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NAVAL AVIATION

F-14 Upgrades Are N
Adequately Justified

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The Honorable Robert C. Byrd
Chairman, Committee on Appropriations
United States Senate

The Honorable Sam Nunn
Chairman, Committee on Armed Services
United States Senate

The Honorable David R. Obey
Chairman, Committee on Appropriations
House of Representatives

The Honorable Ronald V. Dellums
Chairman, Committee on Armed Services
House of Representatives

We evaluated the implications of the Navy's decision to spend about $2.5 billion between fiscal years 1994 and 2003 for a limited ground attack upgrade and other modifications to about 200 F-14 Tomcat fighters. Subsequent to our review, the Navy removed the ground attack upgrade from its Program Objectives Memorandum. However, the Navy is currently awaiting the results of an ongoing cost and operational effectiveness analysis (COEA) of potential F-14 improvements to determine the magnitude of future modifications to the F-14, including this upgrade. Since this upgrade or a similar one continues to be a possibility, we are providing this report to assist you in ongoing deliberations of Department of Defense aviation modernization issues at a time of declining Defense budgets and forces.

Background

Prior to recent congressional deliberations on the Navy's fiscal year 1995 budget, the Navy planned to spend over $2.5 billion to add limited ground attack capability and other improvements to 210 F-14 Tomcat fighter aircraft (53 F-14Ds, 81 F-14Bs, and 76 F-14As). According to the Navy, the ground attack capabilities were required to partially compensate for the loss in combat capabilities during the period starting in 1997, when all of its A-6E Intruder attack aircraft are scheduled to be retired, to the end of the century when the F/A-18E/F, the next generation strike fighter, is scheduled to arrive. The F-14 was to undergo two upgrades. An initial upgrade, commonly called the A+ upgrade, included structural

modifications to extend the F-14's fatigue life to 7,500 hours, improved defensive capabilities and cockpit displays, and incorporation of digital architecture and mission computers to speed data processing time and add software capacity. The A/B upgrade had to be incorporated into 157 F-14 aircraft before the second upgrade, called the Block I, could be added. Block I was to add a Forward Looking Infrared (FLIR) pod with a built-in laser to designate targets and allow F-14s to independently drop laser guided bombs (LGBs), a modified cockpit for night attack operations (night vision devices and compatible lighting), and enhanced defensive countermeasures.

Concerned about the Navy's capability to maintain carrier-based power projection without A-6Es and with only limited F-14 upgrades, the Joint Conference Committee on the fiscal year 1994 Defense Authorization Act directed the Navy to add an F-15E-equivalent capability to its F-14D aircraft, including the capability to use modern air-to-ground stand-off weapons. The act restricted the obligation of fiscal year 1994 F-14 procurement funds until 30 days after the Navy submitted a report outlining its plans to add more robust ground attack capability. The report, submitted on May 20, 1994, reiterated the Navy's intent to add only the A/B and Block I upgrades.

During recent fiscal year 1995 deliberations, the defense authorization act conferees eliminated funding for F-14 Block I ground attack upgrades, authorizing funds for only the A/B structural and survivability modifications. In a subsequent similar action, defense appropriation act conferees did not appropriate funds for the Block I upgrades. The Navy eliminated the Block I ground attack upgrade from its Program Objectives Memorandum. However, Navy officials continue to believe a ground attack upgrade is necessary. A final decision on the extent of the upgrade depends upon the results of a [illegible]EA and an acquisition milestone decision scheduled for the first quarter of fiscal year 1995.

In a related response to congressional direction to add more robust capability to the F-14 beyond that mentioned above, the Navy estimated it would cost $1.8 billion to add F-15E-equivalent capability to 31 F-14Ds and another $9 billion to upgrade 198 F-14A/Bs. According to the Navy, an upgrade of that magnitude was not affordable.

Results in Brief

Although the Navy justified F-14 attack upgrades as necessary to replace some capability that will be lost when it retires all A-6E attack aircraft by

fiscal year 1998, planned upgrades will not include an air-to-ground radar for precision ground mapping that would permit crews to locate, identify and attack targets in adverse weather and poor visibility. In addition, no F-14s will be able to launch current or planned precision munitions or stand-off weapons, except for Harms.

Upgraded F-14s generally have greater range than the F/A-18C and could possibly reach targets beyond the Hornet's range. However, this capability may not be needed with the Navy's shift to a littoral warfare strategy. In the Navy's revised strategy, "From The Sea," dated September 1992, it announced a need to concentrate on capabilities required to operate near the world's coastlines. The Navy recognized that this direction represented a fundamental shift away from open-ocean war fighting and toward joint service operations conducted from the sea. In defining this change of emphasis, the Secretary of the Navy said 85 percent of the Navy's potential targets are within 200 miles of the coast. This is within the F/A-18C's range. If greater range is needed, the Navy's Tomahawk cruise missile can attack targets up to a range of about 700 miles, and Air Force bombers have even greater range. Both supplement and complement carrier aviation in striking deep within enemy territory.

Delivery of upgraded F-14s is not scheduled to begin until after the A-6Es are retired, even though the Navy stated they were needed to fill a gap between A-6E retirement and the introduction of the F/A-18E/F aircraft. By default, carriers will deploy for several years without either A-6Es or upgraded F-14s. For example, the USS Constellation will deploy later this year using its F/A-18Cs for all attack missions, demonstrating the Navy's willingness to rely fully on the F/A-18C for its strike capability.

The Navy has not made a compelling case to proceed with its $2.5 billion plan because upgraded F-14s will not (1) have any capability not available or planned for the F/A-18C, (2) replace a significant portion of the attack capability lost with the A-6E retirement, or (3) be available to fill any gap between the A-6E retirement and introduction of the F/A-18E/F.

Most Upgraded F-14s Will Be Less Capable Than F/A-18Cs

Most F-14s, even after receiving the Tomcat 21 upgrade, will lack some important capabilities that the F/A-18C currently has or will gain in the near future. The absence of these capabilities could limit the combat effectiveness and utilization of the F-14 under some adverse conditions.

Most F-14s Will Lack Ground Attack Radars

The Block I upgrade will permit F-14s to drop bombs which are more accurate than unguided gravity bombs. But the usefulness of laser targeting is limited when targets are obscured by clouds, smoke, haze, and moisture that prevent laser beams from illuminating and marking the targets and from providing a clear path for the bomb guidance system to follow. Thus, to assist crews in locating and identifying targets, attack aircraft need synthetic aperture radar with ground mapping capability.

The F-14A/B models' AWG-9 radar is one of the most powerful U.S. military aircraft radars for detecting multiple air targets approaching at long range, but it is not ideally suited to pinpointing ground targets under some conditions. For example, it does not provide a ground mapping capability that permits crews to locate and attack targets in adverse weather and poor visibility or to precisely update the aircraft's location relative to targets during the approach, a capability that improves bombing accuracy. Only the 53 F-14Ds, with their improved APG-71 synthetic aperture ground mapping radar, will have this capability. The 157 F-14A/Bs in the Block I program, lacking the APG-71 radar, will not be as effective in locating, identifying, and attacking targets, except in daylight and clear visibility conditions. F/A-18C's, which have synthetic aperture ground mapping radar with a doppler beam sharpening mode to generate ground maps, have greater capability, and they will get even more precise and clear radar displays when they receive the APG-73 radar upgrade later this decade. New production F/A-18C's are scheduled to receive APG-73 radars later in 1994.

Limited Variety of Weapons

The Navy, in a 1982 COEA summary dated May 1982 comparing the F/A-18 to various alternatives, wrote that "a strike fighter should be capable of effectively employing all Navy strike and fighter weapons in the inventory and under development." However, the Block I upgrade will not add any weapon capability new to the F-14, except the ability to independently drop bombs. No Block I F-14s will be able to launch precision stand-off attack weapons such as the High-speed Anti-Radiation Missile (HARM), Harpoon antiship missile, Maverick anti-armor missile, Walleye guided bomb, and Stand-off Land Attack Missile (SLAM). F/A-18C's and A-6Es can. Block I aircraft will not be able to employ future precision stand-off weapons, including the Joint Direct Attack Munition (JDAM) and the Joint Stand Off Weapon (JSOW). F/A-18C's will. The Navy does plan to add the capability to launch the Advanced Medium Range Air to Air Missile (AMRAAM) to F-14Ds when their computer software is updated. (AMRAAM is the Defense Department's newest air to air missile.) The Navy has stated

that it cannot afford to add stand-off weapon capability to other F-14s. Currently, F/A-18Cs have this capability. Table 1 shows the weapons carried by F-14s and F/A-18Cs.

Table 1: Variety of Weapons to Be Carried by F/A-18Cs and Block I F-14s

Air-to-ground	F/A-18C	F-14A/B	F-14D
[illegible]	•	•	•
[illegible]	•	•	•
[illegible]	•	•	•
[illegible]	•	•	•
[illegible]	•	•	•
[illegible]	•	•	•
[illegible]	•	•	•
HARM	•		
[illegible]	•		
Maverick	•		
SLAM	•		
Walleye	•		
JDAM	•		
JSOW	•		
Air-to-air			
AIM-9 Sidewinder	•	•	•
AIM-7 Sparrow	•	•	•
AIM-54 Phoenix		•	•
AIM-120 AMRAAM	•		•

[illegible]

F-14s Have Greater Range Than F/A-18C's, but Existing Weapon Systems Offer Alternatives

In defending the F-14 upgrade, Navy officials said F-14s have a combat range and/or endurance approaching that of the A-6E, which is considerably longer than the F/A-18. While range, distance, and endurance (loiter time in the target area) are important capabilities, they are not as critical in littoral warfare, where carriers may operate close to shore. Operating close to the shore decreases the distance to targets and increases the amount of loiter time the aircraft has at or near the target. The Secretary of the Navy, in the 1994 Posture Statement, stated that 75 percent of the Navy's potential targets are within 200 miles of the world's shorelines.

Although the F-14 generally has greater range and endurance than the F/A-18C, the majority of littoral targets should be within the F/A-18C's range, even with an aircraft carrier operating 100 miles or more offshore. The Navy's Atlantic Fleet officials told us that F/A-18Cs carrying four 1,000-pound bombs and external fuel tanks have an unrefueled mission radius of about 340 miles. Future F/A-18Es are projected to carry the same weapon load up to 520 miles without refueling. While the longer range F-14s could potentially reach the 15 percent of the targets beyond 200 miles of shorelines, alternatives are available. The Navy's Tomahawk cruise missile can strike fixed targets up to a range of about 700 miles. Air Force bombers, with mid-air refueling, have even a greater range. If aerial refueling is available, as should be the case with U.S. forces operating jointly, an aircraft's range, including the F/A-18's, can be extended significantly.

Upgraded F-14s Will Be Less Capable Than Some Attack Aircraft

The Block I F-14 aircraft will not have all of the capability of the Air Force's F-15E Strike Eagle (a long range, all-weather, multimission strike fighter with precision weapons capability), the Navy's own F/A-18C Hornet, or its A-6E Intruder (see table 2). F-14A/Bs can drop most unguided bombs, including 500-, 1,000-, and 2,000-pound gravity bombs, as well as cluster munitions. They can also drop LGBs if another aircraft marks the target with a laser beam. Block I will add the capability to independently drop LGBs without external assistance. F-14A/B aircraft will not have a radar ground mapping capability to assist crews in locating, identifying, and attacking targets when visibility is poor. No F-14s, including the D model, will be able to launch precision stand-off weapons and none will have all-weather terrain following capability.

Table 2: Selected A-6E, F/A-18C, F-15E, and F-14 Block I Capabilities

	Block I				
Capability	**F-14A/B**	**F-14D**	**A-6E**	**F/A-18C**	**F-15E**
Radar detection					
[illegible]		•		•	•
[illegible]		•		•	•
Passive infrared detection		•			
Elements contributing to all-weather					
[illegible]		•	•	•	•
[illegible]	•	•	•	•	•
[illegible]				•	•
[illegible]			•	•	•
Targeting laser	•	•	•	•	•
Moving map display				•	
Radar reconnaissance				•	
Photo reconnaissance	•	•			
Weapons					
Air-to-ground					
[illegible]	•	•	•	•	•
[illegible]			•	•	
[illegible]			•	•	
[illegible]			•	•	•
[illegible]			•	•	
[illegible]			•	•	
[illegible]				•	•
[illegible]				•	•
Air-to-air missiles					
[illegible]	•	•		•	•
[illegible]					
[illegible]	•	•		•	•
[illegible]					
[illegible]	•	•			
[illegible]		•		•	•
[illegible]					

[illegible]

Upgraded F-14s Will Not Reach the Fleet Before A-6Es Are Retired

Although the Navy justified the F-14 upgrade as necessary to fill the gap between A-6E retirements and delivery of F/A-18E/Fs, no F-14s under the original Block I plan were scheduled to begin receiving upgrades until fiscal year 1999, a year after the last A-6s were retired. The Navy plans to procure F/A-18 E/F aircraft starting in fiscal year 1997 and expects the aircraft to enter service in the year 2000. In the interim, two carrier air wings have retired their A-6Es, and these air wings will operate for 5 years at a minimum before the first upgraded F-14s are delivered in 1999. The USS Constellation is scheduled to deploy late in 1998, without A-6Es. Its F-14Ds cannot drop bombs because they lack the necessary computer software.

The first carrier air wing equipped with Block I F-14s will not deploy until fiscal year 1999 or 2000. The last F-14s will not complete the upgrade until fiscal year 2003. By that time, if not earlier, the Navy should start receiving squadrons of F/A-18E/Fs to replace F-14s and older F/A-18s.

As the Navy eliminates A-6Es from carrier air wings, it plans to add a third squadron of F/A-18s to each wing, increasing the number of F/A-18s in each air wing from 20 to 36. The Navy also plans to eliminate one F-14 squadron from each air wing, reducing the number from 20 to 14 planes. Two air wings, including the USS Constellation's, will receive this modified air wing mix in fiscal year 1998. Two more air wings are expected to change their aircraft mix in fiscal year 1999, with three more wings changing in fiscal years 1998 and 1997, respectively, until the configuration of all 10 active air wings is changed.

Navy Study Concluded a Modernized F-14 Was Less Capable Than the F/A-18C

As noted earlier, most F-14s, even after undergoing the Block I upgrade, will lack some important capabilities that the F/A-18C has or will gain in the near future. The absence of these capabilities could limit the F-14's combat effectiveness and utilization under some adverse conditions. This view is supported by an April 1992 Navy study summary, which compared the F/A-18 to various alternatives, including an upgraded F-14D called Quick Strike. This version was to have more capability than is planned for Block I. The analysis concluded that the F-14 Quick Strike was a less capable strike aircraft than the F/A-18C.

Matters for Congressional Consideration

Because the Navy faces an uncertain budget environment and system affordability concerns, and since planned F-14 upgrades offer little or no improvement over current capabilities and may not be fielded before F/A-18E/Fs are delivered, the upgrades do not appear to be cost effective.

Current Navy plans will not provide F-14s with F-15E-equivalent capabilities. If the Congress wishes to add these capabilities, Navy estimates show that it will cost much more.

Therefore, the Congress may wish to defer authorizing or appropriating additional monies for the F-14 until the Navy can demonstrate that planned upgrades are essential when considering (1) the current F/A-18 capabilities, (2) the net weapon capability gain over current F-14A/B levels, (3) the absence of a ground attack radar in 157 of the 210 aircraft, (4) the lack of precision stand-off weapons capability in all 210 F-14 aircraft that limits the versatility and use of these aircraft in combat, (5) the nearly simultaneous delivery of upgraded F-14s and F/A-18E/Fs and (6) the Navy's willingness to deploy carriers without A-6Es or upgraded F-14s, as evidenced by the upcoming deployment of the USS Constellation.

Agency Comments

Navy officials, commenting on a draft of this report, defended the F-14 upgrade as necessary, even though they were aware that the Block I ground attack upgrade capability had been eliminated from the Navy's budget by the House and Senate defense authorization conferees and from the Navy's 1996 Program Objectives Memorandum. Navy officials said the upgrade was only eliminated from the Program Objectives Memorandum for the present. They defended the need for this upgrade, which is one of several possible upgrades being considered in an ongoing CAIG/CEA. The Navy could resubmit the ground attack upgrade in a future budget. However, if this upgrade is delayed, it is likely that new F/A-18E/Fs will be deployed before upgraded F-14s enter the fleet, making a need based on capability more questionable.

Navy officials said the key issue discussed in our report is not whether planned F-14 upgrades duplicate strike capabilities available in the Navy as well as in the other services, as suggested by us, but rather the contribution these aircraft would make to the capability of each carrier air wing. Commenting on the Navy's willingness to immediately deploy carriers without A-6Es, relying completely on F/A-18s for its strike capability, Navy officials said this decision is a reflection of affordability constraints, not a willingness to forgo the capability. We agree that affordability is part of the issue. Affordability provided the impetus for the Navy to set priorities. In setting its priorities, the Navy eliminated the F-14 upgrade from its Program Objectives Memorandum, which was a clear

admission that the Navy weighed its needs and found it had more important priorities.

Scope and Methodology

Our data gathering and analysis focused on the Navy's decision to upgrade 210 F-14 aircraft. We interviewed officials and reviewed documents from the Office of the Chief of Naval Operations (Director for Air Warfare), the Naval Air Systems Command, and Headquarters, U.S. Air Force, in Washington, D.C. We also interviewed personnel at the U.S. Naval Air Forces, Atlantic Fleet and Pacific Fleet, Headquarters, U.S. Air Force Air Combat Command, the Naval Strike Warfare Center, Naval Air Station, Fallon, Nevada, Carrier Air Wings Two and Fifteen at Naval Air Station, North Island, California, and Naval Air Station, Miramar, California, and Hughes Aircraft Company, Los Angeles, California.

We conducted our review between June 1993 and May 1994 in accordance with generally accepted government auditing standards.

We are sending copies of this report to the Secretaries of Defense, the Navy, and the Air Force, the Director, Office of Management and Budget, and the Chairman, Commission on Roles and Missions of the Armed Forces.

Please contact me at (202) 512-3504 if you or your staff have any questions concerning this report. The major contributors to this report are William C. Meredith, Kenneth W. Newell, and Frances W. Scott.

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