BY THE U.S. GENERAL ACCOUNTING OFFICE

Report To The Secretary Of Defense

An Analysis Of The Counterair Mission Is Required To Help Ensure That The Air Force Is Buying The Capabilities It Needs

The mission analysis concept basically consists of assessing mission capabilities to identify deficiencies and needs and then suggesting alternative ways to achieve the desired capability. The need for and benefits of mission area analysis have long been recognized in both the Department of Defense and the legislative branch. In GAO's opinion, the mission area analysis concept should be an integral part of the process which ultimately results in developing the Air Force's congressional budget submission.

Because the Air Force has not analyzed the counterair mission, the Tactical Air Command may be submitting requirements that are not the best solutions to actual mission deficiencies; that is, the requirements were based on perceived deficiencies in mission capabilities rather than on an analysis of the mission. To the extent that this situation goes uncorrected, the validity of the need for the proposed programs in the counterair portion of the Air Force budget could be open to question.

GAO/MASAD-83-1

NOVEMBER 5, 1982

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UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

MISSION ANALYSIS AND
SYSTEMS ACQUISITION DIVISION

B-205620

The Honorable Caspar W. Weinberger
The Secretary of Defense

Attention: Director, GAO Affairs

Dear Mr. Secretary:

This report contains our review of the counterair mission. We limited our review to that mission because we were principally interested in ascertaining the Air Force mission area analysis process and how well it was working. Our review examined the extent to which the Air Force conducts mission area analysis to identify counterair deficiencies and requirements. This report points out that the Air Force has recognized the desirability of conducting mission area analyses. In fact, the Air Force has incorporated the requirement to perform such analyses in its management regulations and the Air Staff has developed a framework through an Air Force-wide mission area analysis to rank proposed programs across all Air Force missions, including the counterair mission.

This report addresses (1) the fact that, contrary to the Air Force and its own regulations, the Tactical Air Command is not using mission area analysis to identify counterair deficiencies and validate counterair needs, (2) some problems associated with the Air Force-wide mission area analysis, and (3) the influence the absence of counterair mission area analysis has on the credibility of the Air Force budget.

This report contains recommendations to you on pages 12, 18, and 21. As you know, section 236 of the Legislative Reorganization Act of 1970 requires the head of a federal agency to submit a written statement on actions taken on our recommendations to the House Committee on Government Operations and the Senate Committee on Governmental Affairs not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We are sending copies of this report to the Director, Office of Management and Budget; the Chairmen, House Committees on Armed Services, Appropriations, Budget, and Government Operations, and

the Senate Committees on Armed Services, Appropriations, Budget, and Governmental Affairs; and the Secretary of the Air Force.

Sincerely yours,

W. H. Sheley, Jr.
Director

GENERAL ACCOUNTING OFFICE
REPORT TO THE SECRETARY
OF DEFENSE

AN ANALYSIS OF THE COUNTERAIR MISSION IS REQUIRED TO HELP ENSURE THAT THE AIR FORCE IS BUYING THE CAPABILITIES IT NEEDS

D I G E S T

The Air Force has defined its counterair mission to include

--destroying enemy aircraft, systems, and support facilities before they can be put into action (offensive counterair);

--identifying, intercepting, and destroying enemy air forces trying to penetrate friendly airspace (defensive counterair); and

--degrading, neutralizing, or destroying enemy surface-to-air missiles, antiaircraft artillery, and command and control systems (defense suppression).

Counterair is one of nine basic Air Force mission areas. Determining how to best allocate Air Force resources among the nine mission areas and within the counterair mission, on which billions of dollars are spent annually, is a difficult and complex task. One management tool that can be used to facilitate this task is mission area analysis (MAA)--a structured, analytical process by which overall mission deficiencies and alternative solutions are identified and evaluated.

The concept of MAA has evolved from the Congressional Budget and Impoundment Control Act of 1974 and the Office of Management and Budget Circular A-109. The need for and benefits of MAA have long been recognized. This recognition has been evident in Department of Defense (DOD) studies and reports, congressional committee hearings, and prior GAO reports. (See pp. 1 to 3.)

If done properly, a MAA provides all levels of management with the ability to trace individual items in the agency's budget back to a documented analysis and justification of why a

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particular budgeted item is considered to be the most effective solution to correcting a formally identified mission deficiency.

WHY THE REVIEW WAS MADE

GAO's review was made to ascertain the Air Force MAA process and how well it was working. To do this GAO selected the counterair mission for detailed examination. GAO found that

--the Tactical Air Command (TAC) is not conducting a counterair MAA to identify deficiencies and validate needs,

--Air Force Headquarters has developed a process for performing Air Force-wide MAA which shows strong potential but is still evolving, and

--the individual counterair related programs within the Air Force's annual budget are not traceable back to a well-documented MAA and justifications.

TAC IS NOT USING MAA TO IDENTIFY COUNTERAIR DEFICIENCIES AND VALIDATE COUNTERAIR NEEDS

Despite the long-standing recognition of the need for and benefits of MAA and the fact that Air Force regulations require that such analysis be made, TAC does not use this type of formal analysis. Instead, this command uses an array of military judgments and miscellaneous studies in its requirements process. This process is oriented to justifications for individual programs based on each programs own merit rather than from a mission-wide point of view. As a result, TAC may be submitting requirements that are not the best solutions to actual mission deficiencies because the requirements were based on perceived deficiencies in mission capabilities rather than on an analysis of the mission. (See ch. 2.)

TAC does not perform a MAA because it believes the following:

--A MAA loses its credibility because of the difficulty in understanding and

tracking how the analysis turned raw data into an end product. GAO believes that this problem can be avoided with a well-designed, clearly documented model. (See pp. 10 and 11.)

--A MAA is of little or no use because of the lack of attention given to the results of such an analysis during the budget process. TAC's position is based on past experience with one unsuccessful attempt at using this approach. GAO acknowledges that the MAA concept is complicated and takes time to mature and be accepted. However, GAO believes that MAAs are useful and that TAC gave up on the concept too quickly. (See p. 11.)

--A MAA has limited value because its outcomes are based on a large number of assumptions. GAO believes that assumptions are unavoidable and not necessarily objectionable, provided they are visible and documented so they can be critically examined. Also, GAO believes that, generally, the same assumptions that would be required to perform a MAA are already being used, although not documented, in the military judgment that is now used by TAC to justify individual programs on their individual merit. (See pp. 11 and 12.)

AIR FORCE-WIDE MAA--A GOOD PROCESS BUT IMPROVEMENTS ARE NEEDED

While TAC has failed to adopt MAA to identify deficiencies and justify needs within the counterair mission, the Air Force Headquarters' staff has developed a good framework through an Air Force-wide MAA process designed to consider proposed programs across all nine Air Force mission areas. Efforts are needed to improve the credibility and acceptance of this process Air Force-wide. These efforts are needed because

--a September 1980 Air Force Inspector General report stated that the major commands have distorted their input data to the Air Force-wide MAA to get desired results (see p. 16),

--the methodology used in the Air Force-wide MAA is open to criticism because (1) it does not consider all relevant factors (such as cost) when evaluating proposed programs and (2) the effectiveness of training programs cannot be adequately measured or accurately quantified (see pp. 16 and 17), and

--top management in the Air Force has been reluctant to use the results of the Air Force-wide MAA. (See p. 17).

In GAO's opinion, with continued efforts to improve the reliability of the information from the major commands and to incorporate all relevant factors, including cost and training, the current problems can be overcome and then this Air Force-wide process should provide valuable information to facilitate Air Force resource allocation decisionmaking. (See ch. 3.)

ABSENCE OF COUNTERAIR MAA INFLUENCES THE CREDIBILITY OF THE AIR FORCE BUDGET

GAO examined the justification for several counterair programs that were included in the Air Force budget. GAO found that no formal MAA exists which supports the overall mission effectiveness of the items selected. Generally, the overall justification for these programs from the mission point of view was inadequate.

Regarding an analysis of the counterair mission, the Congress has directed that a North Atlantic Treaty Organization Conventional Capability Improvement Study be conducted, including a comprehensive program for counterair weapon capability. This study is to be submitted concurrent with the defense budget request for fiscal year 1984. GAO believes that this study provides DOD the opportunity to use MAA in conjunction with its budget request for the counterair mission. (See ch. 4.)

CONCLUSIONS

The need for and benefits of MAA have long been recognized within DOD and the legislative branch. In this vein, Air Force regulations require operating commands to continually

analyze their assigned mission areas to assess, from an overall mission point of view, the deficiencies and alternative solutions for meeting future capability needs. After only one attempt, TAC stopped conducting MAA, having adopted a pessimistic attitude toward the concept. As a result, TAC may be submitting counterair requirements that are not the most effective solutions to actual mission deficiencies. GAO believes that TAC should follow Air Force regulations and perform a formal analysis of the counterair mission.

A recent congressional mandate to do a comprehensive study of the counterair mission (North Atlantic Treaty Organization Conventional Capability Improvement Study) provides an excellent opportunity for DOD to use the MAA concept in support of its counterair-related budget submission to the Congress.

The Air Force Headquarters' staff has developed an Air Force-wide MAA process that has the potential to provide a sound analytical basis for making resource decisions across major command and mission area lines. Currently, the full potential of this process is not being realized because of problems with the major commands' input data, limitations in the methodology being used, and a reluctance on the part of decisionmakers to use the results. The staff recognizes these problems and is making genuine attempts to correct and improve the quality of their analyses.

Because TAC does not use MAA to determine its deficiencies and needs and because of the problems previously discussed relative to the Air Force-wide MAA process, the counterair portion of the Air Force budget could be open to question. That is, the Air Force does not have adequate assurance that the counterair systems/programs it is proposing for the budget do in fact represent a valid need and/or are the most effective solution to the identified deficiencies in mission capabilities.

RECOMMENDATIONS

GAO recommends that the Secretary of Defense direct the Secretary of the Air Force to require:

--TAC to comply with Air Force regulations and perform a formal MAA of the counter-air mission to properly identify deficiencies and potential problems. This analysis should be updated as required, based on changes in the threat or other needs.

--The Air Staff to continue to develop the Air Force-wide MAA into a valuable management tool.

--The congressionally mandated North Atlantic Treaty Organization Conventional Capability Improvement Study be conducted in accordance with the MAA concept discussed in chapters 2 and 3 of this report.

Contents

ABBREVIATIONS

AFWMAA	Air Force-wide mission area analysis
DOD	Department of Defense
GAO	General Accounting Office
MAA	mission area analysis
OSD	Office of the Secretary of Defense
PDP	Program Decision Package
POM	Program Objective Memorandum
TAC	Tactical Air Command

CHAPTER 1

INTRODUCTION

The Air Force, in response to the Department of Defense (DOD) direction, has established nine basic mission areas, each with specific tasks and objectives designed to meet operational mission goals. Counterair is one of these nine mission areas. While this mission area has common elements with missions of other services (for example, the Army's air defense and fire support missions), this report deals primarily with the Air Force's counterair mission.

Counterair includes offensive, defensive, and defense suppression tasks. Offensive counterair involves destroying the enemy's aircraft, systems, and support facilities before they can be put into action, for example, airfield attack. In defensive counterair the tasks are to identify, intercept, and destroy enemy air forces trying to penetrate friendly airspace. Defense suppression degrades, neutralizes, or destroys the enemy's surface air defense (surface-to-air missiles and antiaircraft artillery) and command and control systems. According to Air Force budget officials, billions of dollars are spent annually for the counterair mission.

In general, counterair tasks and objectives are designed with the ultimate goal of gaining and maintaining air supremacy. This is a condition that gives friendly forces freedom of action throughout the area of conflict while denying the enemy the same freedom. To carry out and attain the counterair mission objectives, warfare systems must be prepared to fight, forces must be trained, and weapon systems must be designed. These processes involve a diversity of counterair projects with complicated interrelationships. As a result, determining how to best allocate counterair resources is a difficult and complex process.

The Tactical Air Command (TAC) is the major Air Force command responsible for the counterair mission. TAC is required to evaluate counterair capabilities, identify counterair deficiencies, and determine counterair needs. Air Force regulations require TAC to use mission area analysis (MAA) in this process.

VALUE OF MAA

One of DOD's most difficult activities is deciding how to invest limited available resources to maximize combat capability. There has been a constant striving to improve this resource allocation process. In the 1970s, emphasis was directed toward a broad, mission-area approach to allocating resources.

One catalyst for this emphasis was the Congressional Budget and Impoundment Control Act of 1974. It required that a mission-oriented display of an agency's programs be presented to the Congress each year. Another stimulus was the Office of Management and Budget Circular A-109. Issued in 1976, Circular A-109 provides an organized approach to managing major system acquisitions. The circular was based on recommendations made by the Commission on Government Procurement to help solve a number of problems which have historically plagued major system acquisitions. It supplies a framework of flexible management policies that can be applied to all systems, ranging from public buildings to defense weapons. A-109 requires a continuing analysis of current and forecasted mission capabilities, technological opportunities, overall priorities and resources and also provides that mission needs be assigned a relative priority within the agency. The results of this continuing mission analysis are reflected in formal statements of mission need. Once submitted and approved by the agency, the mission need is usually communicated to the Congress during the budget process.

One outcome of the Office of Management and Budget and congressional direction is the adoption of the MAA concept. MAA provides a structured analytical process by which mission deficiencies and subsequent solutions are identified and evaluated. Its major advantage is that it provides a structured, traceable means of identifying deficiencies and assessing proposed solutions so that the greatest mission effectiveness can be obtained for given resources.

The need for and benefits of MAA have long been recognized. For example, two DOD reports issued during the 1970s on the weapon system acquisition process endorsed the use of MAA. The first report, prepared in 1975 by the Acquisition Advisory Group made up of civilian and military professionals familiar with acquisition problems, recommended that a continuing series of mission analyses be done by the services to assess current and projected capabilities. The group said that the deficiencies and needs identified in these MAAs should serve as a basis for specific recommendations for corrective action. The second report, prepared by the Defense Science Board in 1978, stated that the Office of the Secretary of Defense (OSD) must take steps to ensure that the services reorient their analyses away from requirements analyses which were individual program oriented toward mission analyses which would address all aspects of mission capability needs. The report added that the user community needs to be a contributor to these MAAs which are to be used in identifying deficiencies and needs.

Another key endorsement of the value of the MAA process comes from the Army's Training and Doctrine Command which completed a MAA in 1980 of the Army's fire support mission. In its report on that MAA, the Command stated:

"After 15 months of concerted effort, we can state that the Mission Area Analysis approach is worth all the resources invested in it."

The report cited numerous important results and spin-offs from the analysis, including opening important information exchange channels, providing greater user participation in the identification of needs and solutions, and forcing both full consideration of intermediate and long-term needs and explicit articulation of assumptions and operating premises.

Further recognition of the need for and value of MAA can be seen in congressional hearings held in March 1982. In these hearings the Chairman of the Subcommittee on Defense, House Committee on Appropriations, asked OSD officials if they agreed that a joint review of the ground air defense mission area could lead to improvement in the services' abilities to address problems of mutual concern. OSD acknowledged that, given that improvement is required, such a review could be beneficial.

In our years of work in reviewing DOD programs, we have come to appreciate the usefulness of MAA as a management tool for providing decisionmakers with valuable information for making resource allocation decisions. In reports to the Secretary of Defense on May 15, 1981, 1/ and March 17, 1982, 2/ we encouraged much greater use of MAA for identifying deficiencies and weapon system needs.

MAA CONCEPT IN THE AIR FORCE

The MAA concept can be applied at various levels within the Air Force. One of these applications should occur at the major commands (for example, TAC) and one at Air Force Headquarters. While each application has a different emphasis, we believe they are each important and necessary to the resource allocation process.

According to Air Force regulations, MAA at the major command level should be used to evaluate assigned mission responsibilities, identify mission deficiencies, and determine solutions to the identified deficiencies. This is the foundation of the requirements process and is essential to resource allocation decisions. TAC's use of MAA for the counterair mission area is discussed in chapter 2.

Air Force-wide mission area analysis (AFWMAA) at the Headquarters level (Air Staff) is a process used to evaluate Air Force

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1/"Improving the Weapon Systems Acquisition Process" (MASAD-81-29).

2/"Review of the Impact of A-109 on Weapon Systems" (MASAD-82-10).

capabilities and identify Air Force deficiencies within and across all major missions. The Air Staff has been using and developing this process since 1977. Two major distinctions between MAA and AFWMAA are: (1) MAA assesses capabilities from a single-mission perspective while AFWMAA assesses capabilities from an Air Force-wide (multiple mission) perspective and (2) although both MAA and AFWMAA evaluate capabilities and identify deficiencies, MAA proposes solutions to identified deficiencies while AFWMAA assesses and prioritizes the proposed solutions. AFWMAA is discussed in chapter 3.

MAA IS NEEDED IN THE BUDGET PROCESS

MAA is intended to provide a logical process for decision-makers to prioritize and select programs in the resource allocation process. At TAC, a MAA is important in that it can provide an in-depth perspective of an individual mission area (counterair). It is the foundation on which deficiencies can be accurately identified and needs properly supported.

The Air Force-wide MAA at Air Force Headquarters is also important in the budget process. It can broaden individual major command mission perspectives by gathering, analyzing, and assessing data within and across Air Force missions. It provides an assessment of programs' contributions to the Air Force's overall combat capability.

Involvement at both TAC and Air Staff levels is required to ensure that contemplated programs fulfill mission needs and that the optimum combat capability is obtained for our budget dollars. Weaknesses in major commands' MAA and/or the Air Force-wide MAA are carried through the entire budget process and can affect resource allocation decisions. MAA's effect on the budget process is discussed in chapter 4.

OBJECTIVES, SCOPE, AND METHODOLOGY

The objectives of this review were to determine the extent to which the Air Force conducts MAA to identify counterair mission deficiencies and requirements and to determine if and how MAA is used. During this review we discussed MAA and the requirements and budgeting processes with officials in OSD, Office of the Joint Chiefs of Staff, and various organizations within Air Force Headquarters, and TAC at Langley Air Force Base, Virginia. We also analyzed documents related to MAA; the requirements process; the Planning, Programming, and Budgeting System; and our prior reports concerning mission analysis and systems acquisition.

Since we were principally interested in ascertaining the Air Force MAA process and how well it was working, we limited our review to examining only the counterair mission. We examined this mission to determine how (1) deficiencies are identified,

(2) requirements are established and validated, (3) requirements become programs, and (4) programs are incorporated into the budget. To do this we selected several counterair-related programs which have or had been proposed for funding. We traced these back through the requirements process in an attempt to identify the formal analysis which should have supported their need.

Our review was performed in accordance with generally accepted government audit standards.

CHAPTER 2

TAC DOES NOT CURRENTLY USE MAA TO IDENTIFY COUNTERAIR DEFICIENCIES AND VALIDATE COUNTERAIR NEEDS

Counterair needs should be identified by a comprehensive and objective analysis of the overall mission area. Although the Air Force requires the use of a MAA by its major commands to formally assess their mission capabilities, identify deficiencies, and establish mission needs, TAC has not implemented this requirement. Instead, TAC officials question the usefulness of MAA and rely primarily on "military judgment" to identify deficiencies and establish needs. Because TAC does not use MAA, it may be submitting requirements that are not the best solutions to actual counterair mission deficiencies.

AIR FORCE REGULATIONS REQUIRE MAA TO IDENTIFY DEFICIENCIES AND VALIDATE NEEDS

In the 1970s, attempts were made to improve the resource allocation process in DOD. One outcome of these attempts was the adoption of a mission oriented perspective of identifying needs as a key to planning. For example, DOD Directive 5000.1 requires DOD components to conduct continuing analyses of their assigned mission areas to identify deficiencies or to determine more effective means of performing assigned tasks. The Air Force has incorporated into its regulations the requirement for a formal, structured MAA as a prerequisite to the requirements process at various levels throughout the service.

Operating commands, such as TAC, are required to use MAA as a prerequisite to identify a need, the first step in the requirements process. As described in Air Force Regulation 57-1 (1979), the requirements process is a structured system of analysis and iterative refinement by which operational deficiencies and needs are validated. It consists of 3 stages: (1) need identification, (2) need evaluation, and (3) need solution. MAA should be used to identify and evaluate mission deficiencies, refine the formal requirements document, and guide the search of alternative solutions to deficiencies. Subsequently, needs are translated into alternative solutions and are eventually incorporated into program proposals to ultimately compete for budget dollars.

MAA required of an operating command should include an assessment of basic mission tasks and the ability to perform these tasks taking into consideration factors such as long-range planning guidance, current and projected threat, other services'

contributions to the mission, manpower, and other factors that might cause mission deficiencies or limit solutions. Figure 1 on page 8 describes these and other factors that need to be considered in identifying mission deficiencies and possible solutions.

The results of this analysis, then, should form the foundation on which Statements of Operational Needs--the formal document which expresses an Air Force need--are developed. The Statements of Operational Needs are eventually incorporated into the Program Decision Packages (PDPs) for programming and funding.

Although the Air Force Regulation 57-1 is being revised, an Air Force official said that MAA will continue to be a requirement in the complex process of identifying and evaluating capability deficiencies and needs.

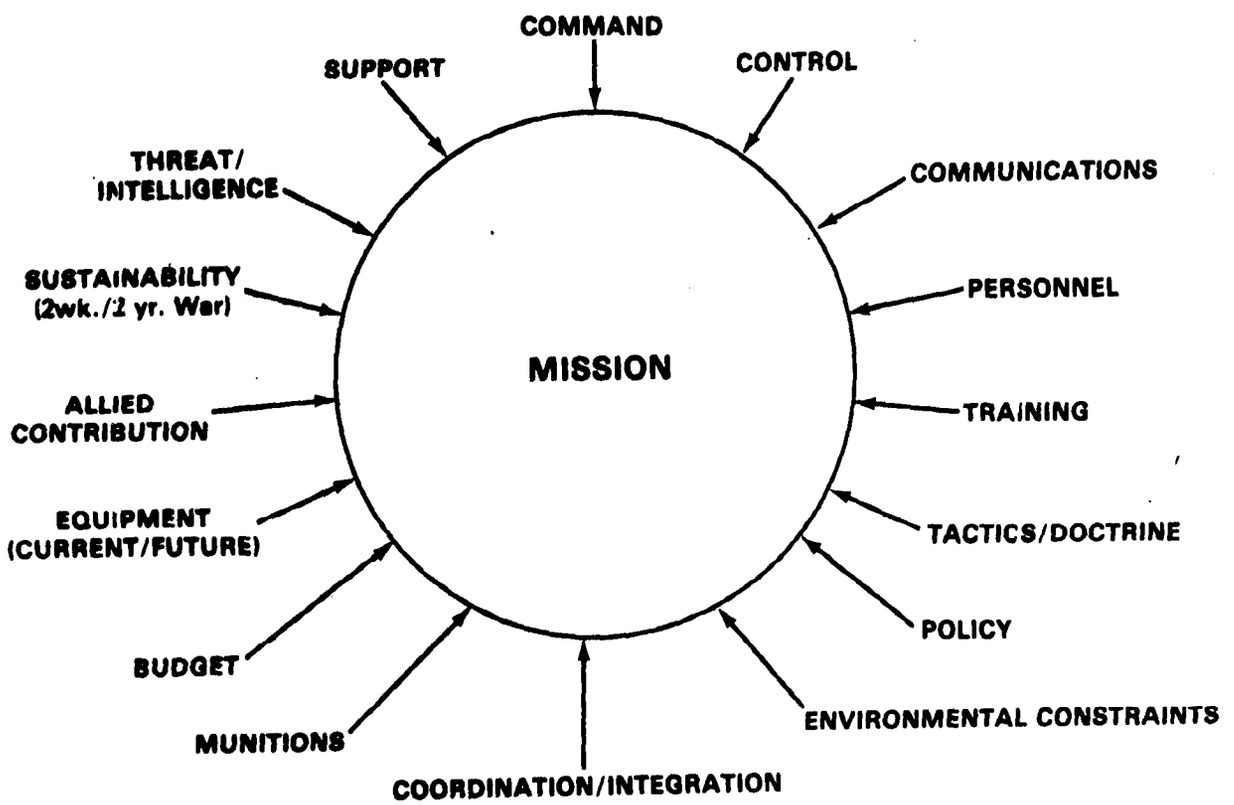
TAC is required to perform a formal analysis to identify deficiencies

The requirement for TAC to perform a structured continuing analysis of the counterair mission is evident in numerous TAC documents (for example, Headquarters Operating Instruction 57-1, TAC Regulation 23-1, and Deputy Chief of Staff Requirements Instruction 57-1). These criteria require TAC to include MAA as part of its supporting documentation for planning and to approve and amend Tactical Air Force's Statement of Operational Needs. (The Tactical Air Force is comprised of the U.S. Air Force Europe, Pacific Air Force, and TAC.)

TAC Regulation 23-1 designates the Force Analysis Division within TAC's Directorate of Plans as the MAA functional manager. This Division is required to annually conduct MAAs for all the Tactical Air Force mission areas and identify and prioritize the Tactical Air Force needs based on MAAs. In addition to analyzing the Air Force's counterair mission, by Memorandum of Agreement between TAC and TRADOC dated January 25, 1980, TAC must coordinate its efforts with the Army's counterair efforts and jointly conduct and evaluate MAAs for the counterair mission area to determine deficiencies and needs.

In summary, a TAC requirement should evolve through many stages from its initial identification as a deficiency through its incorporation into a Statements of Operational Need, a PDP, and its final approval and authorization by the Congress. Criteria exists requiring TAC, for the counterair mission, to begin this process with a MAA. Identifying a counterair need should be supported and can best be expressed by a comprehensive and objective analysis of the mission area. The purpose of such a MAA is to identify deficiencies in capability and provide support for requirements. Then a substantive response would be provided to the question: "Is there a counterair deficiency?"

AREAS TO BE CONSIDERED WHEN CONDUCTING MISSION ANALYSES



Note: We prepared this figure for illustrating purposes, and it is not intended to be all inclusive.

TAC DOES NOT COMPLY WITH AIR FORCE AND ITS OWN REGULATIONS WHICH REQUIRE THE USE OF MAA

Despite Air Force and TAC requirements to use MAA to identify deficiencies and corresponding requirements, TAC does not use this type of formal analysis. Instead, TAC uses an array of military judgments and miscellaneous studies in an attempt to identify counterair deficiencies and justify needs. Basically, the military judgments and studies are used to analyze and justify specific, individual systems within the counterair mission rather than analyzing counterair from a total mission area perspective. As a result, TAC may be submitting requirements that may not be the best solutions to actual mission deficiencies because the requirements were based on perceived deficiencies in mission capabilities rather than on an analysis of the mission. Some examples of this possibility follow.

Medium Range Air-To-Surface Missile

An example where a MAA would have been useful in identifying mission deficiencies involves the $23 million procurement authorized by the Congress in fiscal year 1981 for the Medium Range Air-To-Surface Missile. (The Air Force would use this standoff system for airfield attack.) The Under Secretary of Defense for Research and Engineering subsequently directed joint Navy and Air Force development of this system. In 1981 we reported that no statement of mission need had been prepared by the Navy. 1/ Currently, we found that TAC has also failed to establish this requirement. If TAC would have performed a comprehensive analysis of its counterair mission area, it would have a better basis to defend and document its decision to procure the Medium Range Air-To-Surface Missile.

JP-233

Developing the counterair JP-233 Low-Altitude Airfield Attack System is an example where a MAA might have been useful in evaluating alternative solutions. In February 1981 we reported that the U.S. participation in developing this system deviated from DOD acquisition policy. 2/ We found TAC's draft analysis of its airfield attack mission appeared more than 1-1/2 years after the Air Force began qualified full-scale development of JP-233 with the United Kingdom and 5 months after the United States was committed by the Air Force to paying half of the joint development

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1/"Some Land Attack Cruise Missile Acquisition Programs Need To Be Slowed Down" (C-MASAD-81-9, Feb. 7, 1981).

2/"U.S. Participation In The United Kingdom's Development Of JP-233--A Costly Deviation From Acquisition Policy" (MASAD-81-17, Feb. 27, 1981).

cost. Various other studies conducted after the Air Force commitment to the JP-233 development indicated that limited U.S. aircraft allocations for airfield attack and high expected attrition seriously limit the effectiveness of aircraft-delivered weapons (like JP-233), particularly those without standoff capability. In December 1980 the Congress denied the $56.5 million the Air Force had requested for JP-233 for fiscal year 1981.

A properly executed MAA of counterair might have precluded U.S. involvement in this system before substantial funds were invested. (The United States is no longer participating in this program.) We believe a MAA would have shown early the deficiencies with JP-233 that eventually led to its U.S. cancellation. DOD's participation in the JP-233 program cost about $109 million with termination costs exceeding an additional $36 million. As a result, DOD has lost some of its limited resources and foregone an opportunity to improve its counterair capability.

TAC DOES NOT FAVOR THE USE OF MAA

Our review indicates that counterair MAA is not currently used because TAC questions the credibility and usefulness of such analysis. These attitudes are based on TAC's perceptions that MAA (1) loses its credibility because of the transparency loss 1/ often associated with large-scale modeling 2/, (2) is of little or no use as shown by its one attempt at using this approach which seemingly provided no immediate payoff, and (3) is of little use because its outcomes are based on a large number of assumptions.

Transparency problems can be corrected

TAC officials expressed a lack of faith in the end results of large-scale modeling due to transparency loss. Transparency becomes a problem as the complexity of the model and the number of assumptions increase. TAC officials believe that large-scale modeling and/or interactive analyses (a force against force war

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1/Transparency is the ability to understand and track how a model turns raw data into an end product.

2/A model is a symbolic representation of the various aspects of a complex event, situation, and their interrelationships. There are two types of models--dynamic and static. A dynamic model illustrates the interaction of forces, takes into account the dimension of time, and has built into it feedback loops that affect input/output elements of a situation. A static model is a graphic representation of a situation at a given point in time.

game, such as those used in the Training and Doctrine Command's MAA described in chapter 1), lose credibility if the results cannot be traced back to the inputs.

We learned at TAC that its 1978 counterair MAA model was difficult to follow because (1) the model was not well documented, (2) staff turnover lessened TAC's ability to maintain design continuity, and (3) many modifications were made to the model rather than incorporated with documentation into the design. We believe most of the transparency loss can be avoided with a well-designed model that is clearly documented.

TAC's one attempt at counterair MAA--a perceived failure

In 1978 TAC attempted to identify its counterair needs through the use of MAA. This document was never published and remained as a draft. TAC officials believe this attempt failed to identify any new deficiencies. Also, according to TAC officials, the Statements of Need that was generated and supported with the MAA results was not later funded at the Air Staff level. As a result, TAC officials have developed a pessimistic attitude about the usefulness of MAA.

In our opinion, this brief test of the counterair MAA process is far from conclusive proof that the process does not work. MAA is complicated and takes time to mature. It is to be used only as a tool in the requirements process, not as a final authoritative solution. We believe that TAC gave up on MAA much too quickly.

TAC fears numerous modeling assumptions--relies heavily on military judgment

TAC officials also believe the results of modeling lose most of their usefulness if based on numerous assumptions. We recognize that the end product of an analysis depends on the assumptions used (especially if those assumptions are subjective and not easily quantifiable; for example, training). However, it is these same subjective assessments, to which TAC objects, that form the basis for the military judgment that is now used to identify counterair deficiencies.

Assumptions are unavoidable. When attempting to make decisions on how to best identify counterair deficiencies, whether by formal analysis or not, similar assumptions have to be made. The primary difference is that formal analysis allows assumptions to be visible and thereby open to criticism and improvement. Undocumented military judgment obscures those same assumptions and thereby precludes criticism. We believe military expertise is indeed a valid factor to be considered in the deficiency/need identification process but is used to its best advantage when

employed in creating assumptions and the interplaying factors which form the structure of a MAA.

Studies of human behavior indicate that experts, whether individually or in groups, can make consistently good assessments of specific, well-defined attributes of a problem. They are not as well able, however, to make judgments on large, complex, and interrelated problems as would be involved in mission area deficiency identification.

CONCLUSIONS

In 1979 the Air Force issued regulations requiring operating commands to continually analyze their mission areas using MAA as the framework. The MAAs are a prerequisite to the requirements process. However, after only one attempt, TAC, the designated command responsible for conducting counterair MAAs, stopped conducting this type of analysis, having developed a pessimistic attitude toward the concept.

We believe that without a formal analysis of the mission area, TAC may not be able to effectively determine its deficiencies. This could have a direct effect on the allocation of resources. TAC's use of military judgment without the additional information that a MAA would provide, could create situations where TAC might be buying something that is not needed and/or not buying something that is needed.

A MAA of the counterair mission would provide a more comprehensive identification and evaluation of capability deficiencies and their alternative solutions. The present process used by TAC does not consider or explain all necessary factors that contribute to combat effectiveness. With MAA, the Air Force would be better able to effectively evaluate the mission area and substantively respond to the question: "Is the Air Force buying the counterair systems it needs?"

RECOMMENDATION

We recommend that the Secretary of Defense direct the Secretary of the Air Force to require TAC to comply with Air Force regulations and perform a formal MAA of the counterair mission to properly identify deficiencies and potential solutions. The MAA should be updated as required, based on changes in the threat or other needs.

CHAPTER 3

AIR FORCE-WIDE MAA--

A GOOD PROCESS

In 1977 the Air Force developed the framework to prioritize and allocate resources across all its missions. That framework is AFWMAA. It appears that this concept will ultimately evolve into a system that will provide valuable information to decisionmakers in the Air Force resource allocation process. However, because of shortcomings in the major commands' input data and problems with the AFWMAA's methodology and the reluctance of Air Force top management to accept it, work to improve the credibility of the AFWMAA is needed. We believe it is a good process and with continued efforts and more reliable information from the major commands, current problems can be overcome.

BACKGROUND OF AFWMAA

Continuing analysis of its current and future capabilities to perform its mission is a vital function of the Air Force. One of the primary purposes of this analysis is to determine whether deficiencies exist in its capabilities to perform its mission, what capabilities are needed, and the best way to obtain the needed capabilities (for example, organizational changes, training, new weapon systems, changes in doctrine or tactics, and so forth). Although the Air Force requires its major commands to assess their capabilities and identify their deficiencies and requirements (for example, TAC for the counterair mission), we believe these commands are not in the best position to determine how to allocate resources across all Air Force missions.

These decisions are best made at Air Force Headquarters level where allocation alternatives can be viewed with an Air Force-wide perspective. It is at this level that AFWMAA can play an important role because Headquarters uses AFWMAA to analyze and compare its programs in terms of their relative contribution to overall combat effectiveness. This analysis enables the Air Force to prioritize needs for improvements in Air Force mission capabilities within and across all major Air Force missions. The results are used in the development of the Air Force's Program Objective Memorandum (POM)--the 5-year program plan which helps form the basis for the Air Force's annual budget request to DOD. Figure 2 on page 14 shows AFWMAA's role in assessing Air Force capabilities and evaluating PDPs.

IMPLEMENTING AFWMAA

Air Force Regulation 57-1 has assigned the Air Force's mission analysis management responsibility to the Director of Plans. The Capability Assessment Division (Air Staff), within this

THE ROLE OF AFWMAA
IN POM PROCESS

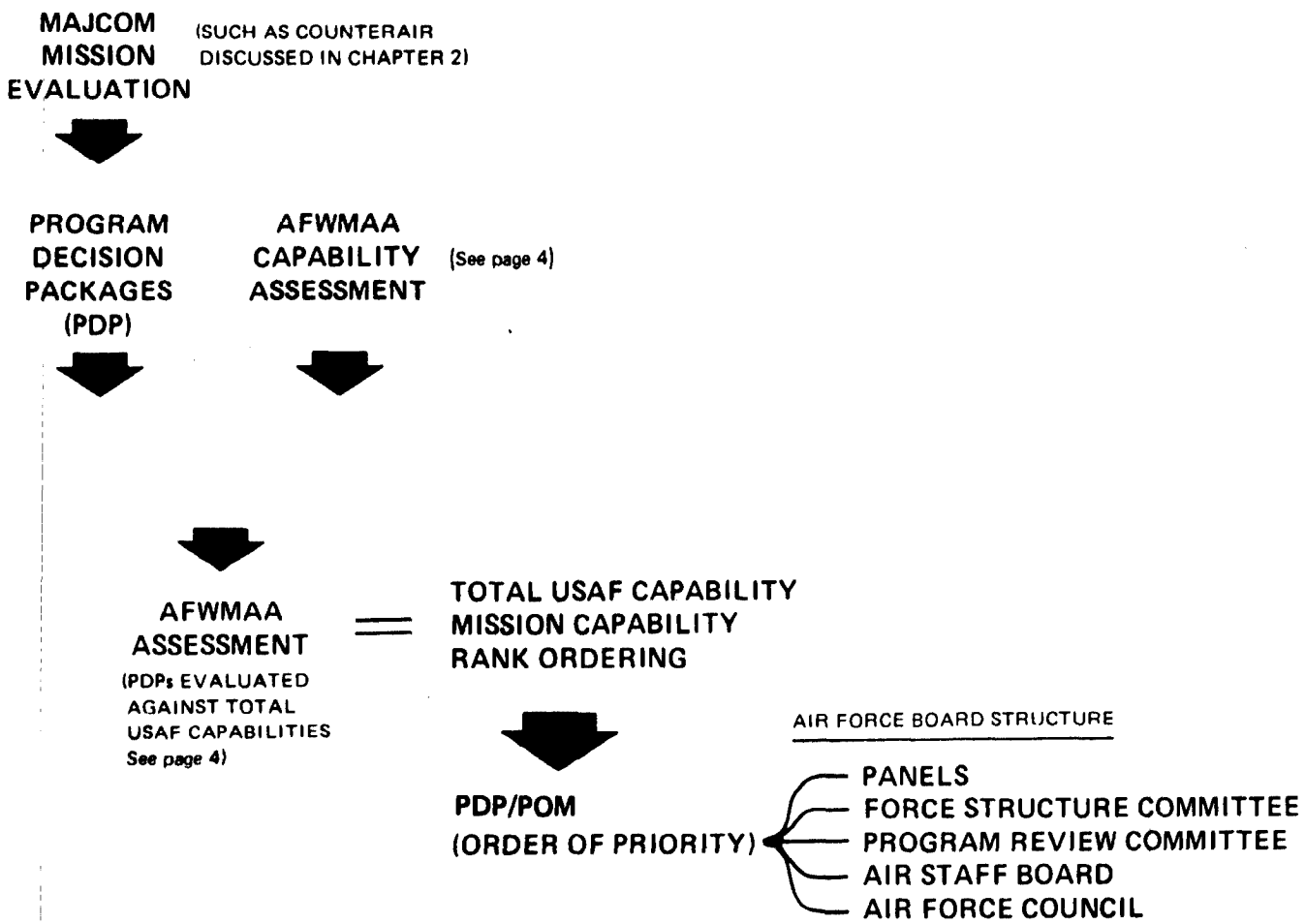

FIGURE 2

directorate, is tasked to perform Air Force-wide MAA. Air Force Regulation 57-1 neither defines what mission analysis management responsibility consists of nor directs AFWMAA's use. However, in June 1980 the Air Force Chief of Staff defined its use as a management tool by directing its integration into the Air Force POM development process.

This is done by publishing the results of the AFWMAA in the Air Force Planning Guide. The Air Force Planning Guide contains an assessment of Air Force mission objectives and capabilities as well as identifying mission deficiencies and associated limiting factors within and across all major Air Force missions.

Identifying Air Force deficiencies

The Air Staff uses AFWMAA to identify Air Force deficiencies by comprehensively analyzing many factors, functions, and tasks which contribute to the Air Force's overall effectiveness. Included in this analysis are judgments and analytical assessments of specific tasks needed to accomplish certain goals. The tasks are expressed as discrete "Mission Objectives" and are weighted for importance. These mission objectives become the standard against which Air Force capabilities are measured.

For example, the counterair mission area is combined with Defense Supression/Electronics Combat, Interdiction, Close-Air-Support/Battlefield Air Interdiction, and Special Operations mission areas into the major mission area of Theater Conflict. The Air Staff employs AFWMAA for the entire Theater Conflict area as well as other major mission areas to determine deficiencies in total Air Force war fighting ability. In performing this analysis, the Air Staff uses three interrelated computer models to identify and prioritize deficiencies in the Theater Conflict mission area. (See app. I for a discussion of these models.) The result of this analysis is a prioritized index of deficiencies in capabilities within the major mission area.

Prioritization of Air Force needs

AFWMAA is also used as a means of analyzing PDPs submitted to the Air Force Board Structure. The Air Force Board Structure is an Air Force corporate decisionmaking body used to formulate and recommend an Air Force POM to the Secretary of the Air Force. Members of the Board represent a cross section of the Air Force functional areas so that a balanced perspective is attained during POM formulation.

AFWMAA provides the Board Structure with a capability assessment of each PDP and compares the PDPs in terms of their relative contribution to Air Force combat effectiveness. With these results, the Air Staff can rank the PDPs, both within and across major mission areas. This ranking is forwarded to the Air Force Board and can provide useful information for making choices as to which new Air Force programs should be funded.

In summary, AFWMAA provides a good conceptional framework for decisionmakers in the POM development process. First, it provides estimates of Air Force capability to perform the necessary tasks and objectives. Second, it evaluates how proposed programs (PDPs) would improve overall Air Force capability. While we believe AFWMAA is a good process, there are some shortcomings which decrease its usefulness.

SHORTCOMINGS IN AFWMAA

There are three factors decreasing AFWMAA's usefulness: (1) weaknesses in the quality of major commands' input data, (2) limitations in methodology affect its credibility as a good management tool, and (3) the Air Force Board Structure has been reluctant to accept AFWMAA. Until these problems are corrected, the AFWMAA efforts will not significantly enhance the resource allocation process.

Problems with major commands' inputs

The AFWMAA process depends on information received from major commands. The quality of these inputs directly affects the credibility of the overall analysis because the results can only be as good as the input data. The major commands' input data is critical because it depicts current Air Force capabilities. AFWMAA measures the relative contribution of various programs against these baseline capabilities. If these baseline capabilities do not adequately reflect the actual capabilities, then a realistic assessment of a program's value will not be provided. For example, if the major commands' input data understates current counterair capabilities, then this analysis will place undue emphasis on counterair programs and rank them unrealistically high.

A September 1980 report on the functional management of the AFWMAA conducted by the Inspector General, U.S. Air Force found that the major commands "gamed" input data to the Air Staff AFWMAA to get desired results. 1/ As a result, the program evaluations were distorted.

Problems with AFWMAA methodology

Development of the AFWMAA methodology is still evolving. Considerable time and effort have been devoted to this development, and the Air Staff is working to improve the results of this analysis. However, certain improvements are still needed to increase its credibility.

1/Data is gamed when it is altered to influence the outcome of an analysis.

One problem with AFWMAA is that it does not consider all of the significant factors necessary to evaluate the PDPs. For example, when evaluating the PDP for the F-15 conformal fuel tank the AFWMAA changed the aircraft's endurance capability to reflect an increased range. However, other related factors such as added weight, increased logistical needs, or increased maintenance were not changed. By only focusing on the positive aspects of the conformal fuel tank, the analysis does not provide a true picture of this proposed program.

Also, AFWMAA cannot adequately measure the worth of a given PDP when it is in the area of training. This occurs because the Air Staff has been unable to quantify the effectiveness of its personnel or to measure the affect of training on increasing that effectiveness. As a result, a PDP for more and/or better training may not be able to show significant payoff in the AFWMAA process.

Finally, the AFWMAA model does not consider costs when it evaluates and prioritizes the PDPs. Instead, the PDPs are ranked based on their contributions to combat effectiveness. As a result, the AFWMAA would maximize combat effectiveness without considering the solution's cost effectiveness.

Air Force Board Structure has been reluctant to use AFWMAA

While AFWMAA offers opportunities to enhance the Board's POM development efforts, it has had little influence in the process. This can be attributed to several factors. While some Board members have critized AFWMAA for assessing only a limited number of PDPs and for being introduced too late in the POM cycle, the major problem precluding high-level management acceptance appears to be that AFWMAA's methodology is complex and difficult to understand.

According to the 1980 Air Force Inspector General's Report on AFWMAA, Board members had difficulty seeing how the AFWMAA data base was formed and they questioned the consistency among assumptions made and the rationale applied in the methodology. Consequently, many Board members have been reluctant to use AFWMAA in the POM development process, even though they do see its potential as a credible management tool.

CONCLUSIONS

AFWMAA at the Air Staff level is a good approach toward improving the Air Force resource allocation process. It has the potential to provide a sound analytical basis useful in making resource allocation decisions by providing estimates of Air Force capabilities and evaluating how proposed programs would improve these capabilities. Currently, the full potential of AFWMAA is not realized because of the major commands' gamed input data,

AFWMAA's inadequate consideration of significant factors, and the Air Force Board's reluctance to use AFWMAA results.

We believe problems with AFWMAA methodology will be corrected as experience is gained through continued use of the AFWMAA models. The Air Staff recognizes its problems and is making genuine attempts to correct and improve the quality of its product. Also, the Air Staff is working closely with the Air Force Board Structure to improve the acceptance of AFWMAA. However, unless positive steps are taken by the major commands to improve the accuracy of the information they provide for the AFWMAA process, the efforts of the Headquarters' staff will be diminished.

RECOMMENDATIONS

Therefore, we recommend that the Secretary of Defense direct the Air Force to continue to develop the Air Force-wide MAA into a reliable management tool in the resource allocation process. Specifically, the Secretary of Defense should direct that the Secretary of the Air Force require:

--Major commands to improve the quality of their data inputs so that accurate information is used as a starting point in the AFWMAA process.

--The Assessment Capability Division to continue its efforts to improve the credibility of its modeling techniques.

--The Air Force Board Structure continue to work with the Air Staff towards the ultimate goal of incorporating AFWMAA as a valuable management tool in POM development.

CHAPTER 4

ABSENCE OF A COUNTERAIR MAA INFLUENCES THE VALIDITY OF THE AIR FORCE BUDGET

Chapter 1 of this report pointed out that the need for and benefits of MAA have long been recognized by DOD studies and reports, congressional committee hearings, and prior reports by our office. Chapters 2 and 3 discussed some problems relative to implementing the MAA concept at TAC and at the Air Force Headquarters level. This chapter is an extension of the preceding chapters and focuses on the influence of the MAA concept on the annual Air Force budget that is submitted to the Congress.

MAA that we have discussed in the preceding chapters basically consists of assessing mission capabilities to identify deficiencies and needs and then suggesting ways to fill those deficiencies or needs. In our opinion, that concept should be an integral part of the process which ultimately results in developing the Air Force's congressional budget submission. Therefore, to the extent that the problems we discussed in chapters 2 and 3 are permitted to go uncorrected, the validity of the need for the proposed programs in the counterair portion of the Air Force budget could be open to question.

SUMMARY OF MAA PROBLEMS AT TAC AND AIR FORCE HEADQUARTERS

As discussed in chapter 2, contrary to the requirements in the Air Force regulations, TAC does not analyze counterair from a total mission perspective. Instead, TAC uses an array of military judgments and miscellaneous studies of individual systems within the counterair mission. In our opinion, the lack of a formal MAA of the counterair mission by TAC is the first step which leads to a weakness in the overall Air Force budget process. That weakness is that TAC is submitting programs (via PDPs) to Air Force Headquarters to be included in the budget that are not supported by a comprehensive, documented analysis.

The problems resulting from TAC's lack of reliance on MAA to identify mission deficiencies and proposed solutions become increasingly significant because they in turn affect Air Force Headquarters' development of the budget. As discussed in chapter 3, the Air Staff is developing (through AFWMAA) a system for evaluating and prioritizing proposed programs (PDPs). However, the quality of this output can only be as good as the quality of the PDPs inputed. As we have just stated, the PDPs coming from TAC are not supported by a MAA. Thus, while the AFWMAA system for prioritizing PDPs contains several limitations of its own and

has not been widely accepted, the most serious problem limiting its ability to reflect counterair needs is the shortcomings in the justification for the PDPs themselves.

These inadequately supported counterair PDPs in turn diminish the quality of the Air Force POM, which is the basis for Air Force's budget request to DOD. As discussed in chapter 3, the Air Force Board Structure uses PDPs as building blocks in developing the Air Force POM. Therefore, the inadequately supported counterair PDPs may be inhibiting the Board's ability to submit to DOD the most needed programs, which in turn can adversely affect DOD's support for the counterair items it includes in its budget request to the Congress.

BETTER SUPPORT IS NEEDED TO JUSTIFY THE COUNTERAIR BUDGET REQUEST

We believe that the lack of MAA undermines the assurance that the Air Force is proposing, and the Congress is funding, the counterair programs that are most needed. Recent actions in the Congress reinforce our position that DOD needs to perform a formal MAA of the counterair mission to properly identify deficiencies and potential solutions. Specifically, in the conference report on the DOD Fiscal Year 1983 Authorization Act, the Secretary of Defense was directed to submit to the Senate and House Armed Services Committees a North Atlantic Treaty Organization Conventional Capability Improvement Study. The conference report stated:

> "The study should include a comprehensive program for . . . a counterair weapon capability. This program should define a development and acquisition program, including schedule and costs, options for program acceleration, and an early IOC (initial operational capability) (1986) utilizing past and current development programs . . . . the proposed program for counter air should be measured against the projected European threat environment and designed to augment and complement aircraft through the use of a ground-based system for fixed targets . . . ."

The study is to be submitted concurrent with the President's budget request for fiscal year 1984.

In our opinion, the congressional requirement for this study offers an excellent opportunity for DOD to incorporate MAA in its annual budget submission.

CONCLUSIONS AND RECOMMENDATIONS

MAA should be an integral part of sound budgeting. It should identify deficiencies and present proposed solutions to correct problems in warfighting capability and influence how the Air Force

will spend billions of dollars. It is therefore imperative that counterair MAA be done to provide supported solutions to identified deficiencies. DOD is not now relying on MAA to support its counterair requirements, and, thus, the validity of the need for these programs is open to question.

The recent congressional directive for a North Atlantic Treaty Organization capability study should provide the stimulus for DOD to begin using MAA in conjunction with its budget request for counterair items in fiscal year 1984. Therefore, we recommend that the Secretary of Defense assure that the North Atlantic Treaty Organization Conventional Capability Improvement Study is performed in accordance with the MAA concept discussed in chapters 2 and 3 of this report.

DESCRIPTION OF AIR STAFF'S MAA METHODOLOGY

The three models used by the Air Staff in performing Theater Conflict MAA are described below.

--The multiobjective tree model specifies the mission tasks under given conditions, the relative importance of the mission tasks, the quantitative objectives for the mission tasks, and the functions for translating the achievement of the objectives into indexes of capability or deficiency.

--The resource allocator model uses Air Force sortie generation data to allocate sorties to the mission tasks specified by the multiobjective tree. Allocation is determined on the basis of mission task importance and size of objective (that is, number of targets), both of which are specified by the multiobjective tree.

--The sortie effectiveness model computes the effectiveness of the allocated number of sorties in the specified mission tasks. This effectiveness is compared to the objectives of the trees. The outcome is an index of the deficiency in war fighting ability.

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