

February 1997

# COMBAT AIR POWER

## Joint Assessment of Air Superiority Can Be Improved



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

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**National Security and  
International Affairs Division**

B-260442

February 26, 1997

Congressional Committees

The Department of Defense (DOD) plans to spend over \$43 billion from fiscal year 1996 to fiscal year 2001 to acquire weapon systems to equip and modernize forces for the air superiority missions. DOD will face difficult decisions as it attempts to cover the high cost of these and other defense acquisitions while the nation is moving toward a balanced budget.

This is an unclassified version of a classified report we recently issued to you. It evaluates the air superiority missions to identify the overlap among the military services' planned capabilities and to determine whether the joint warfighting assessment process relating to air superiority was useful to assist in making program and budget decisions about these programs. This evaluation is one of six individual air power evaluations that we have conducted over the past 2 years.

We believe the concerns identified in this report—namely that the joint warfighting assessment needs to cover a longer period, include cost-effectiveness analyses of alternative means to achieve U.S. objectives, identify unnecessary overlap and duplication, and address major issues such as the need to acquire three new tactical fighters (F/A-18E/F, F-22, and Joint Strike Fighter)—should be addressed as part of DOD's efforts to improve its analytical support for overall decision-making. We are addressing this report to you because of your oversight responsibility for defense issues and budgets and your interest in this important subject.

Please contact me at (202) 512-4841 if you or your staff have any questions concerning this report. Major contributors to this report are listed in appendix IV.

A handwritten signature in cursive script that reads 'Louis J. Rodrigues'.

Louis J. Rodrigues  
Director, Defense Acquisitions Issues

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B-260442

List of Congressional Committees

The Honorable Strom Thurmond  
Chairman  
The Honorable Carl Levin  
Ranking Minority Member  
Committee on Armed Services  
United States Senate

The Honorable Ted Stevens  
Chairman  
The Honorable Daniel K. Inouye  
Ranking Minority Member  
Subcommittee on Defense  
Committee on Appropriations  
United States Senate

The Honorable Floyd Spence  
Chairman  
The Honorable Ronald V. Dellums  
Ranking Minority Member  
Committee on National Security  
House of Representatives

The Honorable C.W. Bill Young  
Chairman  
The Honorable John P. Murtha  
Ranking Minority Member  
Subcommittee on National Security  
Committee on Appropriations  
House of Representatives

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B-260442

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# Executive Summary

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## Purpose

One of the primary objectives that U.S. combat air power is expected to achieve is air superiority. Achieving air superiority permits operations in the air and on land and sea without prohibitive interference from an enemy's air forces, cruise missiles, and theater ballistic missiles. The Persian Gulf War clearly demonstrated the superior U.S. and coalition forces' capability to quickly achieve air superiority by paralyzing Iraqi air defenses and dominating the air-to-air battle.

The Department of Defense (DOD) plans to spend over \$43 billion from fiscal year 1996 to fiscal year 2001 to acquire weapon systems to equip and modernize forces for the air superiority mission. Because of the large investment planned during the next several years and pursuant to its basic legislative authority, GAO evaluated the air superiority mission to (1) identify the overlap among the military services' planned capabilities and (2) determine whether the joint warfighting assessment process relating to air superiority was useful to assist in making program and budget decisions about these capabilities.<sup>1</sup> This is an unclassified version of an earlier classified report on this subject.

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## Background

Congress has recognized that each service's military missions and the capabilities of the services to accomplish those missions overlap one another, at least to some degree. To achieve a stronger joint orientation in DOD, Congress enacted the Goldwater-Nichols Department of Defense Reorganization Act of 1986. This act gave the Chairman of the Joint Chiefs of Staff and the commanders in chief (CINC) of the combatant commands stronger roles in DOD matters, including the acquisition process. In this role, the Chairman is expected to advise the Secretary of Defense on the priority of requirements identified by the CINCS and the extent to which service program recommendations and budget proposals conform with these priorities. The Chairman is also expected to submit to the Secretary alternative program recommendations and budget proposals to achieve conformance with CINC priorities. Subsequent legislation has given the Chairman additional responsibilities to examine ways DOD can eliminate or reduce duplicative capabilities and to assess military requirements for defense acquisition programs from a joint warfighting military perspective.

To assist the Chairman, the Vice Chairman of the Joint Chiefs of Staff established in 1994 the joint warfighting capability assessment process.

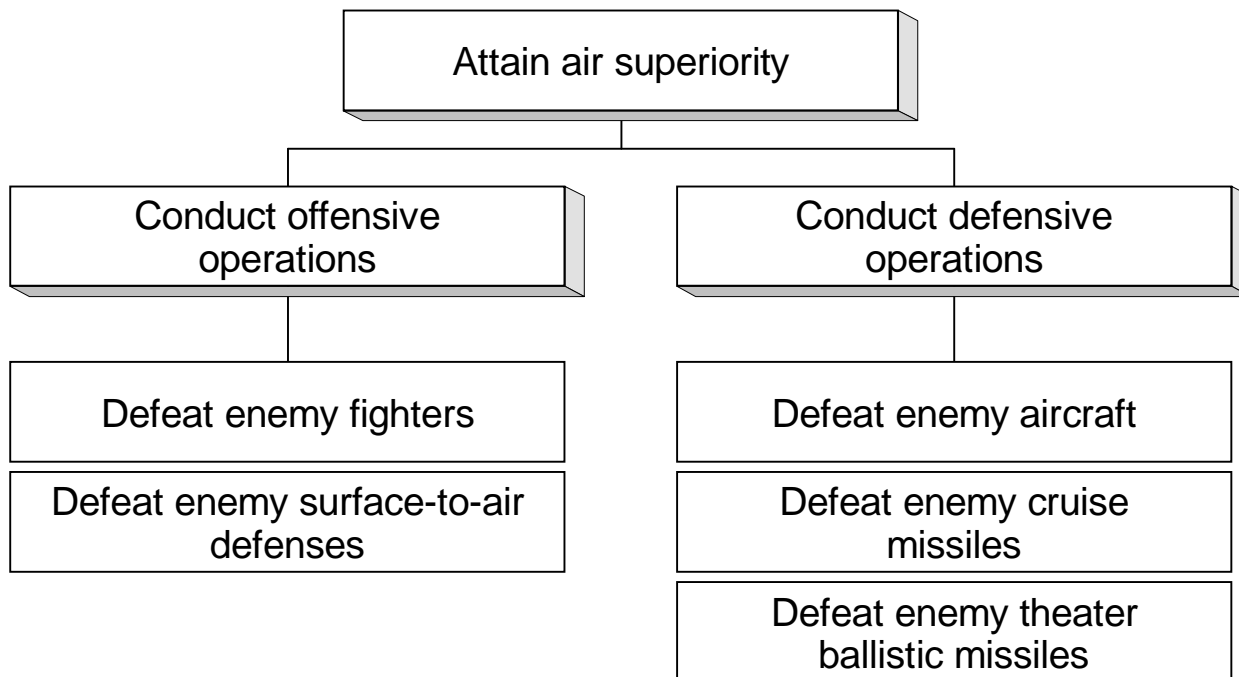
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<sup>1</sup>Similar evaluations were conducted on interdiction, close support, air refueling, suppression of enemy air defenses, and surveillance and reconnaissance missions. A culminating report entitled Combat Air Power: Joint Mission Assessments Needed Before Making Program and Budget Decisions (GAO/NSIAD-96-177, Sept. 20, 1996) built on and synthesized the findings of these six evaluations.

The Vice Chairman looked to the process to produce the information the Chairman needs to meet his program review and assessment responsibilities and to resolve cross-service requirements issues, eliminate duplicate programs, and pursue opportunities for enhancing the interoperability of weapon systems.

Air superiority, the subject of this report, is the degree of dominance one force possesses over another in the air, governing the extent to which air, ground, and sea forces can achieve campaign objectives. DOD analytically divided the achievement of air superiority into two offensive and three defensive missions. Figure 1 shows that alignment of missions.

Figure 1: The Missions of Air Superiority



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For fiscal years 1996-2001, DOD plans to apply most of its acquisition funding for air superiority systems to aircraft to defeat enemy fighters and aircraft and to defensive systems to defeat enemy theater ballistic missiles.

The air superiority joint warfighting assessment team evaluated the services' joint capabilities by evaluating nine functions that must be accomplished to successfully achieve the objectives of each mission. DOD has termed this an "end-to-end" assessment. Overall, the team concluded that the capabilities to achieve the five air superiority missions were marginal, or acceptable with some risk, through 2001. A formal assessment report was not done. Although a team spokesman said the team made recommendations to the Chairman of the Joint Chiefs of Staff for preparation of the Chairman's program assessment, he would not share the recommendations with us.

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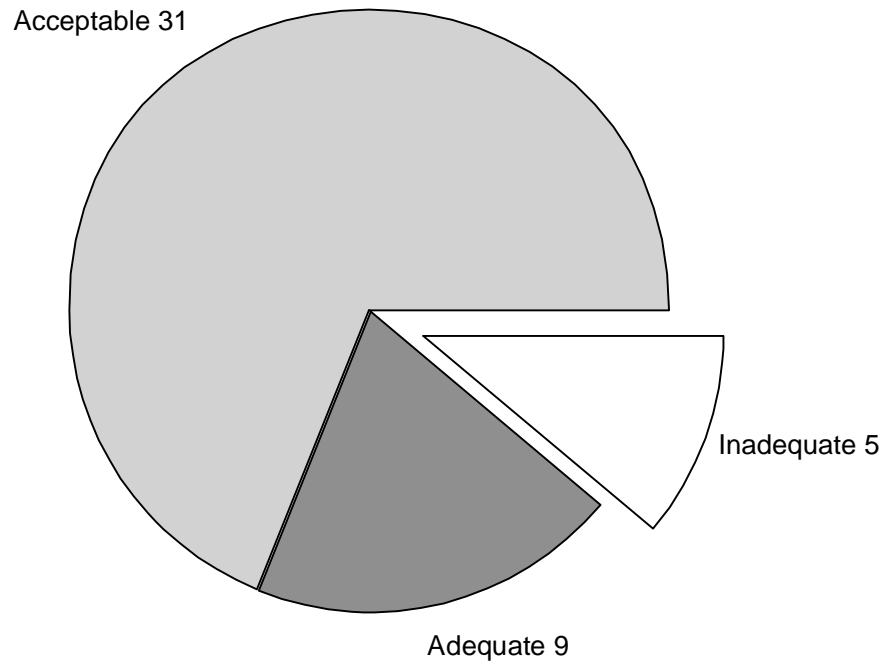
## Results in Brief

The services have overlapping capabilities for achieving each of the five component missions of air superiority. For example, every service has weapon systems that perform some portion of each of the five missions except for the conduct of offensive operations to defeat enemy fighters in enemy territory, for which the Army has no capability. Overlaps exist primarily in the systems to defeat enemy aircraft and ballistic missile systems. While some degree of overlapping capabilities may be necessary and/or unavoidable, DOD has not determined how best to reduce overlaps in the post-Cold War era without unnecessary effects on force capabilities.

The process used by DOD's air superiority joint warfighting capabilities assessment team to make its assessment provided a useful, though limited, result and used a meaningful method of displaying the results. An unclassified summary of the ratings assigned to 45 capabilities (9 functional elements, such as detecting targets and engaging targets, for each of the 5 missions) is shown in figure 2.



Figure 2: Summary of Ratings Assigned to Air Superiority Capabilities



The team identified several functions for which joint capabilities were determined to be inadequate. DOD classified the descriptions of the inadequate capabilities.

Although the assessment pointed out several inadequacies in existing forces, it did not adequately address several major issues regarding the overlap of capabilities, priorities of future acquisitions of air superiority weapon systems, or alternative means of meeting the highest priority requirements. Further, it did not assign ratings of warfighting capability over a long enough period of time to be useful for establishing acquisition and budget priorities.

The assessment did not examine certain key issues related to the modernization of forces for the air superiority mission. For example, the assessment was limited to the 6-year period, fiscal year 1996 to fiscal year 2001, and many of the weapon systems being planned were not included in the assessment because they are in development and were not

scheduled to be available in the active force until after fiscal year 2001. Further, the results of the assessment indicate that the acquisition of major aircraft systems like the F-22 may not be justified because acquisition of new aircraft is not clearly related to the functions rated inadequate by the joint assessment team.

Other critical issues that were not evaluated during the assessment include the need for and affordability of the acquisition of three new tactical fighters (F/A-18E/F, F-22, and Joint Strike Fighter), appropriate timing for replacing F-15s with F-22s, the need to replace each F-15 with an F-22, the operational utility of the F/A-18E/F compared with the F/A-18C/D, and the appropriate size and makeup of the forces to be acquired for theater ballistic missile defense.

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## Principal Findings

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### Services Have Overlapping Capabilities to Perform Air Superiority Missions

Overlapping capability among the services exists in each of the five air superiority missions. Aircraft used for air superiority were generally developed by one of the services for use within that service except for the recent initiative to acquire a Joint Strike Fighter for use by the Air Force, the Navy, and the Marine Corps. Systems in inventory in 1996 with capability to defeat enemy aircraft include the Navy F-14, the Air Force F-15 and F-16, the Marine Corps F-18 and AV-8B, and several Army surface-to-air missile systems. Most of the aircraft in the inventory have a primary mission other than air superiority but have a significant air superiority capability. The Air Force is developing the F-22 and it is expected to be in service in 2004, the Navy is beginning procurement of the F/A-18E/F in fiscal year 1997, and the Air Force, the Navy, and the Marine Corps have begun development of the Joint Strike Fighter.

Several systems are commonly used among the services. They consist primarily of missiles that are developed in joint program offices under DOD direction. For the most part, however, aircraft have been acquired that are used only by a single service. The only current exception is the F/A-18 used by both the Navy and the Marine Corps.

Each service is developing its own equipment to defend against theater ballistic missiles, and as a result, there is an overlap of capabilities planned. Nine systems currently in development could cost an estimated

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\$71 billion if all are produced. Overlapping systems include the Patriot Advanced Capability Level 3, the Medium Extended Air Defense System, the Improved Hawk, the Theater High Altitude Air Defense System, and the Navy Area System, all of which are intended to intercept enemy theater ballistic missile systems in the terminal phase of their flight to their target. Even though there is substantial overlap of capabilities among air superiority systems, the joint warfighting capabilities assessment did not evaluate the degree of overlap and duplication among these systems or the other existing or planned systems that perform the air superiority missions.

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**The Joint Warfighting Capabilities Assessment Did Not Adequately Address Some Key Issues**

The joint warfighting capabilities assessment process has the potential to provide decisionmakers better insight into the capabilities of the entire U.S. military force to perform particular missions. GAO recognizes that it will take some time for this process to mature. The methodology used in the air superiority assessment had significant limitations and did not address key issues confronting the air superiority missions. Further, the assessment offers little information to achieve one of its objectives, which was to assist in making program and budget decisions. One limitation is the relatively short period of time, 6 years, covered by the assessments. Most major weapon acquisition programs last over 10 years, and intelligence estimates of the projected threat may cover as much as 15 years. Thus, this assessment may not include the impact of significant changes in the U.S. weapon capabilities or significant changes in the projected threat expected to come about after the 6-year period.

Other limitations are that the assessments do not identify the extent of overlap among air superiority systems, nor do they evaluate the cost-effectiveness of alternative weapon mixes. Further, the assessments did not address several other key issues. For example, a major issue confronting DOD and Congress is the need to pursue and the affordability of, as currently planned, three new tactical aircraft programs that will cost an estimated \$355.7 billion. It is crucial to address this issue through an aggregate assessment of the quantity of U.S. aircraft with air superiority capabilities compared to potential adversaries. For example, the United States has over 2,000 frontline fighters (F-14s, F-15s, F-16s, and F-18s), but potential adversaries have few. An aggregate assessment of capabilities is absent from the joint warfighting capabilities assessment. This report identifies additional key issues involving the air superiority missions that must be addressed.

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## Recommendations

GAO is not making new recommendations in this report. In its overall report on combat air power, GAO recommended that the Secretary of Defense, along with the Chairman of the Joint Chiefs of Staff, develop an assessment process that yields more comprehensive information in key mission areas. In making this recommendation, GAO includes the offensive and defensive aspects of the air superiority mission and the results of this review of the assessments conducted by the joint warfighting capability assessment team. GAO said the recommended process could be achieved by broadening the joint warfighting capability assessments or developing an alternative mechanism. DOD partially concurred with the recommendation, agreeing that analytical support for overall decision-making can be improved, but disagreeing that the Secretary is currently receiving inadequate advice from a joint perspective.

In DOD's assessments of air superiority mission areas, GAO believes the concerns identified in this report—namely that the assessments need to cover a longer period, include cost-effectiveness analyses of alternative means to achieve U.S. objectives, identify unnecessary overlap and duplication, and address major issues set forth in chapter 3—should be addressed as part of DOD's efforts to implement GAO's prior recommendation.

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## Agency Comments and GAO's Evaluation

In commenting on a draft of the classified version of this report, DOD agreed that overlap exists among the air superiority missions but stated that the overlap among the Army's theater ballistic missile defense systems is by design. DOD further agreed that analytical support for overall decision-making can be improved. GAO believes many of DOD's other comments were not clearly related to the central message in this report.

DOD stated that it disagreed with assertions that it believes are included in the report and in a prior report, *Combat Air Power: Joint Mission Assessments Needed Before Making Program and Budget Decisions*, (GAO/NSIAD-96-177, Sept. 20, 1996). DOD said that GAO implies that the threat does not warrant investment, and that air power is not important. Neither report makes such assertions. The intent of this report is to show overlap in air superiority capabilities and to raise specific issues that future joint assessments of the air superiority mission could address to improve the analytical support for decisionmakers.

DOD also believes that this report leaves a misleading impression that the DOD processes used to develop modernization plans are inadequate. This

report identifies equipment overlap among the air superiority missions and ways to make the joint warfighting capabilities assessment of the air superiority missions more useful to decisionmakers. This report is not intended to be a comprehensive evaluation of DOD processes for developing modernization plans, but suggests that the air superiority joint warfighting capabilities assessment can be improved to better support the DOD processes used to develop modernization plans.

DOD further takes the opportunity in its comments to point out an apparent change in DOD mission descriptions by stating that it wants not only air superiority but also air dominance, and that its modernization program is designed to maintain air dominance. However, DOD did not provide a clear description of the differences between air superiority and air dominance or the additional capabilities it believes are justified because of this undefined change of mission objectives.

DOD's comments and GAO's detailed evaluation of the comments are in appendix III.

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## Abbreviations

CINC	commander in chief
DIA	Defense Intelligence Agency
DOD	Department of Defense
GAO	General Accounting Office
JROC	Joint Requirements Oversight Council
JSF	Joint Strike Fighter
JWCA	Joint Warfighting Capabilities Assessment

# Introduction

Sweeping changes in the global threat environment, sizable reductions in resources devoted to defense, technological advancements in combat systems, and other factors have significantly affected the Department of Defense's (DOD) combat air power. Ensuring that the most cost-effective mix of combat air power capabilities is identified, developed, and fielded to conduct effective, joint military operations in such an environment is a major challenge that will confront DOD and Congress for years to come.

This report, which focuses on air superiority, is one of a series that examines the overall air power of the United States. The other reports in the series concentrate on interdiction, close support, defeat of enemy surface-to-air defenses, surveillance and reconnaissance, and air refueling. A culminating report, which builds on and synthesizes the findings of these six evaluations, was issued on September 20, 1996.<sup>1</sup>

## Congressional Mandate to Assess Defense Acquisitions From a Joint Warfighting Perspective

Traditionally, the individual services have been the dominant players in the acquisition process based on their broad responsibilities to organize, train, and equip their forces under title 10 of the U.S. Code. However, to achieve a stronger joint orientation in DOD, Congress enacted the Goldwater-Nichols Department of Defense Reorganization Act of 1986. This act gave the Chairman of the Joint Chiefs of Staff and the commanders in chief (CINC)<sup>2</sup> of the combatant commands stronger roles in DOD matters, including the acquisition process. As principal military adviser to the Secretary of Defense, the Chairman is now expected to advise the Secretary on the priority of requirements identified by the CINCS and the extent to which service program recommendations and budget proposals conform with these priorities. The Chairman is also expected to submit to the Secretary alternative program recommendations and budget proposals to achieve greater conformance with CINC priorities. The National Defense Authorization Acts for Fiscal Years 1993 and 1996 have given the Chairman additional responsibilities to examine ways DOD can eliminate or reduce duplicate capabilities and to assess military requirements for defense acquisition programs from a joint warfighting perspective.

<sup>1</sup>Combat Air Power: Joint Mission Assessments Needed Before Making Program and Budget Decisions (GAO/NSIAD-96-177, Sept. 20, 1996).

<sup>2</sup>CINCS of: (1) Atlantic Command, (2) Central Command, (3) European Command, (4) Forces Command, (5) Pacific Command, (6) Southern Command, (7) Space Command, (8) Special Operations Command, (9) Strategic Command, and (10) Transportation Command. CINCS are responsible for military operations in their geographic region or functional area.



According to the 1995 National Military Strategy, major modernization programs involving significant investments are to be undertaken only when there is “clearly a substantial payoff.” To evaluate the merits of the services’ weapon investment proposals, programs, and budgets, various entities within the Office of the Secretary of Defense, such as the Director of the Program Analysis and Evaluation, provide the Secretary independent analyses. The Joint Requirements Oversight Council (JROC) assists the Chairman of the Joint Chiefs of Staff in carrying out his responsibilities. This assistance includes identifying and assessing the priority of the joint military requirements (including existing systems and equipment), ensuring that the assignment of program priorities reflects projected resource levels, and considering alternatives to any acquisition program identified to meet military needs.

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## Joint Warfighting Capability Assessment Process Established to Improve Joint Perspective

To assist the JROC in advising the Chairman and the Secretary on joint warfighting capabilities, the joint warfighting capabilities assessment (JWCA) process was initiated in April 1994. Under this process, 10 assessment teams have been established in selected mission areas, 1 of which is air superiority. The intent of JWCA is to continuously assess available information on the services’ respective joint capabilities to identify opportunities to improve warfighting effectiveness. A Joint Staff official who participated in conducting JWCA for the air superiority mission told us that the purpose of this assessment was not to identify overlap and unnecessary duplication among the services.

In expanding the JROC process, including the establishment of the JWCA teams, it was envisioned that the JROC would be more than simply another military committee on which members participate strictly as representatives of their services. Recommendations coming from the JROC would not simply reflect the sum of each service’s requirements. Rather, the JROC, with the support of the JWCA process, would produce joint information the Chairman needs to meet his program review and assessment responsibilities and to resolve cross-service requirements issues, eliminate duplicative programs, and pursue opportunities to enhance the interoperability of weapon systems.

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## Objectives, Scope, and Methodology

Because of the large planned investment during the next several years and pursuant to our basic legislative responsibility, we evaluated the air superiority mission (1) to identify the overlap among the military services’ planned capabilities and (2) to determine whether the joint warfighting

assessment process was useful to assist in making program and budget decisions about these capabilities.

We visited or obtained information from the following organizations:

Air Force Organizations

- Headquarters, Air Force Materiel Command, Wright-Patterson Air Force Base, Ohio.
- Headquarters, Air Force Air Combat Command, Langley Air Force Base, Virginia.
- Office of the Assistant Secretary of the Air Force (Acquisition), Washington, D.C.
- Air Force Roles and Missions Office, Washington, D.C.
- National Air Intelligence Center, Wright-Patterson Air Force Base, Ohio.
- Airborne Laser Program Office, Albuquerque, New Mexico.
- F-15 System Program Office, Wright-Patterson Air Force Base, Ohio.
- F-16 System Program Office, Wright-Patterson Air Force Base, Ohio.
- F-22 System Program Office, Wright-Patterson Air Force Base, Ohio.

Navy Organizations

- Department of the Navy, Washington, D.C.
- Office of the Chief of Naval Operations, Washington, D.C.
- Office of Naval Intelligence, Washington, D.C.
- F/A-18 Program Office, Washington, D.C.
- F-14 Program Office, Washington, D.C.
- Marine Corps Systems Command, Quantico, Virginia.

Army Organizations

- Office of the Army Deputy Chief of Staff for Operations and Plans, Washington, D.C.
- Army Space and Strategic Command, Huntsville, Alabama.
- Medium Extended Air Defense System Project Office, Huntsville, Alabama.
- Theater High Altitude Air Defense Project Office, Huntsville, Alabama.
- Patriot Project Office, Huntsville, Alabama.
- Army Research Development and Engineering Center, Redstone Arsenal, Alabama.
- Forward Area Air Defense Project Office, Redstone Arsenal, Alabama.
- Weapon Systems Management Directorate, Redstone Arsenal, Alabama.
- Army Air Defense Artillery School, Fort Bliss, Texas.

- Patriot Advanced Capability 3 Project Office, Huntsville, Alabama.

Other DOD Organizations

- Office of the Secretary of Defense, Washington, D.C.
- Ballistic Missile Defense Organization, Washington, D.C.
- Defense Intelligence Agency, Washington, D.C.
- U.S. Central Command, Tampa, Florida.
- U.S. Pacific Command, Honolulu, Hawaii.
- Office of the Joint Chiefs of Staff, Washington, D.C.
- Airborne Interceptor Program Office, Los Angeles, California.
- Missile and Space Intelligence Center, Redstone Arsenal, Alabama.

Non-DOD Organizations

- Central Intelligence Agency, Langley Virginia.

To identify the overlap among the military services' planned capabilities, we identified the roles and missions each service is responsible for performing and listed the existing and planned equipment that could be used for air superiority missions. We reviewed DOD directives, military doctrine, and previous roles and mission reports prepared by the Chairman of the Joint Chiefs of Staff and the Commission on Roles and Missions of the Armed Forces. We asked weapon system program offices and/or operating commands, such as Air Combat Command, to identify the specific air superiority missions the equipment is capable of performing or is being designed to perform so we could identify the equipment that performs the same missions, that which is service unique, and that which is used by more than one service. We discussed the capabilities of existing and planned equipment with officials at the U.S. Central Command, the U.S. Pacific Command, the Joint Staff, and the services. From threat reports prepared by the Defense Intelligence Agency and the Central Intelligence Agency we compared U.S. capabilities to the capabilities of two major regional conflict countries—North Korea and Iraq. Our analyses covered three timeframes—fiscal years 1995, 2001, and 2010. We used DOD's future years defense program database to obtain cost data for fiscal years 1996-2001. For cost data beyond this period, we used selected acquisition reports or estimates prepared by program offices.

To determine whether the JWCA process was useful for making program and budget decisions, we reviewed the methodology and the results of the air superiority JWCA. Further, we reviewed applicable laws and DOD

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instructions involving the roles and responsibilities of the Chairman of the Joint Chiefs of Staff for conducting and reporting on joint assessments. We also discussed the usefulness and the strengths and weaknesses of the JWCA with officials at the U.S. Central Command, the U.S. Pacific Command, and the services.

We also relied on reports published by the Office of the Secretary of Defense, Joint Staff, National Air Intelligence Center, Defense Science Board, Congressional Budget Office, Ballistic Missile Defense Organization, Air Force Roles and Missions Office, Commonwealth Institute, RAND Corporation, Congressional Research Service, and our prior reports (a list of our related products is provided at the end of this report).

We performed our review from October 1994 through September 1996 in accordance with generally accepted government auditing standards.

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# The Services Have Overlapping Capabilities to Perform Air Superiority Missions

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Achieving air superiority is a high priority during any conflict. But independent efforts by the services, without an adequate joint orientation, has led to overlap among service capabilities that could be excessive. Each military service plays a role in achieving air superiority and has capabilities in four of the five missions. However, each service has acquired mostly unique equipment to perform these missions, although Congress advocates jointness among the services. DOD plans include over \$43 billion from fiscal year 1996 to fiscal year 2001 for the acquisition of systems dedicated to the air superiority missions. Most of the planned funding is for the acquisition of aircraft to defeat enemy aircraft, and defensive systems to defeat enemy theater ballistic missiles.

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## Air Superiority Includes Five Missions

Air Force doctrine states that the attainment of air superiority is normally one of the first and most important U.S. military goals in a conflict. Without the attainment of air superiority, achieving success in a military campaign is more difficult. Air superiority is the degree of dominance one force possesses over another in the air, governing the extent to which air, ground, and sea forces can achieve campaign objectives.

The Joint Chiefs of Staff, in its assessment of U.S. air superiority capability, divided it into five distinct missions. Two missions involved offensive air superiority operations to defeat enemy fighter aircraft and surface-to-air defenses within enemy territory, and three involved defensive air superiority to protect friendly territory against enemy aircraft, cruise missiles, and theater ballistic missiles (see fig. 1).

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## Funding Planned for Air Superiority Missions

Substantial funding is planned from fiscal year 1996 to fiscal year 2001 to acquire weapon systems that are dedicated or closely related to achievement of air superiority missions. DOD plans include over \$43 billion for acquisition of dedicated systems, with about 47 percent of the funding intended to modernize U.S. capabilities to defeat enemy fighters (offensive operations) and aircraft (defensive operations) and about 44 percent intended to modernize capabilities to defeat enemy theater ballistic missiles.

Table 2.1 shows the amounts included in the fiscal years 1996-2001 defense plan for acquisition of systems for each air superiority mission, as of June 1995. Additional detail of the funding for each mission is included in table II.1.

**Chapter 2**  
**The Services Have Overlapping Capabilities**  
**to Perform Air Superiority Missions**

**Table 2.1: Approximate DOD Future Years Defense Program Acquisition Funding for the Missions of Air Superiority, as of June 1995**

Then-year dollars in millions		
<b>Missile</b>	<b>Amount</b>	<b>Percent</b>
<b>Offensive operations</b>		
Defeat enemy fighters	\$20,475.8	47.5
Defeat enemy surface-to-air missiles	807.2	01.9
<b>Defensive operations</b>		
Defeat enemy aircraft	<sup>a</sup>	
Defeat enemy cruise missiles	3,001.9	7.0
Defeat enemy theater ballistic missiles	18,861.4	43.7
<b>Total</b>	<b>\$43,146.3</b>	<b>100.0</b>

<sup>a</sup>The funding to defeat enemy fighters and aircraft in offensive and defensive operations is not separable; all is included under offensive operations.

In addition to acquisition of weapon systems primarily dedicated to achieving air superiority, there are other systems, primarily aircraft, that have a primary mission other than air superiority but that have a significant capability to contribute to air superiority missions. This category includes the Air Force F-15E and F-16, Navy F/A-18, Marine AV-8B, and the Joint Strike Fighter (JSF). Acquisition of F/A-18 fighters is expected to consume the greatest amount of resources in fiscal years 1996-2001, about \$21 billion. Table II.2 includes further information on these systems.

**Overlap Among Services' Performance of the Air Superiority Missions**

While some degree of overlapping capabilities may be necessary and/or unavoidable, many of the systems that the services have or plan to acquire to accomplish the five air superiority missions will have overlapping capabilities. Many of these overlapping capabilities have evolved over the years. Table 2.2 shows that each service has capabilities in each air superiority mission, except the Army does not have a capability to accomplish offensive operations against enemy fighters.

**Chapter 2**  
**The Services Have Overlapping Capabilities**  
**to Perform Air Superiority Missions**

**Table 2.2: Services' Capability to Perform Air Superiority Missions**

<b>Air superiority missions</b>	<b>Army</b>	<b>Navy</b>	<b>Air Force</b>	<b>Marine Corps</b>
<b>Offensive operations</b>				
Defeat enemy fighters		X	X	X
Defeat enemy surface-to-air defenses	X	X	X	X
<b>Defensive operations</b>				
Defeat enemy aircraft	X	X	X	X
Defeat enemy cruise missiles	X	X	X	X
Defeat enemy theater ballistic missiles	X	X	X	X

Note: "X" indicates that the service has or is acquiring capabilities to perform an air superiority mission.

Appendix I shows the missions and the current and future equipment planned by each service to perform the five missions to achieve air superiority. Our display in appendix I of the current and future planned equipment shows that most equipment in the inventory has been procured by a service for operational forces within that service. Rarely have the same systems been used by more than one service, except for certain missiles and munitions. For example, the Air Force, the Navy, and the Marines have their own aircraft platforms capable of defeating enemy fighters and aircraft. The Navy operates F-14s and F/A-18s, the Air Force operates F-15s and F-16s, and the Marine Corps operates F/A-18s and AV-8Bs. The Air Force is developing the F-22 fighter and expects it to be in service in 2004, and the JSF is expected to be in service in 2010. The largest percentage of acquisition funding included in the DOD's plans for air superiority (47 percent) is for defeating enemy fighters and aircraft. About 44 percent of the funding is for acquisition of theater ballistic missile defenses.

**Air Superiority Fighters**

Although air superiority missions have many components, and many types of equipment are involved, the acquisition of U.S. fighter aircraft with the capability to defeat enemy fighters and other aircraft is expected to consume about 47 percent of the resources planned for air superiority missions. The Air Force, the Navy, and the Marines all have capabilities to defeat enemy fighters and other aircraft as a part of offensive and defensive air superiority missions using aircraft equipped with air-to-air missiles and guns. Although the missiles used are generally common for the air superiority missions regardless of the service (AIM-7 Sparrow, Advanced Medium Range Air-to-Air Missile, AIM-9 Sidewinder), the

aircraft in use and being acquired are generally unique to each service. Table 2.3 shows the fighter aircraft systems in service or being acquired that have a capability to defeat enemy fighters and other aircraft. Some fighters have air superiority designated as their primary mission, while others have a significant capability to accomplish air superiority missions, but their primary missions are interdiction or are related to the attack of ground targets.

**Table 2.3: Fighter Aircraft in Service or Being Acquired That Have Capability to Accomplish Air Superiority Missions Against Enemy Fighters and Other Aircraft**

<b>Service</b>	<b>Aircraft system</b>	<b>Air superiority primary mission?</b>
Navy	F-14	Yes
Navy	F/A-18	No
Air Force	F-15 C/D	Yes
Air Force	F-16	No
Air Force	F-15E	No
Air Force	F-22	Yes
Marines	AV-8B	No
Marines	F/A-18	No
Joint	JSF	No

Successful acquisition of systems that are commonly used among the services has been accomplished in air-to-air missiles and several air-to-ground munitions programs. However, despite Congress’ push for more efficient use of resources by emphasizing jointness among the services, few joint initiatives, particularly in the acquisition of aircraft, have been undertaken by DOD. Initiatives to acquire aircraft for joint service use in the past have often failed. For example, the Air Force was to develop and acquire the advanced tactical fighter (F-22), and the Navy was to develop and acquire an advanced tactical aircraft (A-12). These aircraft were both planned for use by both the Air Force and the Navy. Ultimately, the Secretary of Defense terminated the troubled A-12 program, and the Navy withdrew its support for the advanced tactical fighter program reportedly because of affordability problems.

In a more recent attempt to reduce overlap in future aircraft systems, DOD initiated the Joint Advanced Strike Technology program in 1993. This program focuses on affordability and on developing common components such as engines, aviation electronics, ground support, training, and munitions for use in three similar, but different JSF variants—one for the Air Force, the Navy, and the Marine Corps. Operational capability for this “family” of JSF aircraft is tentatively scheduled for 2010.



**Theater Ballistic Missile Defense**

The Army, the Navy, the Air Force, and the Marine Corps each are developing some capabilities to defend against theater ballistic missiles by defeating them at one of three intercept areas—boost phase, midcourse phase, or terminal phase. DOD plans to fund nine systems from fiscal year 1996 through fiscal year 2001 to defeat enemy theater ballistic missiles. Table 2.4 lists the nine theater missile defense systems that were included in the DOD plans for fiscal years 1996-2001. The estimated cost to acquire these nine systems is \$71 billion. Five of those planned systems—three Army, one Navy, and one Marine Corps—are designed to defeat theater ballistic missiles during the terminal phase of an enemy missile’s trajectories.

**Table 2.4: Theater Ballistic Missile Defense Systems**

<b>Service</b>	<b>System</b>	<b>Intercept point</b>
Army	Patriot Advanced Capability Level 3	Terminal
Army	Theater High Altitude Air Defense System	Terminal and midcourse
Army	Medium Extended Air Defense System	Terminal
Marine Corps	Improved Hawk	Terminal
Navy	Navy Area System	Terminal
Navy	Navy Theater Wide System	Midcourse
Air Force	Airborne Laser	Boost
Air Force and Navy	Airborne Interceptor	Boost and midcourse
DOD	Space-Based Laser	Boost

# Air Superiority Joint Warfighting Assessment Did Not Adequately Address Some Key Issues

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JWCA teams began assessing the U.S. joint warfighting capabilities in 1994, and in early 1995 rated the overall capability to conduct air superiority missions as marginal, or acceptable with some risk, through fiscal year 2001. This assessment process is an evolving one. Although the assessment was useful for displaying and rating the current joint force capability, it cannot be used to justify the spending planned by DOD for fighter aircraft planned for deployment beyond fiscal year 2001.

The Chairman of the Joint Chiefs of Staff is expected to advise the Secretary of Defense on the priority of requirements identified by the CINCS and the extent to which service program recommendations and budget proposals conform to these priorities. Further, the Chairman is expected to submit to the Secretary, alternative program recommendations and budget proposals. Although the assessment was useful in pointing out several inadequacies in forces that exist at this time, it did not adequately address several major issues regarding overlap of capabilities, priorities of future acquisitions of air superiority weapon systems, or alternative means of meeting the highest priority requirements. Further, it did not assign ratings of warfighting capability over a long enough period of time to be useful for establishing acquisition and budget priorities.

To assess the joint capability, the JWCA team evaluated the capabilities of the services to perform air superiority missions. The assessment was based on the services' ability to accomplish nine functions that are determinants of the overall ability to accomplish the missions. For example, to defeat enemy fighters, the JWCA evaluated the effectiveness of the capabilities to integrate command, control, communications, computers, and intelligence; deploy assets to the theater; plan missions, detect, identify, track, engage, and kill targets; and assess damage.

A formal report of the assessment was not made. Although a spokesman for the JWCA team told us that recommendations were made to the Chairman of the Joint Chiefs of Staff for preparation of the Chairman's program assessment, they would not share their recommendations with us.

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## Joint Staff Rated Overall Air Superiority Capability as Acceptable With Some Risk

In February 1995, the JWCA rated overall air superiority capabilities as acceptable with some risk through 2001. Aspects of several functional elements, however, were rated inadequate.

In 1994, the JWCA, under the direction of the Vice Chairman, began making assessments to evaluate the joint warfighting capabilities of U.S. military forces to perform designated missions. To conduct its assessment of air superiority, the JWCA divided the five air superiority missions into nine functional elements. Based on a combination of military judgment and existing analyses, they rated the capability to effectively accomplish each functional element through fiscal year 2001. One of three possible ratings was assigned to each element as follows:

- inadequate (high risk),
- marginal (acceptable with some risk), or
- adequate (low risk).

The marginal rating was determined to be an acceptable level to achieve in a realistic, fiscally constrained environment.

The Joint Staff briefed each CINC to obtain concurrence with the ratings and eventually achieved a consensus among the Commanders and the Joint Staff. The assessment provides an overview of the capabilities of the joint forces to accomplish the nine functions as they affect each of the five air superiority missions. The assessment permits a rapid identification of the immediate problem areas.

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## Several Elements Rated Inadequate

Although the overall assessments for the air superiority missions were that the capabilities were acceptable with some risk through fiscal year 2001, several elements were rated inadequate. DOD officials told us that all the services are working to rectify one of the long-standing deficiencies.

The process used by the team to make its assessment provided a useful, though limited, result and used a meaningful method of displaying the results. The details of the assessment were classified by DOD. However, the results of the assessment do not justify the acquisition of major aircraft systems like the F-22 because correction of the functions rated inadequate would not necessarily be impacted by acquisition of new aircraft.

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## The 1995 Air Superiority Joint Warfighting Assessment Has Limitations and Did Not Address Major Issues

Without broad, comprehensive assessments, the decisionmakers cannot be sure that they have sufficient information to make the difficult tradeoff decisions that may be required. At a minimum, we believe that such assessments should, for the air superiority mission (1) assess the relative merits of retiring assets, reducing procurement quantities, or canceling acquisition programs where excesses exist or where substantial payoff is not clear and (2) determine the most cost-effective means to satisfy deficiencies. Conducting such assessments could help determine what priority should be given to competing programs, whether programmed investments should continue to be funded, and whether new investments should be made.

The use of a joint perspective to assess U.S. warfighting capability has the potential to provide decisionmakers better insight into the capability of the entire U.S. military force to perform particular missions than by assessing an individual service's capability to perform a particular mission. However, there were limitations in the assessments of the air superiority mission and some major issues were not addressed.

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### Assessment Limitations

DOD limited its assessment to the planned capability contained in the future years defense program that covers fiscal years 1996-2001. Also, this assessment did not evaluate the overlap of capability in each mission and offered no alternative means of achieving the capabilities contained in the program.

For the warfighter who is concerned about the U.S. capability to fight a war in the near future, a 6-year period may be sufficient. However, to improve the usefulness of these assessments to assist program and budget decisions, comprehensive capability ratings over a longer period are necessary. Intelligence estimates of the projected threat may cover as much as a 15-year period. Many major weapon systems included in the fiscal years 1996-2001 defense plan will not be in the active inventory until long after fiscal year 2001 and, in some cases, are intended to respond to threats that may not exist until after fiscal year 2001. Thus, the air superiority joint warfighting assessment through fiscal year 2001 may not include the impact of significant changes in U.S. weapon capabilities or significant changes in the projected threat expected to come about after the 6 years covered in the defense program.

Another limitation was that the assessments do not examine the cost-effectiveness of alternative mixes of weapon systems to achieve the

objectives of the air superiority mission. For example, the JWCA assessed current plans to upgrade theater missile defenses and to upgrade fighter aircraft; yet, they did not identify other possible mixes or combinations of weapons to achieve the objectives.

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## Major Issues Not Addressed

As the nation attempts to achieve a balanced budget, our evaluations of U.S. air power missions and acquisition plans<sup>1</sup> showed that some programs would only marginally improve existing capabilities at a very high cost. The timing of others may be questionable in view of the changed security environment. For some programs, less costly alternatives could be pursued to meet identified needs.

An air superiority program that appears to be proceeding at an unnecessarily fast pace is the Air Force F-22 fighter program. The Air Force is proceeding with its plan to have a high degree of concurrency in the development and production of the F-22 aircraft. It plans to begin to acquire F-22 fighters in fiscal year 1999 and to rapidly accelerate the pace of production to 48 aircraft a year.<sup>2</sup> The Air Force plans to begin initial operations with F-22s in November 2004. Our analyses showed that the existing U.S. frontline fighter, the F-15, compared favorably to the projected frontline aircraft of potential adversaries used in the assessments through fiscal year 2010. DOD told us that there are several current or soon to be fielded foreign fighters that are at parity with the F-15. Although we recognize several foreign fighter aircraft are in development that are projected to be roughly comparable with the F-15C when those foreign aircraft are ultimately developed and fielded, it is uncertain how quickly the aircraft will be produced. It is also unlikely that large quantities will be available and affordable by countries that the United States considers to be potential adversaries. Additionally, there are risks associated with the concurrent development and production planned for the F-22, risks that DOD and we have disagreed about, but which need to be an important consideration in a decision to move into production of a high technology system such as the F-22.

We previously recommended that, at a minimum, the Joint Staff should assess the impact on joint warfighting capability of delaying the F-22's

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<sup>1</sup>Combat Air Power: Joint Mission Assessment Needed Before Making Program and Budget Decisions (GAO/NSIAD-96-177, Sept. 20, 1996).

<sup>2</sup>Tactical Aircraft: Concurrency in Development and Production of F-22 Aircraft Should Be Reduced (GAO/NSIAD-95-59, Apr. 19, 1995).

initial operations to 2010 and adjusting acquisition plans to slow the acceleration of the production pace and reduce the degree of concurrency.

Another shortcoming in the assessment was that it did not consider whether the F-15 could be replaced by the JSF instead of the F-22 because the JSF, with some capabilities similar to the F-22s, is also supposed to have low-observable characteristics and the capability to launch missiles against enemy aircraft. The JSF average unit procurement cost is expected to be lower<sup>3</sup> than an F-22 and is scheduled to become operational in 2010, compared to 2004 for the F-22.

The assessment also did not deal with the issue of whether there is the need to replace F-15s with F-22s on a one-for-one basis. The Air Force plans to replace four wings of F-15s with about four wings of F-22s (438). Yet, an Air Force analysis indicates that the F-22 would be 12 times more effective than the F-15C in defeating the same threat.

The assessment, moreover, did not address the issue of whether there was a more viable alternative to the Navy's F/A-18E/F fighter program. Our recent report<sup>4</sup> on the F/A-18E/F program has shown that deficiencies in the current F/A-18C/D range, carrier recovery payload, survivability, and system growth the Navy cited in justifying the F/A-18E/F program either do not exist, can be corrected with minimal changes to the F/A-18C/D, or will only be marginally improved in the F/A-18E/F model. The assessment did not discuss the benefits and drawbacks of canceling the F/A-18E/F and continuing with the less costly F/A-18C/D until the JSF becomes operational.

A major issue confronting DOD and Congress is the need to pursue three new tactical aircraft programs that will cost an estimated \$355.7 billion in fiscal year 1997 dollars, according to the Congressional Budget Office. However, the assessment did not provide an aggregate assessment of the quantity of U.S. aircraft with air superiority capabilities compared to potential adversaries. Even with the drawdown of the U.S. fighter inventory over the past few years, its current and future inventory numbers about 2,600 frontline fighters (F-14s, F-15s, F-16s, and F-18s).

The size and the makeup of the U.S. theater ballistic missile defense is another major issue confronting DOD and Congress; yet the JWCA did not

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<sup>3</sup>CBO Testimony on Modernizing Tactical Aircraft (June 27, 1996).

<sup>4</sup>Naval Aviation: F/A-18E/F Will Provide Marginal Operational Improvement at High Cost (GAO/NSIAD-96-98, June 18, 1996).

address this issue. Pursuing all nine systems could cost an estimated \$71 billion, which is probably understated considering that most of these systems are technologically risky and remain unproven. For example, none of the nine tests conducted on a Navy and on an Army system were a complete success. However, the JWCA did not address the issue of what was the most cost-effective mix of theater ballistic missiles required to meet mission requirements.

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## Conclusions

It is important that U.S. forces be properly equipped to successfully achieve air superiority and that the effectiveness of this equipment be continually modernized. At a time when the country is striving to achieve a balanced budget, the JWCA on air superiority is not ensuring that resources are being applied in an efficient, economical, and effective manner. Moreover, the assessments did not address the key issues involving joint operations and requirements facing the air superiority missions nor do they attempt to identify opportunities to reduce duplications and overlaps in capabilities without unacceptable effects on force capabilities.

We are not making any new recommendations in this report. In our overall report on combat air power, we recommended that the Secretary of Defense, along with the Chairman of the Joint Chiefs of Staff, develop an assessment process that yields more comprehensive information in key mission areas. In making this recommendation, we included the offensive and defensive aspects of the air superiority mission and the results of this review of the assessments conducted by the JWCA team. We said the recommended process could be achieved by broadening the JWCAs or developing an alternative mechanism. DOD partially concurred with the recommendation, agreeing that analytical support for overall decision-making can be improved, but disagreeing that the Secretary is currently receiving inadequate advice.

We believe the concerns identified in this report about DOD's assessments of air superiority mission areas should be addressed as part of DOD's efforts to implement our prior recommendation. Specifically, we believe the assessments need to

- cover a longer period to permit better analysis of projected capabilities of both the U.S. and potential adversaries;
- include cost-effectiveness analyses of alternative means to achieve U.S. objectives;
- identify unnecessary overlap and duplication;

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**Chapter 3**  
**Air Superiority Joint Warfighting**  
**Assessment Did Not Adequately Address**  
**Some Key Issues**

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- include comparisons and analyses of U.S. capabilities to conduct air superiority missions to capabilities of adversaries; and
  - address major issues including (1) the need to proceed with three new tactical fighters, (2) the need to proceed with a highly concurrent schedule and rapid production pace increase for the F-22 program, (3) the need to replace each F-15 with an F-22, (4) the potential for replacing F-15s with the JSF rather than F-22s, (5) the need for procuring the F/A-18E/F rather than modifying F/A-18C/Ds, (6) the most cost-effective mix of theater ballistic missile defenses required to meet mission requirements, and (7) U.S. capabilities to defend against certain cruise missile threats.



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# Services' Identification of Capabilities for Achieving Air Superiority

**Table I.1: Platforms Contributing to Air Superiority**

Mission	Joint	
	Current	Future
<b>Offensive counter air</b>		
Defeat enemy fighters		JSF
Airfield attack only		
<b>Offensive counter air</b>		
Defeat enemy surface-to-air defense		JSF
<b>Defensive counter air</b>		
Defeat enemy fighters		JSF
<b>Defensive counter air</b>		
Defeat enemy cruise missiles		JSF
Ground attack only		

**Appendix I  
Services' Identification of Capabilities for  
Achieving Air Superiority**

Air Force		Army		Navy		Marine Corps	
Current	Future	Current	Future	Current	Future	Current	Future
AWACS	F-22			F-14	F/A-18 E/F	F/A-18 C/D	F/A-18E/F
F-15 A-D				F/A-18 A-D		AV-8B	
F-15E				E-2C			
F-16							
F-117							
F-111							
B-1							
B-2							
B-52							
F-16 (HTS)		Multiple Launch Rocket System		F-14	F/A-18 E/F	F/A-18 C/D	F/A-18E/F
F-4G				F/A-18 A-D			
EF-111				EA-6B			
F-111							
F-117							
B-1							
B-2							
B-52							
F-15 A-D	F-22	Hawk (Guard only)		F-14	F/A-18 E/F	F/A-18 C/D	F/A-18E/F
F-15 E	Airborne laser			F/A-18 A-D	Various Ships	AV-8B	
F-16				Various ships		Hawk mobility	
F-111 (partial)				E-2C			
AWACS							
F-15 A-D	F-22	Hawk (Guard only)	Medium Extended Air Defense System	F-14	F/A-18 E/F	F/A-18 C/D	F/A-18E/F
F-15 E	Airborne Laser	Patriot		F/A-18 A-D	Various ships	Hawk mobility	
F-16				Various ships			
F-111				E-2C			
B-52							
B-1							

(continued)

**Appendix I  
 Services' Identification of Capabilities for  
 Achieving Air Superiority**

Mission	Joint	
	Current	Future
<b>Defensive counter air</b>		
Defeat enemy theater missile defenses		Space-based laser <sup>a</sup>
		Boost phase intercept
Ground attack only		JSF

**Appendix I  
Services' Identification of Capabilities for  
Achieving Air Superiority**

Air Force		Army		Navy		Marine Corps	
Current	Future	Current	Future	Current	Future	Current	Future
	Airborne laser	Patriot	Theater High Altitude Air Defense	F-14D	F-14 D (with inteceptor missile)		Hawk with Theater Missile Defense Upgrade
			Medium Extended Air Defense System		Aegis ships		Medium Extended Air Defense System
			Patriot Advanced Capability - Level 3		Area system		
					Theater-wide system		
F-15 A-D				F/A-18A-D	F/A-18E/F	F/A-18C/D	F/A-18E/F
F-15E							
F-16							
B-52							
B-1							
F-111							

Notes:

1. The platforms and munitions listed in the "Current" columns represent what the services use today.
2. The platforms and munitions listed in the "Future" columns represent what the services plan to buy or upgrade in the future and include new systems or major capability improvements of existing system.
3. JSF - Joint Strike Fighter.
4. AWACS - Airborne Warning and Control System.

<sup>a</sup>This is a DOD-managed system that can potentially be used by all the services.

**Appendix I  
Services' Identification of Capabilities for  
Achieving Air Superiority**

**Table 1.2: Missiles and Munitions  
Contributing to Air Superiority**

Mission	Joint	
	Current	Future
<b>Offensive counter air</b>		
Defeat enemy fighters	Sparrow	AIM-9X
	Sidewinder	Advanced Medium Range Air-to-Air Missile—Improvement
Airfield attack	Advanced Medium Range Air-to-Air Missile	
	Maverick	Joint Direct Attack Munition
	Guided Bomb Unit 24	Joint Standoff Weapon
	Mark 84	
<b>Offensive counter air</b>		
Defeat enemy surface-to-air defenses	High Speed Anti- Radiation Missile	Joint Direct Attack Munition
	Maverick	Joint Standoff Weapon
	Mark 82, 84	

**Appendix I  
Services' Identification of Capabilities for  
Achieving Air Superiority**

Air Force		Army		Navy		Marine Corps	
Current	Future	Current	Future	Current	Future	Current	Future
					Phoenix		
Air-to-Ground Munition 130, 142	GPS Aided Munition Wind Corrected Munition				Standoff Land Attack Missile (extended range)		
Cluster Bomb Unit 5					Walleye		
Cluster Bomb Unit 87					Rockeye		
Conventional Air Launched Cruise Missile					Laser Guided Bomb 83		
Guided Bomb Unit 10, 15, 27, 28					Mark 83		
Mark 82					Tomahawk		
Cluster Bomb Unit 58, 87, 97	GPS Aided Munition	Army Tactical Missile System	Army Tactical Missile System Improvements		Guided Bomb Unit 24		
Guided Bomb Unit 10, 12, 15, 24, 27	Wind Corrected Munition				Walleye		
Conventional Air Launched Cruise Missile					Rockeye		
Sensor Fused Weapon					Laser Guided Bomb 83		
					Mark 83		
					Tomahawk		

(continued)

**Appendix I  
 Services' Identification of Capabilities for  
 Achieving Air Superiority**

<b>Mission</b>	<b>Joint</b>	
	<b>Current</b>	<b>Future</b>
<b>Defensive counter air</b>		
Defeat enemy fighters	Sparrow	AIM-9X
	Sidewinder	Advanced Medium Range Air-to-Air Missile—Improvement
	Advanced Medium Range Air-to-Air Missile	Avenger Stinger
	Stinger	
<b>Defensive counter air:</b>		
Defeat enemy cruise missiles	Sparrow	AIM-9X
	Sidewinder	Advanced Medium Range Air-to-Air Missile—Improvement
	Advanced Medium Range Air-to-Air Missile	Avenger Stinger
	Stinger	
<b>Defensive counter air</b>		
Defeat enemy theater ballistic missiles		



**Appendix I  
Services' Identification of Capabilities for  
Achieving Air Superiority**

Air Force		Army		Navy		Marine Corps	
Current	Future	Current	Future	Current	Future	Current	Future
		Patriot Advanced Capability 2 Hawk (National Guard only)	Medium Extended Air Defense System	Close-In Weapon System	Close-In Weapon System Blocks 1A, 1B, 1C	Hawk mobility	Hawk with Theater Missile Defense Upgrade
			Bradley Stinger	Rolling Airframe Missile—Block 0	Rolling Airframe Missile—Block 1	Stinger	Stinger
				NATO Sea Sparrow	Evolved Sea Sparrow		
				Standard Missile 2 Block IIIA	Standard Missile 2 Blocks IIIB, IV		
				Phoenix			
		Patriot Advanced Capability 2	Medium Extended Air Defense System	Close-In Weapon System	Close-In Weapon System Blocks 1A, 1B, 1C	Hawk mobility	Hawk with Theater Missile Defense Upgrade
		Hawk (National Guard only)	Bradley Stinger	Rolling Airframe Missile—Block 0	Rolling Airframe Missile—Block 1		
				NATO Sea Sparrow	Evolved Sea Sparrow		
				Standard Missile 2 Block IIIA	Standard Missile 2 Blocks IIIB, IV		
				Phoenix			
			Patriot Advanced Capability 3		Standard Missile 2, Block IVA, Block Theater Missile Defense		Hawk with Theater Missile Defense Upgrade
			Medium Extended Air Defense System				

(continued)

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**Appendix I**  
**Services' Identification of Capabilities for**  
**Achieving Air Superiority**

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<b>Mission</b>	<b>Current</b>	<b>Joint</b>
		<b>Future</b>
Ground attack only		Joint Standoff Weapon

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**Appendix I  
Services' Identification of Capabilities for  
Achieving Air Superiority**

Air Force		Army		Navy		Marine Corps	
Current	Future	Current	Future	Current	Future	Current	Future
			Theater High Altitude Air Defense				
					Maverick		
					Rockeye		

Notes:

1. The missiles and munitions listed in the "Current" column represent what the services use today.
2. The missiles and munitions listed in the "Future" columns represent what the services will buy or upgrade in the future and include new systems or major capability improvements of existing systems.
3. NATO — North Atlantic Treaty Organization.
4. GPS — Global Positioning System.

# Funding for Missions of Air Superiority

**Table II.1: Approximate DOD Future Year Defense Program Acquisition Funding for the Missions of Air Superiority, as of June 1995**

Then-year dollars in thousands

Missions	Fiscal years						Total
	1996	1997	1998	1999	2000	2001	
<b>Conduct offensive operations:</b>							
<b>Defeat enemy fighters</b>							
F-15	\$92,902	\$141,572	\$240,911	\$302,728	\$284,147	\$262,121	<b>\$1,324,381</b>
F-22	2,138,718	2,048,435	2,346,248	2,214,665	3,014,556	3,933,995	<b>15,696,617</b>
F-14	103,537	206,866	225,499	245,931	193,996	121,697	<b>1,097,526</b>
Advanced Medium Range Air-to-Air Missile	266,768	261,160	259,845	243,397	252,639	286,668	<b>1,570,477</b>
Tactical Air-to-Air Missiles	73,673	110,275	142,661	181,498	138,691	139,984	786,782
<b>Defeat enemy surface-to-air missiles</b>							
High Speed Anti-Radiation Missile	3,348	4,226	2,586	2,027	0	0	<b>12,187</b>
F-4G Wild Weasel	615	136	0	0	0	0	<b>751</b>
EA-6B	0	59,422	81,304	143,756	152,454	208,738	<b>645,674</b>
Compass Call	18,914	23,918	29,340	18,781	19,399	19,983	<b>130,335</b>
Manned Destructive Suppression	7,408	2,147	2,150	2,130	2,207	2,166	<b>18,208</b>
<b>Conduct defensive operations:</b>							
<b>Defeat enemy aircraft<sup>a</sup></b>							
<b>Defeat enemy cruise missiles</b>							
Airborne Warning and Control System	356,008	342,620	126,151	117,731	122,318	125,746	<b>1,190,574</b>
E-2C Hawkeye	216,673	303,278	312,945	320,872	324,665	332,921	<b>1,811,354</b>
<b>Defeat enemy theater ballistic missiles</b>							
Theater High Altitude Area Defense System	589,927	740,888	867,941	1,269,833	928,486	862,193	<b>5,259,268</b>
Airborne Laser <sup>b</sup>	19,954	19,954	0	0	0	0	<b>39,908</b>
Navy Area System	254,370	402,161	440,717	499,689	560,328	494,517	<b>2,651,782</b>
Navy Theater-wide System	30,442	33,400	0	0	0	0	<b>63,842</b>
Medium Extended Air Defense System <sup>c</sup>	30,442	33,400	0	0	0	0	<b>63,842</b>
Airborne Interceptor	49,061	44,300	66,300	72,300	0	0	<b>231,961</b>
Patriot Advanced Capability Level 3	690,100	616,670	582,800	453,300	516,700	299,900	<b>3,159,470</b>

(continued)

**Appendix II  
Funding for Missions of Air Superiority**

Then-year dollars in thousands

Missions	Fiscal years						Total
	1996	1997	1998	1999	2000	2001	
Marine Corps' Hawk	30,794	32,883	25,380	596	614	8,260	<b>98,527</b>
Space-Based Laser	72,832	28,372	28,894	28,593	28,304	27,732	<b>214,727</b>
Other	917,668	920,333	1,163,026	1,022,263	1,448,013	1,606,729	<b>7,078,032</b>
<b>Total</b>	<b>\$5,964,154</b>	<b>\$6,376,416</b>	<b>\$6,944,698</b>	<b>\$7,140,090</b>	<b>\$7,987,517</b>	<b>\$8,733,350</b>	<b>\$43,146,225</b>

Notes:

1. Acquisition funding includes research, development, test, and evaluation and procurement of aircraft and missiles as of June 1995.

<sup>a</sup>The funding to defeat enemy fighters and aircraft in offensive and defensive operations are not separable and are essentially all included under the offensive operations.

<sup>b</sup>According to an Air Force official, the Air Force has programmed \$693,200,000 in additional funds for Airborne Laser between fiscal years 1997 and 2001.

<sup>c</sup>According to a Medium Extended Air Defense System project office cost official, the Army has requested \$533 million additional funds for the program for fiscal years 1997-2001.

**Appendix II  
Funding for Missions of Air Superiority**

**Table II.2: Approximate DOD Future Year Defense Program Funding for Weapon Systems With Some Capability, Not Primary Responsibility, for the Missions of Air Superiority**

Then-year dollars in thousands

Missions	Fiscal years						Total
	1996	1997	1998	1999	2000	2001	
<b>Conduct Offensive Operations:</b>							
<b>Defeat enemy fighters</b>							
F-15E	\$293,559	\$280,705	\$236,986	\$232,245	\$262,026	\$289,974	<b>\$1,595,495</b>
F-16	561,455	456,162	499,594	521,707	565,321	563,848	<b>3,168,087</b>
F-111	597	0	0	0	0	0	<b>597</b>
F/A-18	1,886,685	2,938,028	3,561,884	4,196,792	4,245,141	4,206,668	<b>21,035,198</b>
AV-8B	208,890	406,260	379,072	418,489	408,367	411,050	<b>2,232,128</b>
JSF	331,156	480,061	680,611	841,965	664,507	938,805	<b>3,937,105</b>
Defeat enemy surface-to- air defenses	0	0	0	0	0	0	<b>0</b>
<b>Conduct Defensive Operations:</b>							
<b>Defeat enemy aircraft</b>							
	a	a	a	a	a	a	<b>a</b>
Defeat enemy cruise missiles	0	0	0	0	0	0	<b>0</b>
Defeat enemy theater ballistic missiles	0	0	0	0	0	0	<b>0</b>
<b>Total</b>	<b>\$3,282,342</b>	<b>\$4,561,216</b>	<b>\$5,358,147</b>	<b>\$6,211,198</b>	<b>\$6,145,362</b>	<b>\$6,410,345</b>	<b>\$31,968,610</b>

Note:

1. Acquisition funding includes research, development, test, and evaluation and procurement of aircraft as of June 1995.

<sup>a</sup>The funding to defeat enemy fighters and aircraft in offensive and defensive operations are not separable and are essentially all included under the offensive operations.

# Comments From the Department of Defense

Note: GAO comments supplementing those in the report text appear at the end of this appendix.



ACQUISITION AND TECHNOLOGY

## OFFICE OF THE UNDER SECRETARY OF DEFENSE

3000 DEFENSE PENTAGON  
WASHINGTON DC 20301-3000



October 22, 1996

Mr. Louis J. Rodrigues  
Director, Defense Acquisition Issues  
National Security and International  
Affairs Division  
U.S. General Accounting Office  
Washington, DC 20548

Dear Mr. Rodrigues:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report, "COMBAT AIR POWER: Services' Air Superiority Missions Overlap But Include Little Common Equipment," dated September 17, 1996 (GAO 707074), OSD Case 1229-X. The Department disagrees with many of the report's assertions, some of which also appeared in the companion GAO report, "COMBAT AIR POWER: Joint Mission Assessments Needed Before Making Program and Budget Decisions," dated June 20, 1996 (GAO Code 701040), OSD Case 1175. There are no recommendations.

See comment 1.

The GAO implies that, in today's world, the threat does not warrant investment, air power is not important, and the Department lacks robust processes to sort through competing priorities. None of those impressions is accurate, as the Department has pointed out in recent testimony before the Subcommittee on Research & Development and the Subcommittee on Procurement of the House Committee on National Security on the DoD Tactical Aviation (TACAIR) Modernization Program, June 27, 1996.

See comment 2.

Threat aircraft exist today that can challenge many U.S. aircraft. For example, the SU-27 Flanker and MIG-29 Fulcrum have excellent aerodynamic qualities and propulsion systems. Aircraft in development, such as the RAFALE, EF-2000, and SU-35 project increased potential to challenge U.S. aircraft. Surface-to-air missiles continue to get smarter and more lethal. In short, the world of today and tomorrow is fraught with danger to U.S. air dominance.

See comment 3.

The Department used to discuss the requirement for air superiority in terms of kill ratios--accepting U.S. losses to kill enemy forces. We now want not only air superiority, but also air dominance. Until the first day of the Gulf war, the Iraqi Air Force was generating up to 40 sorties a day. Within a few days, we shut down the Iraqi Air Force and achieved total air dominance. Our modernization program is designed to



**Appendix III**  
**Comments From the Department of Defense**

maintain that air dominance—air power is more vital today than ever before to ensure victory at minimal cost in American lives. More importantly, air dominance means that all the other military operations—at sea and on the land—are made easier, because opposing enemy air forces will not be allowed to participate in a meaningful way.

See comment 3.

A more recent example is Bosnia, where the Dayton peace accords would not have occurred without the persuasive influence of U.S. air power—Air Force, Navy, and Marines. The Air Superiority plans we have in place (including TACAIR modernization) will similarly provide us with that air dominance on the battlefield of the future.

See comment 3.

The U.S. is not looking for an equal or fair fight. If our deterrence fails and we must go to war with a future adversary, we want it to be unfair—we want the advantage to be wholly and completely on our side. Air dominance will leverage all the other operations we will be conducting. No U.S. soldier has been killed by an enemy aircraft in over 40 years—and we don't intend to relinquish that advantage.

See comment 4.

Another misleading impression presented in the draft report is that the DoD process used to develop our modernization plans is inadequate. The DoD position was explained in our response to the companion GAO report "COMBAT AIR POWER: Joint Mission Assessments Needed Before Making Program and Budget Decisions," (GAO Code 701040) OSD Case 1175. The Department disagreed with many of the findings in that report and partially concurred with the recommendations. The Department disagreed, in particular, with the finding that ongoing major combat aircraft acquisition programs lack "sufficient analysis of needs and capabilities." The Department also disagreed that the Secretary and Deputy Secretary of Defense are receiving inadequate advice, in particular, inadequate joint military advice to support decision-making on combat air power programs. The Chairman of the Joint Chiefs of Staff weekly discusses such topics with the Secretary of Defense.

See comment 4.

Overall, neither GAO report adequately recognizes the level of scrutiny provided by the Office of the Secretary of Defense and the Joint Staff to major defense programs. The Department's partial concurrence with the prior report reflects that concern. The decision-making processes that are used to make major changes to several combat air power programs, many of which are mentioned in both GAO reports, demonstrate the rigor that DoD applies in reviewing its programs. Moreover, our TACAIR modernization plan flows from years of analysis, thought, and intensive debate. The analytical framework that supports this plan is both complex and rigorous. Each of the Services evaluates current and projected capabilities in the context of changing threats, policy guidance, and military strategy to identify deficiencies. Cost and performance trades are addressed to preserve an acceptable balance between risk and affordability.



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See comment 5.

The Joint Requirements Oversight Council (JROC) has a role in shaping military requirements within the Department of Defense. In 1994, the JROC established its attendant Joint Warfighting Capability Assessment (JWCA) process, including greatly increased involvement by the Combatant Commanders, the Services, and OSD. We believe this process, concluding its second year, has been successful in supporting the Chairman's military advice to the Secretary of Defense. The JWCA process examines key relationships and interactions among warfighting capabilities to identify opportunities for improving joint effectiveness or exploitable technologies, for identifying deficiencies, and for avoiding unnecessary duplication; as well as highlighting areas where we may prudently accept some risk. TACAIR recapitalization is one of the areas in which the JWCA process is heavily involved.

See comment 5.

The JROC, through the JWCA process, special studies, and other ongoing assessments, directs numerous efforts which provide oversight to the requirements process. The JROC specifically focuses on affordability and cost-performance tradeoffs. The goal is to ferret out duplication, unnecessary redundancies, or inflated performance requirements, while ensuring this Nation maintains the capability for air dominance into the 21<sup>st</sup> Century.

See comment 6.

The Department does not concur with many of the GAO assertions and suggestions about TACAIR modernization, especially concerning the F-22 development, production, and deployment; replacing the F-22 with the Joint Strike Fighter; and developing the F-18E/F. The GAO has not made a case for overturning the requirements process decisions described in this letter. (Refer to the enclosure for more detail.)

While the Department agrees there is overlap in the Air Superiority mission, the overlap (layering) of capabilities, specifically within the Army's theater missile defense systems, is done by design, thus achieving sufficient assurance of destroying an inbound missile. The JWCA process and the JROC are tasked to alleviate redundancies in similar, and not complementary systems.

The Department agrees that analytical support for overall decision-making can be improved and included funding for such improvements in the FY 1997 President's Budget. The Department is continually seeking ways to improve its decision-making processes to deal with the greater uncertainties in long-term defense planning that have followed the end of the Cold War. These improvements are being made to an existing set of processes that the Department already considers to be robust; they do not reflect a judgment that the current basis for decision-making is inadequate.

Finally, the Department of Defense has the necessary institutionalized, well-structured oversight mechanisms in place to ensure a critical and independent review of all defense acquisition programs. Policies, processes, and programs--independent

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**Appendix III**  
**Comments From the Department of Defense**

checks and balances--are in place to assess threats, requirements, cost estimates, and cost and operational effectiveness analyses.

The Department appreciates the opportunity to comment on the draft report and includes specific comments in the enclosure.

Sincerely,



George R. Schneiter  
Director  
Strategic and Tactical Systems

Enclosure

SPECIFIC CONCERNS/CORRECTIONS FOR THE DRAFT

Now on pp. 7, 21-22.

See comment 7.

Now on pp. 27-28 and 30.

See comment 8.

See pp. 27-28.

See comment 9.

Now on pp. 28 and 30.

See comment 10.

Now on pp. 28 and 30.

See comment 11.

Now on pp. 8 and 28.

See comment 12.

1. Pages 6-7, 27-29: The report claims strike aircraft such as the F-15E, F-16 and Joint Strike Fighter (JSF) "have a capability to defeat enemy fighters." This noted capability is defensive; these aircraft are heavily tasked in their primary air-to-ground role and due to their combat configurations will rely on air superiority platforms to ensure freedom of maneuver.
2. Pages 41-42, 46: The report suggests that the F-22 program is too concurrent. Refer to the Department's response to the GAO report entitled, "Tactical Aircraft: Concurrency in Development and Production of F-22 Aircraft Should Be Reduced" (GAO/NSIAD-95-59) and the Apr 95 Defense Science Board report on the same subject.
3. Pages 41-42: The Department continues to disagree with the inadequate threat comparison offered by the GAO. Refer to DoD response to GAO report entitled, "Tactical Aircraft: Planned F-15 Replacement Is Premature" (GAO/C-NSIAD-94-11).
4. Pages 42-43, 46: The Department takes exception with the GAO analysis of the requirement to replace the F-15 with the F-22 on a one-for-one basis. The GAO notes the F-22 is more effective than the F-15 and uses this as the basis for reduced numbers. F-22 quantities are determined by maintaining four fighter wing equivalents to satisfy the Defense Planning Guidance. While the F-22 is remarkably improved over the F-15, the F-22 will not be available in significant quantities until 2008. The threat, both air-to-air and surface-to-air, has also improved remarkably since the deployment of the F-15 in the 1970s and will certainly continue to improve their capabilities in the years before the F-22 is fielded and beyond.
5. Page 42, 47: The Department disagrees with GAO's suggestion to replace the F-15 with the JSF instead of the F-22. The air superiority mission requires the ability to roam freely and operate autonomously. The F-22, with stealth, the ability to supercruise, a superior internal weapons load and integrated avionics, meets that criteria. In fact, the F-22 and JSF will complement each other on the future battlefield to provide the best balance of affordability and capability for the USAF.
6. Pages 9, 44: The Department takes issue with the inference that the US will have 2600 "frontline" fighters available to attain air superiority. The report unfairly assumes all US fighters will be available for every contingency, and equates all combat-coded US aircraft with only fourth generation foreign fighters. Moreover, the report ignores the flexibility of air power and the wide variety of critical combat missions that airpower performs at the discretion of the Theater Commander.

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**Comments From the Department of Defense**

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Now on p. 25.  
See comment 13.

7. Pages 37-38: Although the US has faced problems associated with target identification, great strides are being made in all Services to rectify this deficiency, contrary to the report's findings.

Now on pp. 7 and 28.

See comment 14.

8. Pages 6, 43: The Department disagrees with the GAO assertion concerning the F/A-18E/F. As stated in the Department's response to GAO/NSIAD-96-98, the DoD has rejected the recommendation to reconsider procurement of the F/A-18E/F in favor of additional F/A-18C/Ds now, while awaiting the JSF. The DoD rationale for the F/A-18E/F remains valid, and the development program is proceeding as planned. The F/A-18C/D has proven deficiencies in range, recovery payloads, payload flexibility, internal volume for system growth, and survivability characteristics. The F/A-18E/F is demonstrating that it can provide the needed operational improvements in these areas.

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The following are our comments on the Department of Defense's (DOD) letter dated October 22, 1996.

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## GAO Comments

1. This report does not suggest, imply, or infer that air power is not important or that the threat does not warrant investment. The purpose of this report is to identify overlap of the military services' capabilities to achieve air superiority and evaluate the utility of the joint warfighting assessment process.
2. The capabilities of the specific threat aircraft mentioned by DOD were considered in the joint warfighting capability assessment (JWCA) for 1996-2001. The JWCA concluded that U.S. capability to defeat enemy aircraft through fiscal year 2001 was marginal (acceptable with some degree of risk). The JWCA considered not only the aerodynamic and propulsion qualities of individual threat aircraft mentioned by DOD in its comments, but also the closely related functions of command, control, communications, mission planning, target detection, tracking, engagement, and destruction.
3. Our review evaluated U.S. capability to achieve air superiority, which was 1 of 10 missions assessed by the Joint Staff in its JWCAs. The Joint Staff did not identify air dominance as one of its missions; however, redefining the objective as air dominance could have significant implications for future programming of forces.
4. This report specifically deals with the air superiority JWCA, not the entire process to develop modernization plans and scrutinize programs. We do believe JWCA can be substantially improved, as can the analytical support, and DOD partially concurred with that evaluation in response to the companion report Combat Air Power: Joint Mission Assessments Needed Before Making Program and Budget Decisions (GAO/NSIAD-96-177, Sept. 20, 1996). Although we disagree that further criticism of the DOD decision processes is intended in this report, there are many facets of DOD's assessment process that we believe can and should be improved. We have and will continue to provide appropriate reports to DOD for comment.
5. DOD did not comment on the specific issues we raised about the JWCA.
6. The intent of this report is to show overlap in air superiority capabilities and raise specific issues that the air superiority JWCA could address to improve the analytical support for decisionmakers. In this report, we have

not intended to make a case for overturning the decisions made by DOD. However, because of concerns we have raised in other reports about tactical aircraft systems (listed on the last page of this report), we believe those concerns should be addressed by JWCA from the point of view of joint warfighting capabilities.

7. The report clearly notes that these aircrafts' primary missions are air-to-ground. However, their significant air-to-air capabilities cannot be ignored and are available to the wartime commander.

8. Our prior report demonstrated the high degree of concurrency that exists with the F-22 program. The ramp up of production from 4, to 12, 24, and 36 aircraft a year under the low-rate production phase, and planned initiation of long lead parts procurement for 48 a year essentially represents a plan to achieve full-rate production before initial operational test and evaluation is completed.

9. We do not make threat projections. The threat information came directly from DOD intelligence agencies.

10. We believe this issue is appropriate for an expanded JWCA on air superiority. We believe DOD's air superiority JWCA should analyze the need to replace F-15s with F-22s on a one-for-one basis.

11. We believe that the Joint Staff's air superiority JWCA should analyze this as a possible option in the context of joint force capabilities.

12. The report was clarified to identify the specific aircraft that make up the 2,600 frontline fighters. None of them are A-10s.

13. This comment has been added to the body of the report.

14. We recognize that the E/F will provide some improvements over the C/D; however, we believe the C/D's current capabilities are adequate to accomplish its assigned mission. Based on the marginal nature of the improvements and the E/F's projected cost, we believe an analysis between these two models should be included in the JWCA.

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**Appendix IV**  
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**Appendix IV**  
**Major Contributors to This Report**

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# Related GAO Products

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Combat Air Power: Assessment of Joint Close Support Requirements and Capabilities Is Needed (GAO/NSIAD-96-45, June 28, 1996).

U.S. Combat Air Power: Reassessing Plans to Modernize Interdiction Capabilities Could Save Billions (GAO/NSIAD-96-72, May 13, 1996).

Tactical Aircraft: F-15 Replacement Is Premature as Currently Planned (GAO/NSIAD-94-118, Mar. 25, 1994).

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