

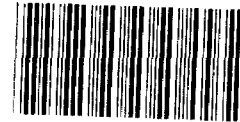
GAO

Report to the Honorable Quentin N.
Burdick, U. S. Senate

June 1987

AIR DEFENSE

Comparison of Upgraded F-4D and F-16A Aircraft



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June 15, 1987

The Honorable Quentin N. Burdick
United States Senate

Dear Senator Burdick:

As requested in your letter dated February 23, 1987, we have reviewed Air Force plans to transfer 270 F-16A fighter aircraft from the Tactical Air Force to the Strategic Air Defense (SAD) force. The aircraft's primary role would be to defend the United States against enemy bombers and cruise missiles.

You noted that a study by the North Dakota Air National Guard questioned the performance capability of F-16As for the air defense mission. The study concluded that the modified F-4D would be a more effective and less costly alternative. Subsequent to the study, the Congress provided funding and directed that the Air Force determine the feasibility of upgrading the F-4D aircraft for the SAD mission as an interim alternative in the event a planned air defense aircraft competition was deferred. This competition has since been held.

You asked us to determine (1) the Air Force's plans and progress on the congressionally directed F-4D demonstration project, (2) the capability of modified F-4Ds and F-16As to meet mission requirements, and (3) the cost of the modified F-4D and F-16A alternatives.

The Air Force does not plan to conduct the F-4D demonstration project and has requested that the funding be reprogrammed. The Air Force has concluded that the F-4D has reached the end of its useful life and should be retired. However, opinions on this seem to differ. According to Air Force Logistics Command officials, the F-4D could be used at least another 10 years, and in the opinion of North Dakota Air National Guard and other National Guard and Air Force officials, a modified F-4D would have capabilities superior to the F-16A in performing the air defense mission. If the modified F-4Ds were used for the mission, approximately \$2.5 billion in aircraft replacement costs could be saved if the F-16As are modified and kept in the Tactical Air Force.

Because of the unresolved questions regarding the cost and operational effectiveness of using the modified F-16A and F-4D in the SAD mission and the potential savings involved, we recommend that the Secretary of

the Air Force conduct a cost and operational effectiveness analysis comparing the modified F-4D and F-16A aircraft for the air defense mission. The analysis should (1) include a demonstration comparing the modified aircrafts' capabilities against requirements needed to counter the strategic air defense threat, (2) consider other potential missions and uses for the F-16As that would be available under the modified F-4D air defense alternative, and (3) consider that F-4Ds would likely require replacement in the SAD mission sooner than modified F-16As. Since the Air Force is accelerating the retirements of F-4Ds, we also recommend that the Secretary of the Air Force identify the approximately 180 most suitable F-4D aircraft for upgrading and ensure they are not retired prior to the conclusion of the demonstration and analysis.

In a separate GAO report (GAO/NSIAD-C-87-11) to be released to the Chairman, Subcommittee on Defense, House Appropriations Committee, we note that certain cost and operational effectiveness benefits will result if the Air Force retires RF-4C aircraft for the reconnaissance mission and replaces them with new F-16 aircraft. The Air Force currently plans to use the RF-4C aircraft until the late 1990s before replacing them. The report notes that the tactical reconnaissance mission requires penetration into enemy territory and requires an aircraft that is difficult for enemy air defense forces to locate and attack. The high maneuverability, low radar detectability, and low fuel consumption characteristics of the F-16 make it well suited for the reconnaissance mission.

The SAD mission, on the other hand, is to protect the continental United States from air attack. The modified F-4D's ordnance carrying and target acquisition capabilities, when compared to the modified F-16A, make it well suited for the air defense mission but are not critical to the reconnaissance mission.

Both reports recognize the operation and maintenance cost advantages of the F-16s over the F-4s. However, this report points out that this cost advantage does not offset the cost of replacing the F-16As with the new F-16Cs.

Details of our findings and additional background information are provided in the appendix.

In conducting our review, we interviewed officials at the Office of the Secretary of Defense; Department of the Air Force Headquarters, Washington, D.C.; National Guard Bureau, Washington, D.C.; Headquarters,

Tactical Air Command, Langley Air Force Base, Virginia; the North American Aerospace Defense Command, Colorado Springs, Colorado; the Air Force Logistics Center, Ogden, Utah; the North Dakota, Montana, Minnesota, and Oregon Air National Guard; and three defense contractors—Boeing Military Airplane Company, Hughes Aircraft Company, and McDonnell Douglas Corporation.

Whichever aircraft is used, its effectiveness against cruise missiles is also dependent on such items as the availability and capability of surveillance, tracking, and command and control systems; over-the-horizon radars and airborne warning and control systems; and missile and gun capabilities. These factors were not included in our review.

As requested, we did not obtain agency comments or discuss the contents of this report with agency officials. We conducted our review from February through April 1987 in accordance with generally accepted government auditing standards.

Unless you publicly announce its contents earlier, we plan no further distribution of this report until 10 days from the date of issuance. At that time, we will send copies to the Chairmen, Senate and House Committees on Appropriations, on Armed Services, and on Budget; the Secretaries of Defense and the Air Force; and the Director, Office of Management and Budget. Copies will also be made available to other interested parties upon request.

Sincerely yours,



Frank C. Conahan
Assistant Comptroller General

Comparison of the Modified F-4D and F-16A Fighter Aircraft for the Strategic Air Defense Mission

In April 1985 the Northrop Corporation submitted an unsolicited proposal to provide the Air Force with F-20 aircraft. This prompted the General Dynamics Corporation to offer the F-16SC at substantially lower prices than the F-16C models currently being purchased.

After submission of the unsolicited proposals, the Congress, in the fiscal year 1986 Appropriations Committees' conference report, directed a competition for new fighter aircraft. Following this mandate, the Air Force stated that it would use the new aircraft for its less demanding Strategic Air Defense (SAD) mission. Subsequently, the Department of Defense (DOD) Appropriations Act, 1986, required the Air Force to fill its air defense aircraft need through competition. The aircraft selected were to be assigned to the 11 Air National Guard squadrons of the SAD forces.

In May 22, 1986, testimony before the Senate Committee on Appropriations, Subcommittee on Defense, the Adjutant General of the North Dakota Air National Guard stated that the F-20 and F-16SC aircraft would be unsatisfactory for air defense requirements. He stated that a modified F-4D, containing the F-15 radar (APG-63), additional avionics upgrades, and an infrared search and track system, would make a superb air defense aircraft and would save about \$4 billion. A supporting study prepared by the North Dakota Air National Guard estimated the cost of upgrading 180 F-4Ds for the air defense role to be about \$540 million. The 180 modified F-4D aircraft would be provided to 7 Air National Guard squadrons; the remaining 4 squadrons would receive about 90 F-16As from the Tactical Air Force. The study concluded that the modified F-4D would be the most cost-effective and operationally effective aircraft to achieve air defense modernization, readiness, and force structure objectives.

As a result of the air defense fighter competition, the Air Force decided not to purchase new aircraft for the SAD mission but to upgrade 270 F-16A fighter aircraft assigned to its Tactical Air Force and transfer the aircraft to its SAD force.

The Air Force plans to spend about \$726 million to upgrade these aircraft for the air defense mission. However, the North Dakota Air National Guard study and the Commander in Chief, North American Aerospace Defense Command, raised serious questions about the performance ability of the proposed upgraded F-16A for the mission. They noted the limitations in critical all-weather capability and radar detection capability of the F-16A aircraft. Also, the Director of DOD's Office of

Operational Test and Evaluation has seriously questioned the capability of the F-16A to perform the mission.

Demonstration Project

The Congress provided \$15 million in fiscal year 1986 and \$50 million in fiscal year 1987 for the Air Force to determine the feasibility of upgrading F-4Ds for the SAD mission.

Air Force officials stated that they do not plan to conduct an F-4D demonstration and have requested a reprogramming of available F-4D modification funds. The reasons for this decision are principally because the

- F-4D has reached the end of its useful life,
- F-4D was not proposed as part of the air defense fighter competition,
- legislation providing the funding does not compel the Air Force to conduct a demonstration, and
- modified F-16As will meet the mission requirements.

Air Force officials informed us that the Air Force plan to phase out the F-4D was based on age, not necessarily on the condition of the aircraft, and that the aircraft's service life could be extended at least 10 years. As part of its plan to accelerate the F-4D phaseout, the Air Force is offering early retirements to about 400 maintenance and support staff at the Ogden Air Logistics Center. However, the Air Force plans to keep other aircraft, such as the RF-4C and F-4E and G, so there should be suppliers and maintenance capability remaining should the F-4D be used for the SAD mission.

At least two contractors had expressed interest to the Air Force in bidding the modified F-4D for the air defense fighter competition, but they informed us that they decided not to bid. They informed us they were not encouraged by Air Force officials to bid. Further, one contractor informed us that the fighter competition structure made bidding the modified F-4D impractical. For example, the competition solicitation required at least 270 aircraft; however, the contractors did not believe that 270 suitable F-4Ds were available.

Capability to Meet Requirements

Aircraft requirements for wartime SAD focus on the aircraft's capability to detect, identify, and destroy enemy bombers and cruise missiles. However, the Air Force has not clearly established specifics about the threat scenario or aircraft requirements to meet the attack options.

Appendix I
Comparison of the Modified F-4D and F-16A
Fighter Aircraft for the Strategic Air
Defense Mission

The SAD mission involves both a peacetime goal (“air sovereignty”) and a wartime goal (“damage limiting”). In peacetime, SAD is designed to demonstrate U.S. resolve to deter intrusion and provide a credible attack deterrent. In wartime, SAD is to provide attack warning and raid assessment and to limit damage to the United States.

A Statement of Need, prepared by the Tactical Air Command for the air defense competition, established general minimum requirements, most of which the modified F-16As and F-4Ds could meet. An Air Force official informed us that the requirements in the Statement of Need, unlike other need statements, were not driven by the enemy threat. It was prepared to enable F-20 and F-16 aircraft to compete in the congressionally directed 1986 air defense fighter competition.

The user requirements and the Statement of Need differ. The Tactical Air Command, in preparing the Statement of Need, used limited input from the SAD users—the North American Aerospace Defense Command, the First Air Force, and the Air National Guard. A Tactical Air Command official stated that the users’ requirements would have exceeded the capabilities of the F-16 and F-20 aircraft, which was not consistent with the congressional intent of the competition.

Essential air defense aircraft capabilities include (1) range and loiter time, (2) scramble time, (3) type and number of missiles carried, (4) enemy aircraft and missile radar detection and intercept capability, and (5) performance under adverse conditions. Although the capabilities of a modified F-16A or F-4D have not been demonstrated, the scramble time, range, and loiter time of both appear to be comparable. The larger F-4D, equipped with the APG-63 radar, would be superior in (1) Sparrow missile carrying capability, (2) radar detection and intercept capability, and (3) adverse weather operational capability. Therefore, the modified F-4D may be superior to the modified F-16A in performing the air defense wartime mission. However, the modified F-16A would be superior in reliability and maintainability.

Costs

To compare the two aircraft, we examined three types of costs—modification, operation and support, and replacement. We found that the F-16A’s modification and operation and support costs would be less than the F-4D’s but not nearly enough to offset the higher cost of replacing the F-16A.

Modification Costs

The Air Force estimated that the cost to modify 270 existing F-16As for the SAD mission would be \$726 million and is presently negotiating the terms of a fixed-price contract for this effort. The Air Force Logistics Center at Ogden, Utah, estimated the modification costs for 180 F-4D aircraft to be \$650 million. This included purchasing and installing the APG-63 radar; installing the infrared search and track system from existing F-106 aircraft; and the design, test, manufacture, and installation of fuel tanks that conform to the shape of the aircraft.

To compare costs for 180 aircraft (7 squadrons), we adjusted the estimate for the F-16As. Based on a review of the planned tasks, we assumed that the first 180 aircraft were the ones to be modified and that a 90-percent learning curve was appropriate. Our analysis showed that the estimated cost to modify the first 180 F-16As would be about \$514 million.

For both aircraft, we assumed that previously planned upgrades would be completed. However, due to the Air Force decision to retire the F-4Ds, the Air Force no longer plans to make the F-4D upgrades.

Operation and Support Costs

The Air Force estimated that the annual operation and support costs for a squadron (18 primary aircraft) would be \$25.8 million for F-16As and \$29.6 million for F-4Ds.¹ For a 180-aircraft force, the F-16A would cost approximately \$38 million less annually than the F-4D to operate and support. However, the improved reliability resulting from modifying the F-4D with a new radar and other components would reduce its operation and support costs.

Replacement Costs

Because the F-4Ds are currently used in the strategic air defense role, no new airframes would have to be purchased. However, the Air Force plans to transfer the F-16As from the Tactical Air Command to SAD and purchase additional aircraft to replace those transferred. An Air Force official stated that the replacement aircraft will be the F-16C/D. Using program unit costs in then-year dollars, the replacement cost for 180 aircraft would be about \$3 billion. This assumes that 90 of the 270 F-16As will still be transferred to the SAD forces to supplement the 180 F-4Ds. Whether or not this replacement cost is incurred depends on

¹This is based on operation and support cost data provided by the Secretary of the Air Force and includes the fixed and variable cost format reported in AFR-173-13. Personnel costs at the unit level, which are higher for the F-4D, are not included. Data comparing these personnel costs for Air National Guard units was not available.

**Appendix I
Comparison of the Modified F-4D and F-16A
Fighter Aircraft for the Strategic Air
Defense Mission**

what the Air Force would do with the 180 F-16As should they not be used in the SAD mission. For example, should the Air Force desire to retire the F-16As, there would still be a replacement cost. Air Force officials stated that there are no alternative plans for the F-16As.

To determine the potential savings of retaining 180 modified F-16As in the Tactical Air Command, the \$3 billion replacement cost would be partially offset by about \$514 million in F-16A modification and upgrade costs. Another cost consideration, which cannot be quantified, is that the modified F-4Ds would likely require replacement in the air defense mission sooner than the modified F-16As.

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