Training, Weather, Testing, etc.)

All the "Direct Action" tasks are target-oriented, whereas the tactical C³ tasks are broken into components; and, the Strategic C³, the Orientation, and the Support Tasks list functions. In each case the tasks were listed as it was anticipated they could be best utilized.

The generalized list of tasks was produced by consolidating the information from the first list in broad, general tasks that
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68

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ignore classical mission areas completely. For example, "Attack/Neutralize Surface Targets" addresses both the strategic bombing of enemy population centers and the precision, tactical strafing of enemy bunkers on the front line.

Both lists of tasks were informally coordinated throughout the Air Staff and several MAJCOMS -- their recommended changes have been incorporated.

2 Atch

1. Combat Tasks
(Specific - 10 pages) (S)
2. Combat Tasks
(General - 2 pages) (S)

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COMBAT TASKS

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I. Orientation

Collect
Evaluate
Produce
Disseminate

II. Decision

Evaluate Situation
Formulate Alternatives
Choose Alternatives

III. Action (Implementation)

Combat/Direct
Strategic Offense
Strategic Defense
General Purpose

Support
Combat Support
Mission Support

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Orientation

Intelligence - Surveillance/Warning - Reconnaissance - Assessment

Collect

Sense
Detect
Measure
Count
Record

Evaluate

Recognize
Quantify
Qualify
Correlate
Decode
Compare
Determine Significance
Assign Confidence Level
Extrapolate

Produce

Compile
Estimate
Project
Synthesize
Deduce

Disseminate

Show
Tell

(Raw Data)

(Processed Data)

(Packaged Information)

Communications

NOTE: Above actions may take anywhere from seconds to weeks.

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Decision

(Evaluate Situation ————— Formulate Alternatives ————— Choose Alternatives)

Command, Control, and Communications (C³) *

Strategic Offense

Pre-Launch

Launch/Boost

Cruise

Penetrate/Re-enter

Return & Recover

Reconstitute Force

Strategic Defense

Pre-Launch

Scramble/Launch

Intercept & Identify

Attack

Return & Recover

Reconstitute Force

Tactical

Command Subsystem

A/C Control & Warning Subsystem

Airlift Subsystem

Tactical Air Support Subsystem

*The classical definition of C³ includes some of the orientation tasks identified on the previous page.

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Action (Implementation)**

DIRECT NEUTRALIZATION

STRATEGIC OFFENSE	Anti- Surface Operations	* Neutralize:	Missile Silos, Mobile ICBMs, C/C Centers, Comm Sys, Nuc Storage, Air Fields, Sub Bases, Subs at Sea, Mil Logistics, Surface Ships, Warn Sys, Air Def Sys, Gov Ctrs, Industry, Energy Sources, Transportation, Logistic Sys, Civil Population, Space Ctrs.
	Anti- Air Operations	Neutralize:	ABNCP, AWACS, Interceptors, SAMs, AAMs
	Anti- Space Operations	Neutralize:	Nav, Comm, C ² , RECON, Surveil, WX, Energy Sources. Offensive Systems, Data Processsing SATs.

Notes:

1. Neutralization may be initiated from surface, air or space.
2. C² + C is required for performing these tasks.
3. Environment includes: All Weather, Electronic Warfare, Nuclear Effects.

* Neutralize includes: Convince, Capture, Counter, By-pass, Scatter, Impede, Degrade, Block, Damage, Destroy.

** Action (Implementation) includes: Acquiesce, Ignore, Passive Defense, Deploy Forces, Employ Forces, Direct Neutralization.

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DIRECT NEUTRALIZATION

STRATEGIC
DEFENSE

Anti-
Surface Operations:

Neutralize Attacking: Personnel, Equipment, Ships, Subs, Internal
Rebels, Saboteurs, Terrorists.

Anti-
Air Operations:

Neutralize Attacking: Aircraft (Bombers, Fighters, Support, RPVs)
Missiles (ASMs, SLCMs, AAMs, ICBMs & SLBMs in
boost phase)

Anti-
Space Operations:

Neutralize Attacking: RV's, Satellites, FOBs, MOBs, Directed Energy.

Notes:

1. Neutralization may be initiated from surface, air or space.
2. $C^2 + C$ is required for performing these tasks.
3. Environment includes: All Weather, Electronic Warfare, Nuclear Effects, initiative
exercised by enemy.

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DIRECT NEUTRALIZATION

GENERAL PURPOSE	Anti- Surface Operations:	Neutralize:	Supply Ctrs, C ³ , Bunkers, Armor, AAA, Personnel, Transportation, Aircraft, Airfields, SAMs, POL, Industry, Agriculture, Shipping.
	Anti- Air Operations	Neutralize:	Manned Vehicles (Fighters, Recce, Bombers, Transports, ABNCP, AWACS, Observation acft) Unmanned Vehicles (RPVs, Missiles, Balloons, RVs, AAMs)
	Anti- Space Operations	Neutralize:	RV's, Satellites, FOBs, MOBs, Directed Energy. (capture, destroy, control, intercept, deny use)

Notes:

1. Neutralization may be initiated from surface, air or space.
2. C² + C is required for performing these tasks.
3. Environment includes: All Weather, Electronic Warfare, Nuclear Effects.

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NEUTRALIZATION SUPPORT

AIR OPERATIONS

- Airlift: Deployment, Supply, Battlefield Mobility, Med Evac, Aerial Ports, Materials Handling.
- Reconnaissance: Surveillance/Warning, Locate/Identify Tgts, Pre/Post Strike, Wx Mapping (Geodetic, Geographic, Electronic), Process/Eval, Relay/Disseminate.
- Rescue: Notification, Escort, Defense Suppression, E&E, Recovery, C²
- Air Refueling/Rearming: Rendezvous, Transfer (Fuel, Ordnance)
- Electronic Warfare
- Other: Battlefield Illumination, Psy Ops, Special Training

SPACE OPERATIONS

- Battlefield Illumination
- EW
- Reconnaissance
- Navigation
- Target Designation } (Weapons Delivery)
- Space Replenishment
- C²
- C

SURFACE OPERATIONS

- Base Activities: Air Base Defense & Security (Passive, Evac, Anti-Air) Operations, Admin, Maintenance & Supply, Construction & Engineering (BCE), Housing and Feeding, Medical, Transportation, Communications.
- Special Operations: COIN, Insurgency, Psy Ops, Underground.

Notes:

1. C² + C is required for performing these tasks.
2. Environment includes: All Weather, Electronic Warfare, Nuclear Effects.

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MISSION SUPPORT

Training: Tech, Crew

Testing: RDT&E, OT&E

Communications

Weather

R&R

Auto Data Processing

Mapping

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LONG-RANGE DEVELOPMENT PLANS
COMBAT TASKS

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1. Command and Control (Initiate/Terminate, Monitor & Direct, Evaluate, and Redirect Operations, & Reconstitute, Report)
2. Attack/Neutralize Surface Targets (Msl Silos, C/C Ctrs, Communications Sys, Airflds, Nuclear Storage, Subbases, Military Logistic Ctrs, Warning Sys, Air Def Sys, Govn't Ctrs, Industry, Energy Sources, Transportation, Logistic Sys, Civ Population Ctrs, Space Ctrs, SAMs, Bunkers, Tanks, AAA, Mil Personnel, Aircraft, POL, Agriculture, Seaborne Combat Vehicles, Mobile ICBMs, Submarines at Sea (SSBNs and others), etc.)
3. Attack/Neutralize Air Targets (ABNCPs, AWACS, Interceptors, SAMs, Bombers, Cruise MsIs, Ftrs, Observation Planes, RPVs, Balloons, etc.)
4. Attack/Neutralize Space Targets (Space Systems: ADPS, Navigation, Communications, Reconnaissance, Surveillance, Weather, Energy, RVs, Projectiles, Offensive Wpns, etc.)
5. Support Battlefield Operations (Battlefld Illumination, Tactical Jam-ers, Reconnaissance, Communications, etc)
6. Conduct Unconventional Warfare
7. Conduct Special Combat Related Operations (Psychological Operations, COIN, etc.)
8. Provide Air Base Def (CONUS and non-CONUS) (Def & Security) (anti-air, AAA, SAMs, etc.)
9. Defend Against Surface Threats (Invasion Forces, Personnel, Equipment, Ships, Submarines, Internal Rebels, Saboteurs, Terrorists, etc.)
10. Defend Against Air-borne Threats (Manned/Unmanned Vehicles: Bombers, Ftrs, Transports, Observation Planes, Reconnaissance Aircraft, RPVs, MsIs, ASMs, SLCMs, AAMs, etc.)

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11. Defend Against Space Threats (RVs, Satellites, FOBS, MOBs, Directed Energy, etc.)
12. Provide Airlift (Deploy, Supply/Resupply, Battlefield Mobility, Medical Evacuation, etc.)
13. Conduct Air/Space Replenishment (Fuel, Ordnance, Personnel, etc.)
14. Conduct Rescue Operations (Notification, Escort, Search, Defense Suppression, Escape & Evasion, Recovery)
15. Conduct Reconnaissance (Locate/Identify Targets, Pre/Post-Strike, Wx, Mapping (Geodetic, Geographic, Electronic))
16. Provide Surveillance/Warning/Assessment
17. Provide Intelligence
18. Support Training (Crew and Technical Training)
19. Provide Special Support (VIPs, etc.)
20. Provide Communications (Global Deployment, Wpns Delivery)
21. Provide Navigation
22. Provide Other Support (Weather Information, ADP, Mapping, etc.)

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MATCHING HARDWARE OPTIONS TO THE COMBAT TASKS

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MATCHING HARDWARE OPTIONS TO THE COMBAT TASKS

The process of matching all current, programmed, and conceptual hardware options to the previously-generated combat tasks is an extensive project. The results of the first iteration of this process is included here.

This appendix is organized in the same fashion as the combat tasks. The Orientation, Decision, and Action steps are compiled separately in three attachments. An outline of the appendix is shown below.

Atch 1. Orientation

- 1.1. Surveillance, Warning, and Assessment
- 1.2. Reconnaissance-Intelligence

Atch 2. Decision

- 2.1. Strategic Command, Control, and Communications
 - 2.1.1. Strategic Offense C³
 - 2.1.2. Strategic Defense C³
- 2.2. Tactical Command, Control, and Communications

Atch 3. Action

- 3.1. Direct/Combat
 - 3.1.1. Strategic Offense
 - 3.1.2. Strategic Defense
 - 3.1.3. General Purpose
- 3.2. Support

The Orientation (1.), Strategic C³ (2.1.), and Support (3.2.) combat tasks are described by functions (e.g. Elint, Order Launch, Strategic Airlift, respectively). And, Tactical C³ (2.2.) tasks are listed as components (e.g. TACC). Whereas, the Direct/Combat (3.1.) tasks are target-oriented. Therefore the hardware options included in this appendix are matched to functions, components, and targets, respectively.

The hardware options are organized in a matrix format that has six rows. The first row lists the appropriate functions, components, or targets for the mission area. The second row includes a compilation of the current systems capable of addressing any or all of the corresponding functions, components, or

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targets. The third row includes the same type of compilation for programmed systems -- a programmed system is defined as one with procurement dollars in the FYDP. The fourth row lists the deficiencies remaining when the functions, components, or targets (Row 1) are matched to the current and programmed systems (Rows 2 and 3). Row five lists all concepts (programmed R&D, ideas, unprogrammed procurement options, etc.) that could possibly address the deficiencies. And, row six lists the continuing limitations that exist after the concepts (Row 5) are compared to the deficiencies (Row 4).

The columns of the matrices vary according to the mission area. The columns consist of systematic subsets of the broader mission areas. For example, in the strategic offense mission area the columns are variations in range (short, medium, long). Since some of the mission areas are quite lengthy, they include several pages of matrices. In general, the pages are organized systematically according to the particular mission area. For example, strategic defense has three pages of matrices: surface threats, airborne threats, and space threats.

Each section of the attachments begins with a brief explanation of how the particular mission area is organized. And, each section also contains a glossary that defines the acronyms, abbreviations, and nicknames used in the matrices.

Since this appendix is part of an Interim Report, the information is not entirely complete. The Direct/Combat (3.1.) and Decision (2.) sections are quite comprehensive, while the Orientation (1.) and Support (3.2.) sections are incomplete. The portions that remain unfinished are primarily the less-expensive hardware options that do not have as great an impact on the USAF Budget. The incomplete sections will be finished while the completed sections are refined -- both activities parallel one another.

3 Atch

1. Orientation (S)
2. Decision (S)
3. Action (S)

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82

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Orientation

The Orientation step includes the tasks related to collecting, evaluating, producing, and disseminating information necessary within the Air Force. Though these primarily relate to the Surveillance, Warning, Assessment, Strategic Reconnaissance, and Intelligence mission areas (Tactical Reconnaissance more properly fitting in "Combat Support"), such fine distinctions were not workable -- Tactical Reconnaissance and Strategic Reconnaissance were not easily severed. Therefore, Reconnaissance was considered an undividable entity and included here in its entirety. As such two matrices follow. The first matches hardware to the Surveillance, Warning and Assessment functions; and, the second addresses the Reconnaissance-Intelligence functions. Each of the matrices is preceded by a brief introduction, and this attachment ends with a glossary of nicknames, abbreviations, and acronyms.

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Surveillance, Warning, and Assessment

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Surveillance, warning, and assessment systems are aggregated reflecting the aerospace arena or particular threat of concern (atmospheric, ballistic missile, or space). Deficiencies exist in atmospheric and space systems in terms of coverage, range, resolution, identification, and survivability. Deficiencies in ballistic missile attack assessment cannot be described at this time because the mission analysis, to describe what such a deficiency is, is currently being performed. Uncertain identification, data credibility, and systems survivability are identified as continuing limitations for surveillance, warning, and assessment.

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AND ASSESSMENT~~UNCLASSIFIED~~~~CONFIDENTIAL~~

Function	Atmospheric S/W	Ballistic Msl S/W/A	Space S/W/A
Current Systems	LRRs/HRIs (JUS) DEW (EC-121) TACS	•FPS 85 •440L(OTH-F) •474N(FSS-7, Spacetracks FPS-44) Intel •BMEWS Sensors •DSP	Spacetrack (Baker Nunn, Shemya, FPS 85, Diyarbaki BMEWS Intel Sensors Mav Spasur
Programmed Systems	OTH-B AWACS Balloon-Borne Radar	DSP Improvements PAVE PAWS (Phased Array Radar Warning System) AAS (Atk Assess Sys)	COBRA DANE Ground Based E-O Sensors
Deficiencies	Gaps: OTH-B Skip Zone LRR/DEW Low Level Resolution: At Long Range ID: Uncertainties Auroral RFB effects on OTH Lim/No height (Some Systems) Lim/No ECCM/Surviv (Most) CONUS Fixed & O/S No mobility	None presently identi- fied except possible requirement for en- hanced attack asses- ment (Msn Anal in Progress) THIS DOCUMENT HAS BEEN DOWNGRADED TO UNCLASSIFIED PER.....	Limited Range Limited resolution Limited Coverage Limited Reaction Time
Concepts	Space-based atmos- pheric surveillance/ warning/tracking/ assessment system Drone/RPV w/surveill radar Unattended surveill & warning radars (e.g. for DEW)	Satellite borne mid- course surveillance system for attack assessment Boost Phase Detection & Tracking System (DSP follow-on) BMEWS Improvements	Spacetrack aug- mentation satell- ites Ground based deep space surveillanc radars SOI (Spc Obj Iden
Continuing Limitations	Uncertainty of ID/ determination of intentions in suffi- cient time for pre- ventive action. Difficulty of achieving timely input for damage limitation Lack of dedicated survivable capabil- ity for CONUS orientation tasks	Multiple phenomenology required for surviv- ability & credibility UNCLASSIFIED CONFIDENTIAL SECRET	Multiple phenom- enology required for survivability & credibility 86

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Reconnaissance - Intelligence

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The particular type of reconnaissance or intelligence information required determines the nature of the system used to produce it. The various types of reconnaissance or intelligence information include the following: electronics, communications, telemetry, photography, radiation, and optical. Deficiencies include data handling, security, timeliness, and night/adverse weather capability. No continuing limitations are identifiable at this time.

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ORIENTATION
RECONNAISSANCE-INTELLIGENCE

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Function	Electronic Intelligence	Communications Intelligence	Telemetry Intelligence	Photographic Intelligence	Radiation Intelligence	Optical Intelligence
Current Systems	RC-135, SR-71, SAO,	RC-135, U-2, RPV, ERU, GROUND SITES, SAO	(COBRA BALL) RC-135 (SECONDARY MISSION), ARIS (USAFSS Manned)	SR-71, U-2, RF-4, RPV, SATELLITE RC-135 (Photo Mapping, C-97 (CREEK MISTY),	ARIS COBRA TALON (Conv), COBRA SHOE (OTHB), CREEK MAID (Conv),	ARIS RC-135 (COBRA BALL),
Programmed Systems	RIVET JOINT, EAPS (SAC), TEREK/ TERPES, PELSS	RIVET JOINT, COMPASS BRIGHT, COMPASS EARS, EMITTER LOCATION SUB/ SYSTEM OF PELSS, SECURE COMM (AN/UYA-7), HIGH ALT LONG END (HALE) REV,	UPDATED TELEMETRY PROGRAM,	UPD-X (SLAR), AAD-5 (IR), TIPI-IP and IT, COMPASS PREVIEW, IMPROVED OPTICAL SENSORS,	COBRA DANE (phased array radar)	MINOR MODS, PROJ 2 (LWIR)
Deficiencies	RT/NRT EMITTER FILTERING	AIRBORNE DATA HANDLING, MAN-POWER INTENSIVE, ADEQUATE DF, LONG ENDURANCE LOITER	UNRELIABLE VHF TYPE E TELEMETRY NO D-BAND TYPE E RECEPTOR	LIMITED NIGHT AND ALL-WX COLLECT-ION RESPONSE- SIVENESS, -IMAGERY X MISSION, -IMAGE PRO-CESSING, -NRT/RT SENSORS, LIMITED RESOLUTION (PLATFORM, SENSOR, FILM RE-LATED)	MIRV & MARV SIZING & WT OF RV. SAFE- GUARD SIGNA- TURES DISTIN- GUISH CAPABILITY. BETWEEN RVs and DECOYS	DISTINGUISH BETWEEN RVs and DECOYS LIMITED ALL-WX RE- LIABILITY OF BALLIS- TIC FRAMING CAMERA. SIZING CAPABILITY. MAT'L DETER- MINATION, SLOW (MANUAL) PROCESSING,
Concepts	RIVET JOINT MOD-ERNIZATION. REAL TIME ANALYSIS/ DISSEM/ APPLICATION REAL TIME COLLECTION (IMMEDIATE RESPONSIVE-NESS). HIGH ALT LONG EN- DURANCE (HALE) RPV	RIVET JOINT MODERNIZA- TION -- APPLI- CATION.	COVERT NIGHT PHOTO. CONTAD. LLLTV . NRT ACQUI- SITION, IDENTI- FICATION. APPLICATION	EXPAND FREQ RANGE COVER- AGE - APPLICATION	COBRA JUDY (ABN/ SHIP- BORNE Phased array radar), SATELLITE RADINT DATA LINK TO CONUS	IMP OPTICS (LASER) - IMP CAMERA -SPECTRAL AND LASER SYSTEM FOR SIZING & PRE- CISE TRACKING - IMP PROCESS- ING

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GLOSSARY

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AAS	Attack Assessment System
ARIS	Advanced Range Instrumentation Ships
AWACS	Airborne Warning & Control System
BMEWS	Ballistic Missile Early Warning System
Cobra Ball	Consists of two RD-135 aircraft configured for the selection of intelligence data from Soviet ICBM re-entry vehicles. The aircraft primarily operate in the Kamchatka Recovery Area.
Cobra Dane	Phased array radar at Shemya AFS, Alaska, used for technical intelligence gathering.
Cobra Judy	Airborne/Shipborne phased array radar system.
Cobra Shoe	OTHB radar
Cobra Token	A program designed to provide technical intelligence concerning the characteristics and capabilities of CHICOM ICBM weapons systems. Consists of a missile tracking radar and passive detection equipment.
Compass Bright	Improvements to an existing remotely controlled SIGINT collection and processing system for drones and minimally-manned aircraft.
Compass Ears	Development of an Emergency Airborne Reaction Unit (EARS) which will provide direct SIGINT support for tactical commanders.
Compass Preview	Program for an advanced high resolution photographic exploitation device.
CONUS	Continental U.S.
Creek Maid	Ground based radar in northern Norway which gathers information from Soviet Navy missile tests
DEW	Distant Early Warning Radar System
DSP	Defense Support Program
ECCM	Electronic Counter-countermeasures
E-O	Electro-optical
ERU	Emergency Reaction Unit
HRI	Height-Range Indicator (Height-Finding Radar)
ID	Identification
II	Imagery Interpretation
IP	Imagery Processing
IR	Infrared
JUS	Joint-Use (Radar) System (DoD/FAA)
LLLTV	Low Light Level Television
LRR	Long Range Radar
O/S	Overseas
OTH	Over-The-Horizon Radar
OTH-B	Over-The-Horizon Backscatter Radar
PAVE PAWS	Phased Array Radar Warning System
PELSS	Precision Emitter Location Strike System

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Rivet Joint

Program to develop a standard configured
RC-135 SIGINT aircraft.

RPV

Remotely Piloted Vehicle

RT/NRT

Real Time/Near Real Time

SAO

Special Actions Office

SLAR

Side Looking Airborne Radar

SOI

Space Object Identification

S/W

Surveillance/Warning

S/W/A

Surveillance/Warning/Assessment

TACS

Tactical Air Control System

TIPI

Tactical Information Processing and Interpretation

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Decision

The decision step consists of the three sub-steps: Evaluate the Situation, Formulate Alternatives, and Choose Alternatives. Conceptualizing the decisionmaking process of a large organization is confounded by the delegation of some decisionmaking authority to all the levels of the organization. Decisionmaking is in fact diffused throughout all the levels of the Department of Defense.

The Decision step of the O-D-A process is fundamentally different from the Orientation and Action steps. Ultimately the decision reduces to a mental activity whereas orientation and action reduce to the physical activities necessary for task accomplishment. There are, however, physical activities that must be performed in support of the decision step.

The primary function of Command, Control, and Communications activities is to support the decisionmaking authority by communicating the necessary information to evaluate the situation and to assure that the chosen alternative is implemented as desired. This general relationship is often obscured by the direct linkage of specific C³ systems to certain decision levels for particular tasks. Thus, there are a large number of task oriented C³ systems within the Air Force. Strategic C³ systems are designed for specific tasks; therefore, these systems are functionally categorized. Tactical C³ systems must be adaptable to many different scenarios; therefore these systems are categorized by major subsystem and components.

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Introduction To Strategic Command
And Communications

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Command, Control, and Communications (C³) encompasses the means of transmitting, processing, and displaying information with which commanders direct and control military operations and support. Strategic C³ systems must exist and be survivable to permit the NCA (National Command Authorities) and the JCS (Joint Chiefs of Staff) to exercise command and control of strategic forces during pre-attack/trans-attack/post-attack periods and to direct these forces throughout the entire spectrum of warfare. This specifically applies to both offensive and defensive missions. DOD Directive 5100.30 establishes the concept of the Worldwide Military Command and Control System (WWMCCS). The primary function of WWMCCS is to support the NCA. Accordingly, the Air Force, as support to the WWMCCS, provides a significant portion of the strategic C³ systems necessary for the NCA to exercise control of the Unified and Specified Commands. Deployment of resources, survivable command centers, survivable sensors, and survivable communications links are basic elements of strategic C³.

Current command, control, and communications systems are fragmented and require improved data capacity, reliability, integration, and survivability to control present or approved future strategic offensive and defensive forces effectively. Current command and control systems have historically been developed to serve the particular needs of the individual users. Because of this tailored development, integration of interfaces into large systems which must be responsive to the NCA, such as WWMCCS, has not been accomplished.

To provide an integrated, reliable, flexible, survivable and secure WWMCCS fully responsive to the needs of the NCA, a program titled WWMCCS Architecture Planning Studies was initiated by the WWMCCS Council in February 1974. The studies and analysis to be performed will provide alternative total WWMCCS configurations for three time periods: 1980, 1985, and 1995. The baseline for these configurations is the existing WWMCCS. Interim and near-term improvements to the WWMCCS either to satisfy better current requirements or facilitate more orderly evolution to the desired system will also be identified. The WWMCCS Architecture effort essentially addresses the development of a total WWMCCS configuration and the planning for orderly acquisition of an adequately integrated and standardized system which is balanced in terms of capability, survivability, and cost.

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Program management for WWMCCS Architecture is provided by the WWMCCS Council with technical administration being exercised by the Director for Telecommunications and Command and Control Systems (DTACCS). The Air Force is responsible for contract administration.

It is anticipated that the WWMCCS Architecture Planning Studies Program will result in a WWMCCS Architectural Plan. Selected architectural alternates from this plan will result in follow-on efforts which will essentially drive future developments in strategic Command Control. Therefore, future developments should be conducted with full cognizance of the products of the WWMCCS Architecture Planning Studies.

To identify specific requirements which could result in long-range developments, strategic offensive and defensive mission profiles were constructed. Specific functions were identified with capability objectives, current systems, programmed systems, deficiencies, concepts, and continuing limitations applicable to these functions displayed in matrix format. From these matrices, operational deficiencies can be identified and translated into system requirements.

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92

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STRATEGIC OFFENSE C³ (THIS PAGE CONFIDENTIAL)

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(C) The matrices present a generalized outline of the characteristics and deficiencies of hard wire (e.g. Telephone lines) and radio communications systems used in controlling Strategic bombers and ICBMs from pre-launch to mission completion. The matrices delineate the C³ functions for each of the six phases of the strategic offensive mission profile (i.e. pre-launch, launch or boost, cruise, penetrate or re-enter, return and recovery of bombers, reconstitute force). They show the characteristics and deficiencies of fixed and mobile command facilities in performing the command functions associated with control of the strategic bombers and ICBMs throughout their mission profiles. One of the most demanding capability objectives for these types of communications systems and command facilities is to perform the control functions at long ranges from bases or silos. Deficiencies include: vulnerability and low survivability of ground-based communications systems and fixed command facilities; limited capability to perform the functions at times or locations in the mission profiles where high speed decisionmaking and high capacity communications are required.

There are concepts that can be pursued to overcome most of the deficiencies listed. However, total resources are limited and there must be a proper balance between command and control capability objectives and strategic offensive forces capabilities.

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94
21

Functions	Attack Warning	Alert Forces	SECRET Order Launch	Cancel Launch
Capability Objectives	Rapid "Real Time" Reporting of ICBM & SLBM Launch giving Source, number TGTs & Time on TGTs Reliable - Low False Alarm Prob Redundant -Dual Phenomenology at least - Independent QMM Sys	Redundant Hard Wire and Radio Links to BMR MSL Forces Improved Survivability thru hardening & mobility	SAME CONFIDENTIAL	SAME
Current Systems	DSP BMEWS 440L SLBMD&W MWDS	PAS SAC Tel Net 465L-DTS SLFCS HF SSB PACCS SAC TTY NET AUTOVON AUTODIN AUTOSEVOCOM	SAME Plus ERCS	SAME Plus ERCS
Programmed Systems	Add Satellite Comm links	SATIN IV AABNCP Add satellite Comm links for increased redundancy	SAME	SAME
Deficiencies	Low Hardness of Ground Systems & DSP Grd Facs Vulnerable Comm Sys from sensors and Ground Proc facilities Limited Coverage	Low Hardness of Ground Nets Limited Capability of ABN Elements (Endurance, Range, Staff)	SAME	SAME
Concepts	Harden Ground Facs Add OTH-B Increase DSP Coverage	Harden Gnd Nets Harden Comm Satellite	SAME	SAME
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Functions	Order or Cancel Atk.	Order Refueling	Change Targets	Change Mission Profile
Capability Objectives	Redundant, Survivable Radio Links to BMR & MSL Forces	High-Capacity, Long Range, Redundant, Survivable Radio Links to BMR & Msl Forces	SAME	SAME
Current Systems	SLFCS HF-SSB PACCS DSCS-II ERCS UHF-FM	(No Existing Capability to Make Large-Scale Change Because of Low Capacity of Comm Systems)	SAME	SAME
Programmed Systems	AABNCP FLTSATCOM AFSATCOM SDS Pkg B or C	Add Satellite Comm Links for Increased Redundancy	SAME	SAME
Deficiencies	Low Hardness of Ground Facilities. Limited Capability of ABN Elements.	Insufficient Capacity, Range and Redundancy	SAME	SAME
Concepts	Harden Ground XMTRS SURV SAT COM	Add ADP to AABNCP Add High Capacity Radio Links	SAME	SAME
Continuing Limitations				

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Functions	Confirm or Cancel Atk Order	Change Refueling	Change Targets	Change Tactics Or Route UNCLASSIFIED
Capability Objectives	Redundant, Survivable Long Range, Secure, Jam Resistant, Nuclear Effect-Resistant Radio Links to BMRS (& missiles?).	SAME, Plus High Speed High Capacity Systems to Handle Large Volume of Data	SAME	SAME
Current Systems	HF-SSB UHF-FM SLFCS PACCS DSCS-II ERCS	No existing capability to make large-scale change. (Because of low capacity of Comm Systems)	SAME	SAME
Programmed Systems	AABNCP FLT SATCOM AFSATCOM	SAME	SAME	SAME
Deficiencies	Low Hardness of Ground Facilities Limited Range, A/J, Nuclear Effect Resistant, Security	SAME, Plus Inadequate Speed and Capacity	SAME	SAME
Concepts	Harden Ground XMTRS SURVSATCOM	SAME, Plus ADP in AABNCP and High Capacity radio links via Satellite	SAME	SAME
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97 PM

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D. PENETRATE OR RE-ENTER

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Functions	Cancel Atk Order	Change Targets	Change Route	Suppress or Counter Defenses
Capability Objectives	Redundant, Sur- vivable Long- Range, Secure, Jam-Resistant, Radio Links to BMRS (and Missiles?)	SAME, Plus High Speed, High capacity systems to handle large volume of data	SAME	SAME
Current Systems	No existing capa- bility to communi- cate with BMRS at low alt. over USSR in nuclear environ- ment (Nor with missiles during Re-Entry)	SAME	SAME	SAME
Programmed Systems		THIS DOCUMENT HAS BEEN DOWNGRADED UNCLASSIFIED TO PER. <i>GDS</i>		
Deficiencies	No Capability	SAME	SAME	SAME
Concepts	High Power LF/VLF with RCVRs on BMRS, UHF or SHF Satellites with high power, A/J features	Unknown	Unknown	Unknown
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98

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RETURN & RECOVER (BOMBERS ONLY)

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Functions	Report Damage	Direct Refueling	Identify Self To Defense	Find Recovery Base & Land
Capability Objectives	Long Range, Nuclear Effect and Jam Resistant Radio XMTRS on BMRS	Redundant, Survivable Long-Range; Nuclear Effect and Jam Resistant, High Capacity Radio Links to BMRS	Reliable, Secure IFF System	Determine Surviving Recovery Bases and Evaluate Capability to accommodate BMRS (Fuel supply Weapons, Crews, Etc). Provide Navigation and landing aids
Current Systems	HF-SSB UHF	No Existing Capability to make large-scale changes	Mk XII SIF	HF-SSB UHF-FM 465L
Programmed Systems	FLTSATCOM AFSATCOM	THIS DOCUMENT HAS BEEN DOWNGRADED TO UNCLASSIFIED PER <i>[Signature]</i>		
Deficiencies	Limited Range, Nuclear Effect & Jam Resistance, and speed	See Above	Lack Reliability	Status Reporting System Lacks Survivability and Capacity for rapid assessment
Concepts	Self Contained Automatic Transmitter (SCAT) SURVSATCOM XMTRS on BMRS	ADP on AABNCP and High Capacity long range radio links via satellite	IR signature system Laser System	ADDL NUDET Report System with more status assessment info
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F. RECONSTITUTE FORCE

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Functions	Report Status	Transmit New Orders	Alert Force	Order Launch
Capability Objectives	Survivable, Redundant, High Speed Hard Wire and Radio Links to Ground & ABN CPs ADP capability to rapidly assess status and pre-prepare new plans	SAME	Same as for Pre-Launch CONFIDENTIAL	SAME
Current Systems	SAC TEL NLT 465-L SLFCS HF-SSB PACCS SAC TTY NET AUTOVON AUTODIN AUTOSEVCOM UHF	SAME	SAME, Plus: PAS JCSAN ERCS JCS-ACA EMATS MEECN THIS DOCUMENT HAS BEEN DOWNGRADED TO CONFIDENTIAL UNCLASSIFIED PER. <i>GD</i>	SAME
Programmed Systems	SATIN IV AABNCP Satellite Comm Links	SAME	SAME	SAME
Deficiencies	Low Hardness Limited Capacity and Speed	SAME	Low Hardness of Gnd Nets Limited Capa- bility of ABN Elements (Endurance, Range, Staff)	SAME
Concepts	Harden Gnd Nets	SAME	SAME	SAME
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GLOSSARY

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1. AABNCP - Advanced Airborne Command Post
2. ADP - Automatic Data Processing
3. AEW&C - Airborne Early Warning and Control
4. AEW&C ACFT - Airborne Early Warning & Control Aircraft
5. AFSATCOM - Air Force Satellite Communications System
6. A/J - Anti-Jam
7. ALCOP - Alternate Command Post
8. AMIS - Air Movement Information System
9. ARTCC - Air Route Traffic Control Center
10. AUTODIN - Automatic Digital Network
11. AUTOVON - Automatic Voice Network
12. AUTSEVOCOM - Automatic Secure Voice Communication
13. AWACS - Airborne Warning and Control System
14. BMEWS - Ballistic Missile Early Warning System
15. BMRS - Bombers
16. CFWRS - Canadian Forces Warning and Reporting System
17. CNI - Communications, Navigation, and Identification Program
18. CRYPTO - Cryptology
19. DEW - Distant Early Warning
20. DIAL LIAISON - Connections between SAGE Center and ARTCC
21. DSCS - Defense Satellite Communications System
22. DSP - Defense Support Program
23. EMATS - Emergency Message Automatic Transmission System
24. ERCS - Emergency Rocket Communication System
25. FAA-ARTCC - Federal Aviation Agency Air Route Traffic Control Center
26. FLTSATCOM - Fleet Satellite Communications System
27. 440L - OTH-F System
28. 465L-DTS - 465 Data Transmission System
29. 427M - NCOC Improvement
30. GATR - Ground/Air Transmitter/Receivers
31. GCA - Ground Control Approach
32. HFSSB - High Frequency Single Sideband
33. ICBM - Intercontinental Ballistic Missile
34. IFF - Identification Friend or Foe
35. ILS - Instrument Landing System
36. IR - Infrared
37. JCS-ACA - Joint Chiefs of Staff Automatic Congerence Arrangers
38. JCSAN - Joint Chiefs of Staff Alerting Network
39. LF - Low Frequency
40. LOS - Line of Sight
41. LRRS - Long Range Radar System
42. MEECN - Minimum Essential Emergency Communication Network
43. MkX IFF - System for Airborne IFF
44. MkXII-IFF - Improved System for Airborne IFF
45. MWDS - Missile Warning Display System

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GLOSSARY (Cont'd)

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- 46. NACP - NORAD/CONAD Airborne Command Post
- 47. NAFTOC - NORAD Automatic Forward Tell Output to Canada
- 48. NAS - National Airspace System
- 49. NAWS - NORAD Attack Warning Systems
- 50. NCOC - NORAD Combat Operations Center
- 51. NFARS - NORAD Forward Automatic Reporting System
- 52. NUDET - Nuclear Detonation
- 53. OTH-B - Over The Horizon (Back Scatter)
- 54. OTH-F - Over The Horizon (Forward Scatter)
- 55. PACCS - Post-Attack Command and Control System
- 56. PAS - Primary Alert System
- 57. PVAS - Primary Voice Alert System
- 58. RAPCON - Radar Approach Control
- 59. RCC - Region Control Centers
- 60. SAC Tel Net - SAC Telephone Net
- 61. SAC TTY Net - SAC Teletype Net
- 62. SAGE - Semi Automatic Ground Environment
- 63. SATIN - SAC Automated Total Information Network
- 64. SCAT - Self Contained Automatic Transmitters
- 65. SHF - Super High Frequency
- 66. SIF - Selective Identification Feature
- 67. SLBM - Sea Launch Ballistic Missile
- 68. SLBM D&W - Sea Launch Ballistic Missile Detecting & Warning
- 69. SLFCS - Survivable Low Frequency Communication System
- 70. SURTAC - Surveillance and Tactical Teletype System
- 71. SURVSATCOM - Survivable Satellite Communications
- 72. TACAN - Tactical Air Navigation
- 73. TISEO - Target Identification System, Electro Optical
- 74. UHF-FM - Ultra-High Frequency, Frequency Modulation
- 75. USSR - Union of Soviet Socialist Republics
- 76. VLF - Very Low Frequency
- 77. WAS - Weapons Alert System
- 78. XMTRS - Transmitters

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102

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STRATEGIC DEFENSE C³

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This section is concerned with those C³ functions applicable to U.S. defensive forces, given that there has been attack warning and assessment (for strategic warning and assessment, see Orientation, section 1.1.). The strategic defensive force has a marginal air defense capability and no ballistic missile defense. The attached matrices delineate the C³ functions for each of the six phases of the strategic defensive mission profile (i.e. pre-launch, scramble or launch, intercept and identify, attack, return and recover, reconstitute force).

The principle deficiencies of existing and programmed systems are the low hardness of ground systems, and limited range and capacity to control defensive forces. As far as C³ for air defense is concerned, there do not appear to be any continuing limitations, given a sufficient level of funding. Ballistic missile defense C³ is not addressed.

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A. PRE-LAUNCH

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Functions	Attack Warning	Alert Forces	Order Launch	Cancel Launch
Capability Objectives	Rapid, "Real Time" Reporting of ICBM & SLBM Launches and Hostile of unidentified aircraft penetration of restricted airspace. High reliability with low false alarm rate. Redundant phenomenology and communications	Redundant Hard wire and radio links to Interceptor main & dispersal bases. Regional control Centers (RCCs) and bases of C2 and support aircraft improved survivability thru hardening & mobility	SAME	SAME
Current Systems	DSP, NFARS, BMEWS, NAFTOC 44OL, CFWRSLBM D&W, MWDS, DEW LINE, LRRS, AEW&C ACFT SURTAC	NAS (incl PVAS, WAS, & NAWS) SAGE AUTOVON AUTOVON	SAME	SAME
Programmed Systems	NCOC Improvement (427M)			
Deficiencies	Low Hardness of ground systems & DSP ground facilities. Vulnerable comm from sensors and ground processing facilities Limited coverage stand-by status	Low Hardness of ground nets Limited redundancy	SAME	SAME
Concepts	Add satellite Comm Links Harden Ground Facs. NCOC Improvement (427M) Add OTH-B Add AWACS, Increase DSP coverage	Harden Gnd Nets Add Radio Links to RCCs & Bases Add Satellite Comm Links for Survivability and Redundancy Add NACP	SAME	SAME
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B. SCRAMBLE OR LAUNCH

Functions	Order or Cancel Atk	Vector	Release Weapons	Avoid Friendly Acft
Capability Objectives	Redundant, Survivable and secure data and voice radio links to the interceptor forces	SAME	SAME	Same, plus improved real-time coordination with FAA-ARTCCs
Current Systems	Ground/Air Transmitter Receivers (GATR) UHF voice and 1-way Data link	GATRs FAA-ARTCC	GATRs	GATRs FAA-ARTCC Voice Page Dial Liaison AMIS
Programmed Systems				
Deficiencies	Low hardness of ground facilities. Limited Range (LOS) Non-Secure	Low hardness of ground facilities Limited Range (LOS) Limited capacity Non-Secure	Low hardness of ground facilities Limited range (LOS) Non-secure	Low Hardness of ground facilities and hardware links Lack automation Limited capacity
Concepts	Harden Ground facilities Add AWACS Add Satellite Comm Links Add CRYPTO Add NACP	SAME	SAME	Harden Ground facilities Add Auto Info transfer between RCCs and ACTCCs Add Satellite Comm Links
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105
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Functions	Vector	Release Weapons	Avoid Friendly Acft	Acquire & Identify
Capability Objectives	Redundant Survivable and Voice Radio Links to the Interceptor Forces	SAME	SAME - Plus improved real-time coordination with FAA-ARTCCs	Reliable, secure, positive identification of coop & non-coop acft at night and in all weather.
Current Systems	GATRs FAA-ARTCC	GATRs	GATRs FAA-ARTCC Voice Page Dial Liaison AMIS	Mk X IFF Mk XII IFF SIF
Programmed Systems				
Deficiencies	Low Hardness of Ground Facilities Limited Range (LOS) Limited Capacity Non-Secure	Low Hardness of Ground Facilities. Limited Range (LOS) Non-Secure	Low Hardness of Ground facilities Lacks automation Limited capacity	Lack reliability Coop System only lack range
Concepts	Harden Grd facilities Add AWACS Add Satellite Comm Links Add CRYPTO	SAME	Harden Ground facilities Add auto intro transfer between RCCs & ARTCCs Add Satellite Comm Links	TISEO IR Signature System Laser System Radar Signature System
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106

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D. ATTACK

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Functions	Confirm or Cancel Atk	Change Target	Release Weapons	Re-Attack
Capability Objectives	Redundant, Survivable and Secure Data. No voice radio links to the interceptor forces.	Same, Plus High Capacity to Handle large number of Tgts in short time	Redundant, survivable and secure data and voice radio links to the interceptor forces	Same, plus capacity to evaluate attack results quickly and transmit new attack order
Current Systems	GATRs	SAME	SAME	SAME
Programmed Systems				
Deficiencies	Low hardness of ground facilities limited range (LOS) Non-Secure	Same, Plus limited capacity	Low hardness limited range non-secure	Same, Plus limited capacity to evaluate and limited reaction speed.
Concepts	Harden ground facilities Add AWACS Add Satellite Comm Links Add CRYPTO	SAME	SAME	Same, Plus Automate Elevation and re-direction capability
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107

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E. RETURN AND RECOVER

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Functions	Report Results & Status	Locate Recovery Bases	Identify Self To Defense	Land
Capability Objectives	Medium Range, Nuclear Effect and Jam Resistant Radio Transmitter on Interceptors. Long Range Surveillance of Battle Area with Identification of Friendly & Enemy aircraft	Real-Time Status of recovery base Capability for rapid analysis of interceptor status vs Base location with efficient base assignment	Reliable, secure positive identification of interceptors with rapid, reliable transmission of info to other manned or unmanned interceptor control	Survivable, All-weather landing systems capable of handling multiple, rapid regular and Emergency landings.
Current Systems	GATRs	GATRs FAA-ARTCC	Mk X Mk XII SIF	GCA ILS TACAN RAPCON
Programmed Systems	THIS DOCUMENT HAS BEEN DOWNGRADED TO UNCLASSIFIED PER 7V28			
Deficiencies	Low Survivability of Grd Station, Low Capacity, Limited Range, Nuclear Effect & Jam Resistance	SAME	Lack Reliability. Low info Transfer Rate Coop Sys only	Low Survivability Insufficient Emergency Capacity
Concepts	Harden Grd sta. Add Ground Sta Add AWACS Add Satellite Comm Lines Add Battle Area Identification	SAME Plus CNI System	TISEO IR Signature Sys, Laser System, Auto-mate Info Transfer to Interceptor Control, CNI System Radar Signature	Harden Grd Station CNI System
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108

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RECONSTITUTE FORCE

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Functions	Radar Results & Status	Transmit New Orders	Alert Forces	Order Launch
Capability Objectives	Redundant Hard Wire and Radio Links between interceptor recovery bases and RCCs (Grd or airborne) and to NCOC and ALCOP Improved Survivability through hardening and mobility	SAME	SAME	SAME
Current Systems	SAGE AUTOVON AUTOVON	SAME	Same, Plus NAS (incl PVAS WAS & NAWS	SAME
Programmed Systems	THIS DOCUMENT HAS BEEN DOWNGRADED TO UNCLASSIFIED PER GDS			
Deficiencies	Low Survivability Low Capacity Limited Redundancy Non-Secure	SAME	SAME	SAME
Concepts	Hardening Grd Sta Add Ground Sta Add AWACS Add Satellite Comm Links Automate Info handling Add CRYPTO	SAME	SAME	SAME
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GLOSSARY

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31. GCA - Ground Control Approach
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33. ICBM - Intercontinental Ballistic Missile
34. IFF - Identification Friend or Foe
35. ILS - Instrument Landing System
36. IR - Infrared
37. JCS-ACA - Joint Chiefs of Staff Automatic Congerence Arrangers
38. JCSAN - Joint Chiefs of Staff Alerting Network
39. LF - Low Frequency
40. LOS - Line of Sight
41. LRRS - Long Range Radar System
42. MEECN - Minimum Essential Emergency Communication Network
43. MkX IFF - System for Airborne IFF
44. MkXII-IFF - Improved System for Airborne IFF
45. MWDS - Missile Warning Display System

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59. RCC - Region Control Centers
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63. SATIN - SAC Automated Total Information Network
64. SCAT - Self Contained Automatic Transmitters
65. SHF - Super High Frequency
66. SIF - Selective Identification Feature
67. SLBM - Sea Launch Ballistic Missile
68. SLBM D&W - Sea Launch Ballistic Missile Detecting & Warning
69. SLFCS - Survivable Low Frequency Communication System
70. SURTAC - Surveillance and Tactical Teletype System
71. SURVSATCOM - Survivable Satellite Communications
72. TACAN - Tactical Air Navigation
73. TISEO - Target Identification System, Electro Optical
74. UHF-FM - Ultra-High Frequency, Frequency Modulation
75. USSR - Union of Soviet Socialist Republics
76. VLF - Very Low Frequency
77. WAS - Weapons Alert System
78. XMTRS - Transmitters

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1110

TACTICAL C³~~SECRET~~
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The primary tactical command and control system is the 407L equipped Tactical Air Control System (TACS). There are five of these systems which will receive another increment of improvements under the 485L development/acquisition program. In addition, within the ANG are four manual, less capable TACS. In addition to the TACS there are relatively fixed facilities in various parts of the world with which the TACS must interface and interoperate. Of particular concern is the NATO NADGE (Nato Air Defense Ground Environment) system and the USAFE 412L AWCS (Air Warning Control System). The 412L system is being transitioned to the FRG and therefore has not been considered as a USAF resource.

The TACS is an assemblage of operation centers, radars and communications equipments configured into subsystems based upon the functional use. The subsystems are the Command Subsystem, A/C Control and Warning Subsystem, Airlift Subsystem, and the Tactical Air Support Subsystem.

As one reviews the overall needs and deficiencies it becomes apparent that at least on the surface most areas are adequately covered by current resources and those under acquisition. However, there are some underlying concerns which need further examination which are germane to the entire TACS capability. These are:

(1) Survivability/Mobility. The survivability of the TACS is accomplished through mobility. Thus the emphasis on lightweight easily transported equipments. Of concern here is the growing reliance on automated assistance in the C³ process which has led to a centralization of computational equipment and has increased the number of shelters in a given operational location. The fall back made is direct to manual operation which is an abrupt change difficult to implement quickly. The concept of graceful degradation and distributed computational resources needs to be explored.

(2) Automation. In order for automation to be effective it must be exercised and procedures must evolve to accommodate the inherent advantages of automation. The impact of adequate, realistic and frequent operational exercises will be felt in the O&M area and needs a closer look. The pressure for further automation improvements must be carefully examined to insure that sufficient time is allowed for current capabilities to mature and stabilize.

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(3) Communications. While the TRI-TAC program will provide qualitative improvement in ground communications equipments, the key to efficiency and survivability of the overall C³ system will probably lie in a high connectivity, multi-route, multi-medium (Troposcatter, HP, RPV relay, satellite, TDMA) system rather than point-to-point dedicated links. This postulated solution requires examination for feasibility, cost and sizing.

(4) Weapon System Impact. There are now emerging new and powerful systems to aid in prosecution of the battle, however, there seems to be an emphasis on their near-real time, quick reaction capabilities. Such systems as PLSS, QUICK STRIKE, Multilateration Radar, SLAR, & Compass Ears have the potential to inundate the Commands with masses of data. They require either dedicated or diverted weapon systems to respond quickly. The ability of the C³ system to react or the availability of weapons to perform these tasks needs further examination.

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TACTICAL

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Component	COMMAND	SUBSYSTEM	A/C CONTROL & WARNING SUBSYSTEM		
	TACC	TUOC	CRC/CRP	FACP	ASRT
Current Systems	TSQ-92 TSC-62 TGC-27 TGC-26 TRC-87 TTC-30 TRC-97 TSC-60	Voice/teletype interface w/ TACC	TSQ-91 w/TPS-43 3d Radar, TRC-97 Tropo, TSC-62 Tech Con- trol, TSC-60 HF, TRC-87 UHF, TCC-30 switch	TSQ-61 w/ TPS 44 2d radar TSC-53 UHF, VHF, HF TRC-97 tropo	None Exists
Programmed Systems	TACC Auto- mation (485L) pro- vides com- puter stor- age, process- ing & display with DSTS at TUOCS, ALCEs and DASCs. Communications improvements via TRI-TAC includes automatic voice/ message switches, digital Tropo radios, improved COMSEC, new DSTs/ teletype, digital secure FAX. AWAC will be able to assume TACC role.	DST or UYA-7 from 485L	485L update Incls: Auto- track of non- beacon A/C, Auto Flt Plan corro, Auto digital inter- face w/other Services. AWAC will assume this role as needed. TRITAC digital secure Comm.	AWACS backup	Ground Directed Bombing System (GDBS)
Deficiencies	ECM/ECCM Capability No digital tie to other services, Vulnerability of ground elements		A-A/G-A digital data link, ECM/ECCM capa- bilities	No height Capabil- ity, ECM/ECCM	Improved Surviv & Efficiency
Concepts	Extend some type of DST to other TACS elements, TDMA Combat Comm net; (SEEK BUS) TACSATCOM, Oper- ate TACC from sanctuary, SEEK STAR (High capac- ity multimode TDMA Comm), ECM/ ECCM fixes		SEEK BUS (TDMA net), ECM/ECCM fixes.	Add height Capability ECM/ECCM fixes.	Use of GPS
Continuation Limitations			THIS DOCUMENT HAS BEEN DOWNGRADED TO UNCLASSIFIED PER <i>GDS</i>		

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COMMAND AND CONTROL
TACTICAL

Component	Airlift Subsystem			Tactical Air Support Subsystem
	ALCC	ALCE	CCT	DASC/TACP
Current Systems	Part of TACC (TSQ-92	UYA-7 terminal	Manpack Radios	TSQ-93 TRC-97 tropo MRC-107/108 HF, UHF, VHF
Programmed Systems	ALCC Automation part of 485L TACC Automation	DST or UYA-7 terminal	UYA-7 terminal	485L Data Source Terminal (DST) Tri-TAC Comm Equip
Deficiencies		Air-Grd Data link	Same as ALCE	
Concepts		DMED Optimized DMED ASDAD/ COED	Same as ALCE	SEEK BUS Terminal More Mobile lightweight Comm
Continuing Limitations				

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GLOSSARY

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AN/XXX	Joint Service nomenclature for Communications-Electronics Equipment
AN/MRC-107/8	Multipurpose HF/SSB, UHF, VHF jeep mounted communications central
AN/TGC-26	Communications central with receiving, transmitting and monitoring equipment for 18 teletype circuits
AN/TGC-27	Communications Central, teletypewriter, receiving, transmitting and monitoring eight (8) teletype circuits
AN/TPS-43	Radar Set, lightweight 3-dimensional radar used at CRCs and CRPs in the Tactical Air Control System
AN/TPS-44	Radar set, lightweight 2-dimensional radar used at FACPs in the Tactical Air Control System
AN/TRC-87	Transportable two-way UHF and VHF radio facility, shelter mounted
AN/TRC-97	12 or 24 channel radio terminal primarily used over extended ranges in a tropospheric scatter mode. Can be used as a LOS radio
AN/TSC-53	Communications Central with voice and teletypewriter capabilities (HF, VHF/AM and UHF/AM radios) used at Forward Air Control Posts (FACPs) in the Tactical Air Control System (TACS)
AN/TSC-60	HF/Single Side Band radio with 4 voice channels and up to 16 TTY on any one voice channel
AN/TSC-62	Technical Central facility controls and monitors communications channels and circuits including point-to-point radio, and landlines
AN/TSQ-61	Operations Center used to display aircraft position information and/or control of air operations. Associated with the AN/TPS-44 radar at Forward Air Control Posts in the Tactical Air Control System (TACS).

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AN/TSQ-91

Operations Center used for control of air operations in conjunction with the AN/TPS-43 radar at CRCs and CRPs in the TACS

AN/TSQ-92

Operations Center of the Tactical Air Control Center of the TACS. Contains resource and positions for current ops, current plans and other sections at this highest level of the TACS.

AN/TTC-30

Electronic Telephone Central Office, provides a transportable circuit switch for use within the Tactical Air Control System. Used at the TACC, CRP and CRC.

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A-A/G-A	Air-to-Air/Ground-to-Air
AJ	Anti-jamming
ALCC	Airlift Control Center
ALCE	Airlift Control Element
ALSS	Advanced Location/Strike System
AWACS	Airborne Warning and Control System
AWCS	Air Weapons Control System
CCT	Combat Control Team
COMSEC	Communications Security
CNCE	Communication's NODAL Control Element
CRC	Control and Reporting Center
CRP	Control and Reporting Post
DASC	Direct Air Support Center
DDL	Digital Data Link
DST	Data Source Terminal
FAC	Forward Air Controller
FACP	Forward Air Control Post
FAX	Facsimile
GAMO	Ground and Amphibious Military Operations (JCS directed joint interface program)
HF	High Frequency (3-30 Mhz)
Hz	Hertz = cycle per second
JCS	Joint Chiefs of Staff
Khz	Kilo-Hertz = 1,000 Hertz
LOS	Line-of-Sight
Mhz	Mega-Hertz = 1,000,000 Hertz
NADGE	NATO Air Defense Ground Environment
NSA	National Security Agency
PACAF	Pacific Air Forces
PELSS	Precision Emitter Location/Strike System
QSR	Quick Strike Reconnaissance
RAFAX	Radio Facsimile
RF	Radio Frequency
RFI	Radio Frequency Interference
RPV	Remotely Piloted Vehicle
R	Remote Terminal
RTTY	Radio Teletype

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SEA Southeast Asia
SEEK STAR Nickname for a conceptual high data rate time division multiple access digital communications system employing an RPV relay for use in the tactical theater.

SLAR Side Looking Airborne Radar
SSB Single Side Band

TAB Tactical Air Base
TAC Tactical Air Command
TACC Tactical Air Control Center
TACP Tactical Air Control Party
TACS Tactical Air Control System
TACSATCOM Tactical Satellite Communications
Currently the use of some limited channels in the Defense Satellite Communications System (DSCS)

TACS/TADS Tactical Air Control System/Tactical Air Defense System (JCS directed joint interface program)

TADIL Tactical Digital Information Link
TALCE Transportable Airlift Control Element
TAWACS Tactical AWACS
TDMA Time Division Multiple Access
TIPI Tactical Information Processing and Interpretation
TRI-TAC Joint Tactical Communications Program
TROPO Tropospheric Scatter Radio
TTY Teletypewriter
TUOC Tactical Unit Operations Center

UHF Ultra-High Frequency (300-3,000 Mhz)
USAFE United States Air Forces in Europe

VHF Very High Frequency (30-300 Mhz)
VHF/AM VHF/Amplitude Modulation
VHF/FM VHF/Frequency Modulation

WWMCCS Worldwide Military Command and Control System

Direct/Combat

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The combat tasks in this sub-step relate to the direct neutralization of enemy targets (includes: convince, capture, counter, by-pass, scatter, impede, degrade, block, damage, destroy). These tasks are categorized by target type and location. Current, programmed, and conceptual systems are matched to these tasks and deficiencies and continuing limitations are identified. This sub-step is organized as follows:

- 3.1.1 Strategic Offense
- 3.1.2 Strategic Defense
- 3.1.3 General Purpose

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Action

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The Action step of the O-D-A process is concerned with the direct application of destructive force upon the target and the associated supporting tasks. Accordingly, this section is subdivided into Direct/Combat and the Support sub-steps. Combat/Direct is broken down in the traditional Strategic/GP fashion and Support is categorized as Combat Support and Mission Support. The latter, which includes the functions of training, testing, weather, automatic data processing, mapping etc. is not addressed in this report. Mission Support has been assigned a relatively low priority because the definition of its tasks necessarily follows the specification of the other tasks.

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The Strategic Offense combat tasks are placed into categories according to target location (surface, air, or space) and target range (Short, medium, and long).

Additional target features were found to be useful during the process of matching hardware options to the combat tasks. Surface target size, point or area, target resistance to damage, hard or soft, and target mobility were identified as important parameters. Present and programmed systems provide the capability to neutralize soft surface targets and some systems have a capability against hard targets. Limitations exist in our ability to detect mobile targets and to neutralize time urgent targets that can accomplish their mission prior to being neutralized, e.g. a Soviet Command and Control System can direct launch on warning in less than missile flight times.

The present and programmed systems are capable of neutralizing most of the identified air targets once they are located and identified. Location of airborne targets and subsequent tracking to permit weapon guidance appears to be a continuing limitation that even conceptual systems may not be able to completely overcome.

Current systems provide very limited capability to neutralize space targets. No systems are programmed for this role. Many technically feasible concepts are available to increase this capability if the decision is made to acquire them.

Six matrices were needed to match hardware to the tasks in this mission area. They are organized as follows:

A. Anti-surface Operations

- | | | |
|----------------|-----------------|------------|
| Direct Attack | { 1. Hard Point | (Matrix 1) |
| | { 2. Soft Point | (Matrix 2) |
| Barrage Attack | { 3. Fixed Area | (Matrix 3) |
| | { 4. Mobile | (Matrix 4) |

B. Anti-space Operations

- | | |
|----------------|-----------------|
| Barrage Attack | { 1. Soft |
| Direct Attack | { 2. Semi-hard |
| | { 3. Hard Point |

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C. Anti-Air Operations

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The next page is a summary of the deficiencies and limitations, the six matrices are on the following six pages, and a glossary ends this strategic offense section.

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STRATEGIC OFFENSE

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Deficiencies:

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- Anti-surface operations
 - Current systems cannot react fast enough to destroy time urgent targets
 - Cannot locate mobile targets, especially SSBNs
- Anti-space operations
 - Limited current capability
 - Limited use of nuclear weapons because of potential for collateral damage
- Anti-air operations
 - Limited Capability to detect, track target, and guide offensive systems

Continuing Limitations:

- Anti-surface operations
 - Cannot react fast enough to prevent missile launch on warning
- Anti-space operations
 - None
- Anti-air operations
 - Limited target detection, tracking and offensive systems guidance.

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STRATEGIC OFFENSE
A. ANTI-SURFACE OPERATIONS

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1. HARD POINT

RANGE	SHORT	MEDIUM	LONG
TARGETS	NOT APPLICABLE	Missile Silos C ² Centers Sub Bases Shelters Communications	Missile Silos C ² Centers Sub Bases Shelters Communications Nuclear storage
Current Systems		B-52, F-105 F-111, F-4, F-15, FB-111	B-52 TITAN, MM II/III FB-111
Programmed Systems		B-1	Improved, MM III B-1
Deficiencies		Current Systems cannot react fast enough to neutralize time urgent targets. Pk for fast reaction missile systems is poor.	
Concepts		RPVs ALCM Supercruiser B-X	RPVs, M-X ALCM Supercruiser MARVs, B-X
Continuing Limitations	Cannot react fast enough to prevent launch on warning.		

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STRATEGIC OFFENSE
A. ANTI-SURFACE OPERATIONS

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2. SOFT POINT

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RANGE	SHORT	MEDIUM	LONG
TARGETS	Not Applica- ble	C ² Centers Communi- cations, Warning, Air Defense, Mili- tary Logistics Gov't Centers, Energy, Trans- portation, Logistics, Missi- les leaving Silos	C2 Centers, Communi- cations, Warning, Air Defense, Mili- tary Logistics, Gov't Centers, Energy, Transpor- tation, Logistics, Space Centers, Missiles Leaving Silos, and Ballistic Missiles
Current Systems		B-52, F-105, F-111 F-4, F-15 Polaris, Poseidon FB-111	B-52, TITAN MM II/III FB-111
Programmed Systems		B-1 Trident	Improved MM III B-1
Deficiencies		We cannot destroy missiles in boost phase.	
Concepts		RPVs Space Laser Supercruiser B-X, MARVs, ASALM	RPVs, M-X Space Laser Supercruiser MARVs, B-X, ASALM
Continuing Limitations			

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STRATEGIC OFFENSE
A. ANTI-SURFACE OPERATIONS

3. FIXED AREA

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RANGE	SHORT	MEDIUM	LONG
TARGETS	NOT APPLICABLE	Air Bases, Surface Ships in Harbor Military Logistics Industry, Energy, Civilian Person- nel	Air Bases, Surface Ships in Harbor Military Logistics Industry, Energy Civilian Person- nel
Current Systems		B-52, F-105, F-111 F-4, F-15, FB-111 Polaris, Poseidon	B-52, TITAN MM II/III FB-111
Programmed Systems		B-1 Trident	Improved MM III, B-1
Deficiencies			
Concepts		RPVs, Space Laser Supercruiser MARVs, B-X ALCM, ASALM	RPVs, Space Laser Supercruiser MARVs, B-X M-X, ALCM, ASALM
Continuing Limitations			

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STRATEGIC OFFENSE
A. ANTI-SURFACE OPERATIONS

4. MOBILE

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RANGE	SHORT	MEDIUM	LONG
Targets	Sea Mobile ICBMs Subs At Sea Surface Ships	Land Mobile ICBMs Sea Mobile ICBMs C2 Centers Subs at Sea Surface Ships	Land Mobile ICBMs Sea Mobile ICBMs C2 Centers Subs at Sea Surface Ships
Current Systems	FB-111 B-52, F-105, F-111, F-4, F-104 F-15, Polaris, Poseidon	FB-111 B-52, F-105, F-111 F-4, F-15, Polaris, Poseidon	FB-111 B-52, TITAN MM II/III
Programmed Systems	B-1 Trident	B-1 Trident	Improved MM III B-1
Deficiencies	Cannot locate SSBMs. Cannot react fast enough to Long Range and Medium Range targets. Future concepts may solve location problem.		
Concepts	Sub Detectors B-X, RPVs Supercruiser Dirigibles B-52/Harpoon	RPVs ALCM Supercruiser Sub Detectors B-X Dirigibles B-52/Harpoon	RPV, M-X, ALCM, Supercruiser MARVs, B-X Sub Detectors Dirigibles B-52/Harpoon
Continuing Limitations	THIS DOCUMENT HAS BEEN DOWNGRADED TO UNCLASSIFIED PER <u>GDA</u> CONFIDENTIAL		

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128

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STRATEGIC OFFENSE
B. ANTI-SPACE OPERATIONS

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	1. Soft	2. Semi-Hard	3. Hard Point
Targets	Navigation Communications Command & Control Weather, Energy, Recon, Offense, and Data Processing Satellites	Navigation Communications Command & Control Weather, Energy, Recon, Offense, and Data Processing Satellites	Navigation Communication Command & Control Weather, Energy, Recon, Offense, and Data Processing Satellites
Current Systems	Limited Surface to space inter- ceptor Any nuclear detonation in line of sight	Limited surface to space inter- ceptor	Limited surface to space inter- ceptor
Programmed Systems	None	None	None
Deficiencies	Limited Capabil- ity Questionable? Limited use of nuclear weapons	Limited capabil- ity Limited use of nuclear weapons	Limited capability Limited use of nuclear weapons
Concepts	Laser fr ground Laser (from A/C) Laser fr Space defense satellite High explosive from space defense satellite Surface to space Interceptor Air To Space	Laser (from A/C) Laser (from Grd) Laser from space defense satellite High explosive from space de- fense satellite Surface to Space Interceptor	Laser (from A/C) Laser from space defense satellite High explosive from space defense satellite Surface to space interceptor

Continuing
Limitations

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STRATEGIC OFFENSE
C. ANTI-AIR OPERATIONS

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DIRECT ATTACK, MOBILE (SOFT)

RANGE	SHORT	MEDIUM	LONG
Targets	Interceptors ABNCP, AWACS Ballistic Missiles in flight SAMS, AAMs Airborne Ballistic/ Cruise Missile Launchers	ABNCP, AWACS Bombers in Flt Airborne Ballistic MsIs Airborne Ballistic/Cruise Msl Launchers	ABNCP, AWACS Bombers in flt Airborne ballistic Missile Airborne Ballistic Cruise Missile Launchers
Current Systems	B-52 Weapons ECM FB-111 ECM	Polaris Poseidon	Minuteman Titan
Programmed Systems	B-1 ECM Weapons (?)	Trident	Trident
Deficiencies	Detection of Tgt Bomber self Def Can't attack Soviet Bombers/Ballistic MsIs in flt	Detection of Target Detection of Target [Tracking of Target and Guidance of U.S. Missiles]	
Concepts	Adv Detection Sys Laser (From A/C) IMP AAM (B-1) SRBDM. ASALM Anti Laser Sys ECM Sys to Attack ABM MsIs/launchers Cps.	Laser (from A/C) M-X SLCM ALCM Mod SRAM Adv Detect Sys SSBN-X Sys to attack ABN MsIs/launchers/ Cps ASALM-UNCLASSIFIED	Laser (from Space) M-X Adv Detect Sys Sys to attack ABN msIs/launchers Cps ASALM BEEN DOWNGRADED
Continuing Limitations	Target Detection Target Tracking, Sys guidance	PER Target Detection Target Tracking, Sys guidance	Target Detection Target Tracking Sys guidance

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GLOSSARY

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ABM	Anti Ballistic Missile
ABNCP	Airborne Command Post
ALCM	Air Launched Cruise Missile
ASALM	Advanced Strategic Air Launched Missile
AWACS	Air Warning & Control System
B-X	New Generation Bomber
C ²	Command and Control
CP	Command Post
ECM	Electronic Counter Measures
MARV	Maneuvering Reentry Vehicle
MM	Minuteman
M-X	Missile X - and advanced ICBM
RPV	Remotely Piloted Vehicle
Shelters	Hardened Mobile ICBM and Aircraft Shelters
SLBM	Submarine Launched Ballistic Missile
Sub	Submarine
Supercruiser	Super-sonic Cruising Fighter
SRBDM	Short Range Bomber Defense Missile

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Strategic Defense

Strategic Defense combat tasks are categorized by the target type (i.e. the specific threat that must be countered), the medium of the enemy's objective (i.e. U.S. surface, airspace, space), and the medium of engagement. The principle deficiencies include no capability for ballistic missile defense, marginally effective air defense, and limited civil defense. Trans/post-attack survivability of many systems elements is doubtful because of the vulnerability to nuclear effects. The principle continuing limitation appears to be the impossibility of preventing major damage to the CONUS in the event of an enemy first strike. Therefore the current policy is to emphasize strategic warning and assessment (see Orientation, 1.1) and the strategic offensive capability (see Action, 3.1.1).

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STRATEGIC DEFENSE

CURRENT DEFICIENCIES:

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- o Few effective damage limitation capabilities (if deterrence fails):
 - No BMD
 - Marginally effective air defense
 - Limited civil defense
- o Trans-/post-attack system integrity/survivability doubtful:
 - Orientation/Decision/Action loop needed throughout conflicts
 - Many system elements soft
 - Reduced system depth/redundancy
 - System elements and comm links vulnerable to EW and nuclear effects
- o System effectiveness varies with threat (characteristics/performance/scenarios):
 - Surveillance/warning limited (vs. some RVs, low-flying aircraft, non-beacon threats)
 - Responsiveness degraded against high-performance/time-critical threats
 - Missiles-first/massive attack scenario disrupts subsequent operation

CONTINUING LIMITATIONS:

- o Limited objective defense capabilities (active or passive)
- o Low priority for modernization (emphasis primarily on Orientation; SAL constraints; low credibility for defense effectiveness)
- o Threat dependence (characteristics, initiative, rules of engagement)
- o System assigned/structured for "peacetime" mission
- o Major damage limitation is impossible

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STRATEGIC DEFENSE:

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U.S. FORCES/VALUE TARGETS -- SURFACE*

MEDIUM OF ENGAGEMENT:	SURFACE	ATMOSPHERE	SPACE
THREATS (to U.S. <u>Surface</u>)	Invasion Forces Sea Blockade Sea Forces Sub Forces (Saboteurs) (Rebels) (Terrorists) } Internal	Bombers Fighter-bombers Support systems ASMs SLCMs/ALCMs RPVs/Drones Decoys RVs (in transit)	ICBMs SLBMs FOBS/MOBS Directed Energy
CURRENT SYSTEMS	Bombers Fighter-bombers Interceptors (Other Services)	F-106 F-101 F-102 EC-121T F-4 Nike HERCULES/Hawk	SAFEGUARD
PASSIVE DEFENSES against threat effects: Civil Defenses, Security Forces, Law Enforcement Agencies, Disaster Control and Recovery Agencies			
PROGRAMMED SYSTEMS	(Silo Hardening)	F-15 F-14 AWACS	TO UNCLASSIFIED PER <i>GIP</i>
DEFICIENCIES	Limited resources Limited survivabil. to nuclear attack Responsiveness Redeployment limited	Limited resources/ thin defense, gaps RV-first attack fur- ther limits capabs. Many elements soft System integrity Marginal time-crit. responsiveness	<u>Very limited ability</u> <u>to counter the</u> <u>primary ballistic</u> <u>missile threat.</u>
CONCEPTS	Civil Defense improvements	IMI/AMI, with CM-killing AAMs SAM-D Long-range SLIM Advanced AWACS RPV platforms Directed energy	Site Defense ABM aircraft Directed energy
CONTINUING LIMITATIONS	Relatively low levels of damage limitation against major attack: degrees achievable determined by priorities and funding.		

*Forces: C² + Comm; Mx Silos; Bomber Bases; Sub/Ship Ports; Mobile ICBMs;
Strategic Defense (BMD & Air); TacForces; Warning/Comm Systems;
Mil Logistics & Transportation

Value: Pop; U/I Centers; Gov't; Industry; Energy; Agric; Stores; Transp; Comm

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STRATEGIC DEFENSE:

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U.S. FORCES/VALUE TARGETS -- AIRBORNE*

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MEDIUM OF ENGAGEMENT:	SURFACE	ATMOSPHERE	SPACE
THREATS (to U.S. Airspace)	SAMs (enemy) AAA (enemy) Effects from Nudets, EW, EMP, EMI	ARMs (enemy) AAMs (enemy) Effects from nuclear air bursts, EW, EMP, EMI	Effects from Exo- atmospheric bursts Active-guided RVs Directed energy
CURRENT SYSTEMS	Fighter-bombers Interceptors (Other Services)	F-106 F-101 F-102 EC-121T F-4	
PROGRAMMED SYSTEMS		F-15 F-14 AWACS	
DEFICIENCIES	Limited resources Limited survivabil. to nuclear bursts Redeployment limited	Limited resources/ thin defense, gaps Poor time-critical responsiveness ID capabilities/proceeds. RV-first attack vs. CONUS further limits capabilities	No active defenses Inherent passive defenses only
CONCEPTS	Improved survivabil.	Air-launched anti- ARM/AAM ECCM improvements Improved survivabil.	Air-launched inter- ceptor missile Improved survivabil.
CONTINUING LIMITATIONS	Low level of damage limitation against direct/nuclear attack: must rely primarily on (limited) on-board active/passive capabilities to survive. Increased technical difficulties. Decreased target numbers and importance (from surface targets).		

*Forces: C² + Comm; Bombers en route; Airlift; Interceptors; Tac Aircraft;
ICBMs leaving silos; SLBMs at launch

Value: Civil Air Traffic; Territorial Airspace

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STRATEGIC DEFENSE:

U.S. FORCES/VALUE TARGETS -- IN SPACE*

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MEDIUM OF ENGAGEMENT:	SURFACE	ATMOSPHERE	SPACE
THREAT (to U.S. in Space)	ABM (enemy)		Coorbiting Anti-Satellite Satellite (enemy)
CURRENT SYSTEMS			
PROGRAMMED SYSTEMS			
DEFICIENCIES	No active defenses; inherent passive defenses/survivability only		
CONCEPTS			Satellite Intcpt Directed Energy Decoys Silent Spares Improved survivabil.
CONTINUING LIMITATIONS	Low level of damage limitation against direct attack: must rely primarily on (limited) on-board passive capabilities to survive. Space policy constraints. Increased technical difficulties. Further decrease in target numbers/importance (compared to surface and airborne targets).		

*Forces: C² + Comm; Surveillance/Warning Satellites; ICBMs/SLBMs in flight
Value: Spacecraft; Domestic Satellites

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GLOSSARY: STRATEGIC DEFENSE

AAA Air-to-air artillery
AAM Air-to-air missile
ABM Anti-ballistic missile
ARM Anti-radiation missile
ASAT Anti-satellite weapon
ASM Air-to-surface missile
AWACS Airborne warning and control system
AMI Advanced manned interceptor
ALCM Air-launched cruise missile
BMD Ballistic missile defense
CM Cruise missile
CONUS Continental United States
C² Command and control
ECCM Electronic counter-countermeasures
EMI Electromagnetic interference
EMP Electromagnetic pulse
EW Electronic warfare

FOBS Fractional orbit bombardment system

ID Identification
ICBM Intercontinental ballistic missile
IMI Improved manned interceptor

MOBS Multiple orbit bombardment system
Mx Missiles

Nudet Nuclear detonation

RPV Remotely piloted vehicle
RV Reentry vehicle
SAM Surface-to-air missile
SAM-D Surface-to-air missile "D"
SLCM Surface-(sea/sub-) launched cruise missile
SLBM Sea- (sub-) launched ballistic missile
SLIM Surface-launched interceptor missile

U/I Urban/Industrial
U.S. United States

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GENERAL PURPOSE

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The General Purpose target oriented combat tasks have been re-grouped into the two broad categories of Air-to-Air and Air-to-Ground. These categories have been further subdivided into the classical mission areas of Counter Air, Interdiction, and Close Air Support. Anti-space operations have been intentionally omitted, since no General Purpose direct neutralization tasks in space are envisioned during the time period of this plan.

The fact that the spectrum of General Purpose tasks is so broad makes it difficult to design a simple two dimensional matrix portraying the target/hardware match-up. Influencing this match-up are numerous critical factors such as target location (surface/air), target type (point/area/mobile), target hardness, timeliness, defenses, range, weather, concealment, size, and how acquired (visual/electrical/IR/radar). A matrix portrayal of all of these factors would not only be overly complex, but would also invite over-simplification when analyzing each target/hardware match-up in isolation. There are conditions where a munition combined with a specific aircraft and delivery avionics will suffice; however, if any one of these variables is changed the capability to neutralize the target may be negated. For example, if the target is a munitions depot, the weather clear and the defenses light, MK-82 GP bombs dropped from an F-4, using manual dive bombing techniques might be sufficient. However, given a degradation in the weather factor alone, the example aircraft/munition,/delivery aid combination may become unacceptable. Continued pursuit of this approach leads to a practically inexhaustible number of combinations to be considered, each requiring varying degrees of subjective reasoning.

Therefore, in an attempt to manage this problem, the selected matrix matches targets against weapons systems (aircraft, munitions and delivery aids). For simplification, the other critical elements are not portrayed but must be implicitly assumed. Also, the aircraft/munitions/delivery aids must be combined in ways which are compatible with one another. For example an AIM-7 must be carried on an F-4 and cannot be carried on an F-105. This assumes some knowledge on the reader's part to be able to develop compatible combinations.

The deficiencies and continuing limitations are derived by first identifying the targets that cannot adequately be neutralized by current systems, programmed systems or future concepts when all the critical elements are considered. Secondly, other problems, such as cost and complexity, that also tend to limit the capability to neutralize targets are identified. No value judgments on priorities, quantities needed or mixes are made at this time.

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GENERAL PURPOSE

Deficiencies:

- Air-to-Ground:
 - Counter Air:
 - Defenses/Fear of high attrition too strongly influence force employment options/priorities
 - Inadequate: Stand off Launch, Trajectory Shaping Reliability, Carriage/Delivery Flexibility, Penetration Aids, Munitions Handling/Turn Around Flexibility.
 - No Hard Structures Penetrator
 - No Effective All Wx Weapons
 - Limited Mining/Area Denial Capability
 - Interdiction:
 - Same as Counter Air, Plus:
 - Inadequate Sensor/Acq/Wpn Tie-In, Target Generation/Ident Capability, Damage Assessment
 - Close Air Support:
 - No Adverse Wx Cap, and Inadequate: Fire Support Line Definition, Accuracy Close In, C/M Hardening, Discriminating Guidance Modes, TST ACQ CAP, NIGHT CAPABILITY.
- Air-to-Air:
 - Missiles:
 - Large WRM Shortfall/Escalating Costs; Poor Reliability; Poor P_k Dependence on A/C Avionics; Excessive Turnaround Requirements; High Support/Live-Cycle Costs; Heavy Aircrew Tasking for Launch; Excessive Weight, Drag.
 - Guns:
 - Poor P_k/Reliability; Excessive Projectile Time of Flight; Poor Ballistics/Striking Power; Excessive Gun System Weight, Inadequate Gun Sights; Excessive System Support Requirements/Life Cycle Costs.

Continuing Limitations:

- Air-to-Ground:
 - Supportability, Complexity, Cost, Target Acquisition
- Air-to-Air:
 - No Small Target Acquisition/Kill Capability
 - Inadequate EW/ECM/ECCM Capability

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42

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GENERAL PURPOSE
AIR-TO-AIR

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TARGETS:	<u>MANNED:</u> Fighters, Recon A/C , Bombers, Transports, ABNCP Observation Aircraft, Helicopters <u>UNMANNED:</u> RPVs, ASMs, Missiles
CURRENT SYSTEMS:	<u>AIRCRAFT:</u> F-4C/D/E, (F-106), F-105, F-100 <u>MUNITIONS:</u> AIM-7E-2, AIM-9E/J, AIM-4D/G/H, M-61(20mm) <u>DELIVERY AIDS:</u> Radar, Tiseo, EIFF, IR, GCI, Data Link
PROGRAMMED SYSTEMS:	<u>AIRCRAFT:</u> F-15, ACF, AWACS <u>MUNITIONS:</u> AIM-7F, AIM-7E-3, AIM-9J+, AIM-9L <u>DELIVERY AIDS:</u> Pulsed Doppler Radar
DEFICIENCIES:	General: No Small Target Acquisition/Kill Capability; Heavy Systems Training Reqmts; Inadequate EW/ ECM/ECCM, IFF Overly-Complex Fire Control Mechanism. Missiles: Large WRM Shortfall/Escalating Costs; Poor Reliability; Poor P_k ; Dependence on A/C Avionics; Excessive Turnaround Requirements; High Support/Life-Cycle Costs; Heavy Aircrew Tasking for Launch; Excessive Weight, Drag. Guns: Poor P_k /Reliability; Excessive Projectile Time of Flight; Poor Ballistics/Striking Power; Exces- sive Gun System Weight, Inadequate Gun Sights; Excessive System Support Requirements/Life Cycle Costs.
CONCEPTS	<u>AIRCRAFT:</u> ATF, Super Cruiser, RPVs, AMF <u>MUNITIONS:</u> SEEK BAT, Starling, CLAW, AGILE, Improved 20mm, New Gun/Ammo, E/O/Laser/Rdr Beam-riding Seekers. <u>DELIVERY AIDS:</u> IR, E/O, Laser Advanced ID, Adv Sight, Dual Mode Recognizer
CONTINUING ITATIONS	No Small Target Acquisition/Kill Capability, Inadequate EW/ECM/ECCM Capability THIS DOCUMENT HAS BEEN DOWNGRADED TO UNCLASSIFIED

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141 *11/28/79*

GENERAL PURPOSE
AIR-TO-GROUND

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TARGETS:

COUNTER-AIR: Aircraft, Shelters, Runways/Taxiways
Airfield Support Facilities/Equipment,
POL, Personnel, C³, Radars, Defenses.
INTERDICTION: Waterways, Bridges, Tunnels, Armor
Vehicles, Depots, Marshalling Points, POL,
Factories, Ports, Shipping Radars, C³
Defenses, Roads/RR.
CLOSE AIR SUPPORT: Armor, APCs, Artillery, Defenses,
Personnel, Bunkers, Helicopters.

CURRENT SYSTEMS:

AIRCRAFT: F-4C/D/E, F-111, A-7D, F-105, F-100 A-37
AC-130, B-52
MUNITIONS: Mk82/84, M117, CBU's, 2.75Rx, M-36E2,
Guns (20mm & Gunship), Laser/TV Mk84/82),
TV Maverick, BLU-27/32, Rockeye, Std Arm,
Shrike, Tactical Nuclear Weapons.
DELIVERY AIDS: Radar, Laser, LORAN, MSQ

PROGRAMMED *
SYSTEMS:

AIRCRAFT: F-15, AWACS, A-10, ACF, F-4E(WW)
MUNITIONS: PEP LGB, Modular Glide Weapons, Laser Pavestorm
LO ALT PROX FUZE, PAVE ROCK, GATOR Grasshopper.
Scene Mag Mav, LASER Mav, IIR Mav, Improved
Shrike/STD ARM
DELIVERY AIDS: MTI, PAVE PENNY, PAVE SPIKE, PAVE TACK,
Loran, INS, ALSS

DEFICIENCIES:

COUNTER AIR: -Defenses/Fear of high attrition too strongly
influence force employment options/priorities
-Inadequate: Standoff Launch, Trajectory Shaping
Reliability, Carriage/Delivery Flexibility,
Penetration Aids, Munitions Handling/Turn
Around Flexibility
-No Hard Structures Penetrator
-No Effective All Wx Weapons
-Limited Mining/Area Denial Capability
INTERDICTION:
-Same as Counter Air, Plus:
-Inadequate Sensor/Acq/Wpn
Tie-In, Target Generation/Ident Capability,
Damage Assessment
CLOSE AIR SUPPORT: No Adverse Wx Cap, and Inadequate:
Fire Support Line Definition, Accuracy
Close In, C/M Hardening, Discriminating
Guidance Modes, TST ACQ CAP, NIGHT
CAPABILITY

CONCEPTUAL OR
UNPROGRAMMED
SYSTEMS

AIRCRAFT: ATF, Super Cruiser, RPVs, AMF
MUNITIONS: Condor, Harpoon, Harm, Modularity
All Wx SEEKER, FAE, Conf A.I.R.,
Bluff, HSM, AFAM, CADM, AREM,
Anti-Armor Bomblet, CEB/ASP, Piranha, 30 mm Gun
Pod
DELIVERY AIDS: GPS, Low Cost INS, EAR, Sensor-Loran Grid,
Deployable Base, PELSS, Radar Correlation,
GEANS, Optical Counter Measures Pod,
Advanced TAC Radar

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CONTINUING
LIMITATIONS

Supportability, Complexity, Cost, Target Acquisition.

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142

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GLOSSARY

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AANCP - Airborne Command Post
A/C - Aircraft
ACQ - Acquisition
AFAM - Airfield Attack Munition
AGILE - Air-to-air "dogfight" missile with off-boresight launch capability and thrust-vector control (NAVY)
AIM - Air Intercept Missile
A.I.R. - Air Inflatable Retardation/stabilization device for GP bombs
ALSS - Advanced Location/Strike System
AMF - Advanced Maneuvering Fighter
APC - Armored Personnel Carrier
AREM - Air Replenishable Munition
ASM - Air-to-Surface Missile
ASP - All Altitude Spin Projected Dispenser
ATF - Advanced Tactical Fighter
AWACS - Airborne Warning and Control System
BLUFF - Bluff shaped bomb optimized for supersonic/high density carriage
CADM - Clustered Airfield Defeat Munition
BCU - Cluster Bomb Unit
CEB - Combined Effects Bomblet
CLAW - Low cost air-to-air "dogfight" missile
C/M - Countermeasures
CONDOR - Standoff air-to-ground missile (NAVY)
Conf Carr - Conformal Carriage
EAR - Electronically Agile Radar using synthetic operative techniques
ECCM - Electronic Counter-Countermeasures
ECM - Electronic Countermeasures
EIFF - Enemy Identification Friend or Foe
E/O - Electro/Optical
EOGB - Electro-Optical Guided Bomb
EW - Electronic Warfare
FAE - Fuel Air Explosive weapon
GATOR - Air scatterable anti-armor land mine
GCI - Ground Controlled Intercept
GEANS - High accuracy selfcontained INS
GPS - Global Positioning System
GRASSHOPPER - Air scatterable anti-materiel/anti-personnel land mine
HARM - High-speed Anti-Radiation Missile (NAVY)
HARPOON - Radar guided anti-ship missile (NAVY)
HSM - Hard Structure Munition
ID - Identification

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IIR - Imaging Infrared
INS - Inertial Navigation System
IR - Infrared
LGB - Laser Guided Bomb
LORAN - Long Range Navigation system used for precise aircraft positioning
MAVERICK - Guided anti-tank/anti-materiel missile
MGGB - Modular Guided Glide Bomb
mm - Milimeter
msl - Missile
MSQ - Ground radar designation
MTI - Moving Target Indicator
NUKES - Nuclear weapons
PAVE PENNY - Laser search and track set
PAVE ROCK - Aircraft shelter penetrator rocket (2.75 inch)
PAVE SPIKE - Day visual selfcontained laser designating system
PAVE STORM - Large guided cluster munition
PAVE TACK - Adverse weather/day/night selfcontained laser designator system
PELSS - Precision Emitter Location Strike System
PEP LGB - Production Engineering Program version of Laser Guided Bomb
PIRANHA - Anti-armor underwater mine
P_k - Probability of kill
POL - Petroleum, Oil and Lubrication
Rockeye - Anti-armor cluster munition
RPV - Remotely Piloted Vehicle
RR - Railroad
RV - Reentry Vehicle
SCENE MAG MAV - TV Maverick with magnified field of view (scene) capability
SHRIKE - Anti-radiation missile
STANDARD ARM - Shrike follow-on anti-radiation missile
STARLING - Low cost medium range air-to-air missile
TAC - Tactical Air Command
TISEO - Target Identification System Electro-Optical
TV - Television
WPN - Weapon
WRM - War Reserve Material
Wx - Weather

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144
MAVERICK

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COMBAT SUPPORT

Combat support tasks are defined to be those tasks which must be successfully accomplished if there is to be direct neutralization of the target, and yet, are not part of the neutralization activity itself. These tasks are quite diverse, and somewhat ambiguous in their distinction from the other combat tasks. For example, in some circumstances reconnaissance can be considered to be both a support task and an orientation task. Matching of combat support tasks with hardware options is not at the same stage of development as the direct combat tasks match ups. This is primarily because we felt that the direct combat tasks had to be articulated before the necessary supporting hardware could be identified.

The table of this appendix shows the tentative task-hardware/option matchup. In a general sense, support systems embody stable technology but important exceptions are the space shuttle and certain reconnaissance systems. Support systems do not appear to have any continuing limitations that can not be resolved assuming resources are available and priorities are high enough. Other support tasks are being considered but they have not as yet been matched up with hardware options. These tasks include electronic warfare, automated data processing, space replenishment. In addition, neither navigation and positioning systems nor approach and landing systems have been addressed as yet. Since we now have a better understanding of the direct combat tasks, the next iteration should yield a much more comprehensive array of information than is shown in the appendix.

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145
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COMBAT SUPPORT

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Function	Strategic Airlift	Tactical Airlift	Ground Materials Handling	Airborne Materials Handling	Strategic Aerial Refueling	Tactical Aerial Refueling
Current Systems	C-5 C-141	C-7 C-123 C-130	463L 25K Loader 40K Loader	CDS LAPES	KC-135	KC-135
Programmed Systems	C-141 Stretch		TAC Loader			
Deficiencies	Insufficient oversize/ outsize capability*	Same, Low Pro- ductivity, STOL			Insuffi- cient Off Load Capabil- ity	Insuffi- cient Off Load Capabil- ity
Concepts	CRAF MODS ATCA C-X Space Shuttle	AMST		HLCADS PARS	ATCA	ATCA
Continuing Limitations	Only limitation in \$ Allocation					

* This deficiency can be eliminated by procurement of additional C-5's.

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COMBAT SUPPORT (Cont'd)

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Function	Surface Rescue	Space Rescue
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Current Systems	HH-3E HH-53	
Programmed Systems		
Deficiencies	Adverse weather performance A/C Performance (special, efficiency etc) Surv./Vuln.	
Concepts	ARS	Shuttle
Continuing Limitations		

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147
11/11/83
21

GLOSSARY

ARS Advanced Rescue System
ATCA Advanced Tanker/Cargo Aircraft

CDS Container Delivery System
CRAF Civil Reserve Air Fleet

HLCADS High Level Container Airdrop System

LAPES Low Altitude Parachute Extraction System

PARS Parachute Altitude Recognition System

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