

NOT FOR PUBLICATION
UNTIL RELEASED BY
HOUSE ARMED SERVICES COMMITTEE

**STATEMENT OF
CHRISTOPHER BOLKCOM
SPECIALIST IN NATIONAL DEFENCE
CONGRESSIONAL RESEARCH SERVICE
BEFORE THE
HOUSE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON PROJECTION FORCES
HEARING ON CONVENTIONAL LONG-RANGE STRIKE OPERATIONS
MARCH 3, 2004**

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Mr. Chairman, distinguished members of the committee, thank you for inviting me to speak with you today about long range conventional strike.

As requested, this testimony will address potential oversight issues and investment options in connection with conventional long-range strike capabilities, with a focus on Air Force long-range bombers, Air Force theater-range aircraft, Navy carrier-based strike aircraft, and Air Force and Navy support aircraft.

At the broadest level, three oversight questions frame the debate on which investments to make to maintain and improve DoD's conventional long-range strike capabilities in an era of limited and uncertain access to land bases in relation to the platforms mentioned above:

- How many, and what kind of aircraft are required to achieve and maintain air dominance?
- How many, and what kind of aircraft are required to conduct attacks against distant targets?
- What kind of support aircraft are required to enable these two missions?

After providing a short background, I will address each of these questions in turn.

Background: Access to forward bases and implications for investment choices

Conventional wisdom suggests that the DoD may increasingly find itself facing conflicts in distant theaters with limited or no forward bases, but there is no consensus whether this will truly be the case, or to what extent. Many believe that pursuing the Global War on Terrorism will likely make distant, limited forward bases the most common scenario. While the United States enjoyed access to well established military bases and other resources in Europe and North East Asia during the Cold War, it is feared that forward bases may be lacking in emerging threat areas. Therefore, some argue that a potential lack of forward bases should be strongly considered as part of weapons procurement strategies. If bases are lacking in the future, certain air combat weapon characteristics will be more valuable than others: long range, fuel efficiency, long-loiter time, large payloads, and the ability to operate from short or austere airfields.

Some say that the recent wars in Afghanistan and Iraq demonstrate how important forward basing is to air combat operations, and strengthens arguments in support of procuring weapon systems that are more effective in basing-limited scenarios. In Afghanistan, these observers say, the lack of regional bases limited the effectiveness of land-based tactical combat aircraft, and that Air Force long range bombers and Navy and Marine Corps carrier-based aircraft dropped most of the bombs and conducted most of the combat sorties. The inability to access, or fully access bases in Turkey and Saudi Arabia complicated U.S. air operations in the Iraq war.

Other observers disagree, saying that concerns about future deployability and access to forward airbases have been exaggerated. The wars in Afghanistan and Iraq prove a contrary point, these observers say, that the U.S. military is very adaptable. Rather than invest heavily in rapid deployability or long range systems, the military should continue to invest in a mix of long and short range capabilities to ensure future flexibility. In Iraq, coalition air forces adapted well to mitigate basing challenges. For instance, the Air Force teamed up with the Army to execute the largest air drop in recent memory. Special operations forces seized and secured airbases within Iraqi territory that were quickly exploited by coalition air forces to conduct combat air operations against Saddam's army. Also, these observers say, because the United States tends to fight wars abroad, we have the

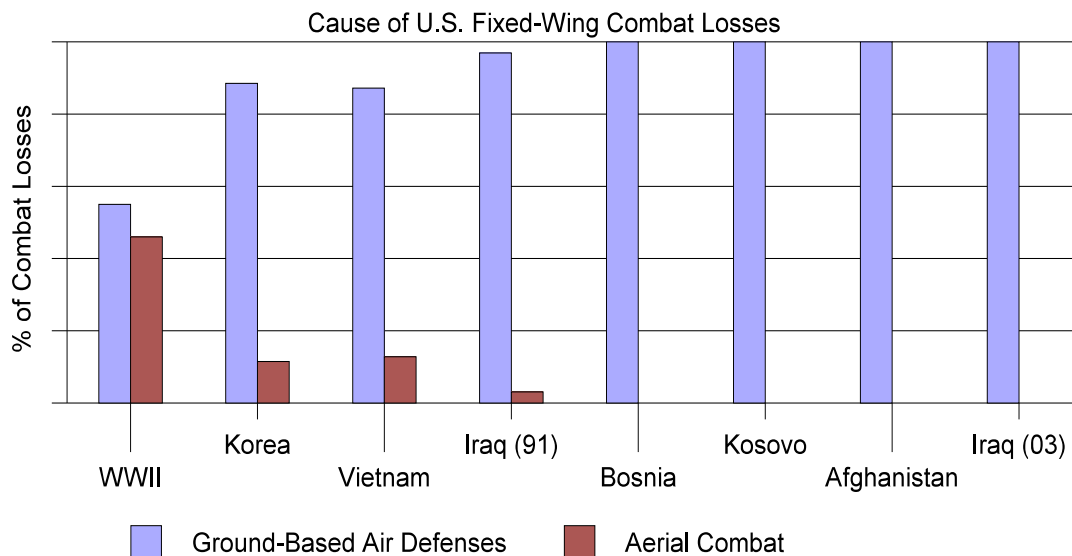
advantage of preparing and executing the war on our time line. Much of the investment in long range or rapid deployment is lost, some say, because the war doesn't start until we are ready. Those concerned about access to forward bases had argued that the United States was lucky in the first Gulf War, because Saddam erred, and allowed us six months to build up a force in the region. Some said that Saddam would never again give us that much time to build up. The recent war in Iraq disproved that theory.

Resolving this debate, or at least bounding it would prove useful for congressional oversight of long-range conventional strike systems. While the prudent planner may wish to invest to cope with the worst case – distant conflicts with little or no forward basing, this prudence would come at a cost. Those programs and platforms that would facilitate U.S. dominance in these scenarios would likely be more expensive than programs and platforms that could exploit forward basing.

Question 1: What kind, and how many, and what kind of aircraft are required to achieve and maintain air dominance?

Tomorrow's air forces will be called upon to achieve air dominance by eliminating or negating both an enemy's air-based, and ground-based air defenses. Many believe that while both these types of defenses were equally threatening in the past, U.S. aircraft will be increasingly challenged by ground-based defenses, while the threat posed by air-based defenses (combat aircraft) will either wane, or at best, hold steady. From this perspective, today's investments in air dominance would likely focus on ground-based defenses such as long-range surface-to-air missiles (SAMs) while considering enemy aircraft as a lesser included case.

There appear to be very few countries today capable of challenging U.S. air forces in air-to-air combat. Since Operation Desert Storm, 100 percent of all U.S. combat aircraft losses have been due to ground-based air defenses. Historically, the percentage of U.S. combat losses due to aerial combat has steadily declined and the percentage of losses due to enemy air defenses has steadily risen. In World War II, U.S. air combat losses were split almost evenly between aerial combat (46%) and air defenses (54%). By the Korean and Vietnam wars however, combat losses due to enemy air defenses had risen to approximately 90% and aerial combat losses had dropped to approximately 10 percent.



Another reason that addressing enemy air defenses may be of growing importance, is that emerging air defense technologies and tactics may prove more threatening and more difficult to counter than current systems. The Air Force frequently expresses concern over several interrelated developments in enemy air defenses: the emergence and proliferation of a new generation of Russian SAMs, and the application of new technologies, either in conjunction with these or with other air defense elements.

Russian SA-10 and SA-12 SAMs were fielded for the first time in the 1980s. These “double digit” SAMs are a concern for military planners due to their mobility, long range, high altitude, advanced missile guidance, and sensitive radars. The Russian SA-20, still under development, has been likened to the U.S. *Patriot* PAC-2 missile, but with an even longer range, and a radar that is very effective in detecting stealthy aircraft. Military planners are concerned that a country with only a handful of these SAMs could effectively challenge U.S. military air operations by threatening aircraft and disrupting operations from great distances.

A variety of new technologies and military systems could exacerbate the “double digit” SAM challenge. First, commercial information and communications technologies are enabling adversaries to better network the elements of their air defense systems. This allows them to disperse radars, SAM launchers and other associated platforms throughout the battlespace, and to share targeting information among launchers. This, in turn, suggests that radars may be used less frequently and for shorter periods of time, complicating efforts to avoid or suppress them. Second, terminal defenses are being marketed by a number of international defense companies. These radar-guided Gatling guns are designed to protect “double digit” SAMs or other high value air defense assets. These systems could prove quite effective in shooting down missiles aimed at enemy air defenses. Third, Russia and other countries have developed and are selling GPS jammers. Over varying distances, these low-watt jammers may degrade the GPS guidance signals used by many U.S. precision guided munitions (PGMs) to augment inertial guidance systems, reducing their accuracy.

In sum, it can be argued persuasively that future challenges to air dominance will likely come from ground-based air defenses. Dominating aerial combat in the future will likely remain a lesser included case.

The Air Force’s plan for addressing these potentially distant and pernicious air defenses is by procuring at least 278 F/A-22 Raptors and using them in combination with the B-2 bomber as part of a Global Strike Task Force. Air Force leaders say that only these stealthy and high performance aircraft will be able to survive tomorrow’s high threat environments, and “kick down the door” (in the Air Force parlance) by destroying the most threatening enemy air defenses. This will enable “persistence forces” such as the Joint Strike Fighter and other bombers to conduct their missions in relative safety. F/A-22s would also defeat or suppress the enemy’s air force, if it chose to fight.

Some observers argue that the historical record, and emerging trends, suggest that the Air Force does not need to invest in very sophisticated and very expensive platforms, such as the F/A-22, to achieve air dominance in the future. Those who challenge the Air Force plans make three general arguments.

The first argument is that the United States is very good today at achieving air dominance, and does not need an aircraft as advanced, sophisticated, and expensive as the F/A-22 for this mission. As the table below indicates, over the past 50 years DoD’s air forces have established an extremely

impressive track record. Since Operation Desert Storm, in particular, the services' have conducted air operations with impunity. Some assert that aircraft more modest than the F/A-22, such as the JSF or the F/A-18E/F, are more than adequate to continue this trend. Others argue that upgrades to the F-15 and F-16 would suffice to guarantee U.S. air dominance for many years. Navy strike aircraft could very well be the only aircraft able to achieve air dominance in future, distant scenarios. However, the Navy doesn't plan to procure an aircraft as advanced and costly as the F/A-22, which indicates, F/A-22 opponents say, that such capabilities are not required. Two hundred and fifty eight million dollars, opponents may argue, is a lot of money to spend on a "wild weasel" aircraft.¹

Estimates of Fixed-Wing Combat Aircraft Losses

Conflict	Combat Sorties	Total Combat Losses ^a	Attrition Rate
World War II ^b	2,498,283	19,030	0.76%
Korea ^c	591,693	1,253	0.2%
Vietnam ^d (AF data only)	219,407	1,437	0.65%
Desert Storm ^e	68,150	33	0.04%
Bosnia ^f	30,000	3	0.01%
Kosovo ^g	21,111	2	0.009%
Northern/Southern Watch ^h	268,000	0	0.0%
Afghanistan ⁱ	>10,000	0	0.0%
Operation Iraqi Freedom ^j	20,733	1	0.004%

^a Other losses, either due to pilot error, accident, or unknown enemy action not included.

^b *Army Air Force Statistical Digest: World War II*. Prepared by the Office of Statistical Control. December 1945. p220, Table IIB. *Naval Aviation Combat Statistics: World War II*. Air Branch. Office of Naval Intelligence, Office of the Chief of Naval Operations. Washington, DC. 17 June 1946. p. 51-59. Greene, Terrell. "Surviving Modern Air Defenses." *Aerospace America*. American Institute of Aeronautics and Astronautics. August 1986. p.14.

^c Robert Futrell. *The United States Air Force In Korea*. Office of Air Force History. US Air Force. Washington, DC. 1983. p.689-692.

^d Thompson, Wayne. *To Hanoi and Back: The USAF and North Vietnam, 1966-1973*. Air Force History and Museums Program. USAF. 2000. p. 304, 311.

^e *Gulf War Air Power Survey*. Volume V: Statistical Compendium and Chronology. Washington, DC 1993. p. 232, 641. US and coalition partners.

^f John Tirpak. The NATO Way of War. *Air Force Magazine*. December 1999. p. 24. Figures include coalition combat sorties and losses.

^g Correspondence from Lt.Gen. C.W. Fulford, (USMC) Director, Joint Staff to Mr. Daniel Mulhollan, Director, Congressional Research Service. October 19, 1999.

^h Gen Walter Buchanan, *Air Force Current Operations*. Briefing to Congressional Air Power Caucus. Bolling AFB. March 12, 2001. According to USCENTCOM Press Release (8/10/01) Iraq has conducted over 1,000 attacks against U.S. and Allied aircraft since December 1998.

ⁱ Nathan Hodge. "In Tons, Air Force Drops Twice the Bombs the Navy Does." *Defense Week*. December 17, 2001.

^j *Operation Iraqi Freedom – By the Numbers*. Assessment and Analysis Division. USCENTAF, LtGen Michael Moseley, Commander. April 30, 2003.

¹ Wild Weasel was nickname of the Air Force's predominant Suppression of Enemy Air Defense aircraft, the F-4G.

A second argument opponents make against the Air Force's plan to invest in the F/A-22 / B-2 force is that the proliferation of sophisticated Russian double digit SAMs has not occurred at the rate that some predicted, and may not spread much further. Despite being on the market for over 20 years, Russia reportedly has only managed to sell double digit SAMs to five other countries (Bulgaria, China, Czech Republic, Germany, and Greece), three of which were Soviet client states at the time of the sale.² While these weapons are clearly dangerous, they are also expensive, and require extensive training to operate effectively, some argue. This has arguably slowed the proliferation of these systems, and may also do so in the future. Russia has had difficulty selling double digit SAMs, some argue, failing to sell SA-10 and SA-12 SAMs to Chile, Egypt, Hungary, Iran, Kuwait, Serbia, South Korea, Syria, and Turkey. These countries have opted instead to purchase either U.S. SAMs, or more modest air defense systems.

A final argument, that some make against heavy investments in the F/A-22 for future air dominance, is that the Raptor is not as well suited for this role as the Air Force contends. The F/A-22's low radar cross section, its aerodynamic maneuverability, powerful radar, and super-cruise capability are all impressive attributes, opponents concede. However, the Raptor's 540-nautical mile un-refueled combat radius dictates that it operate from forward bases. Also, the F/A-22 is capable of carrying internally only two bombs (1,000 Joint Direct Attack Munitions, or JDAM) in the current inventory. The F/A-22 is projected to carry eight Small Diameter Bombs (SDB) internally, but that weapon is still under development.

Those opposed to investing heavily in the F/A-22 as the Air Force's primary future air dominance asset may argue in favor of alternative investments. Examples of other investments that could combine to offer satisfactory air dominance capabilities more affordably than the F/A-22, according to some observers, might include cruise missiles and other stand-off munitions, the short-take off and vertical landing (STOVL) variant of the JSF, unmanned combat aerial vehicles (UCAVs), and increased emphasis on naval strike aviation. Like the F/A-22, these investments would have strengths and weaknesses. Cruise missiles are relatively expensive and most effective against stationary targets.³ They do not risk a pilot, are survivable, and are increasingly able to attack re-locatable targets. The STOVL JSF does not enjoy an overall radar cross section as low as the F/A-22's, and it also requires forward basing. However, it will have a larger payload, and its longer range and ability to use short runways would enable it to use forward bases that the F/A-22 could not, some argue. UCAVs, while still under development, are projected to be much cheaper than the Raptor, survivable, and like cruise missiles, will not risk a pilot's life. Tomorrow's naval aviation is not projected to be as survivable as the F/A-22, but will carry larger payloads, and will not encounter the same basing problems. Also, EA-18G radar jamming aircraft may make tomorrow's Navy strike fighters adequately survivable, say F/A-22 opponents.

Question 2: How many, and what kind of aircraft are required to conduct attacks against distant targets?

Many argue that, in an era of threatened access to forward basing, DoD should be placing a greater emphasis on long range aircraft than it currently does. Long range aircraft, in this context,

²*World Missiles Briefing*. Teal Group, Inc. February 2003.

³ Combat aircraft and bombers are more expensive than cruise missiles, but they can be used for many years, often decades, and drop relatively inexpensive weapons on thousands of targets. While a long-range cruise missile may cost 1/50th of the fly away cost of a combat aircraft, it can only be used once.

could include either long-range Air Force bombers, or Navy aircraft, which, by virtue of operating from aircraft carriers, can strike targets long distances from the United States and frequently deep inside enemy territory regardless of in-theater basing considerations.

Long-Range Bombers

Long-range B-1, B-52, and B-2 bombers played a significant role in the Iraq war, as they did in the war in Afghanistan in 2001-2002. In both conflicts, relatively small numbers of bombers dropped large numbers of precision-guided bombs and traditional unguided bombs, destroying many enemy ground targets, and were able to loiter over the battlefield for extended periods of time, which made them readily available for attacking so-called time-sensitive targets – targets that emerge suddenly and remain susceptible to attack for only short periods of time.

The performance of long-range bombers in the Iraq war and the war in Afghanistan may influence a long-simmering debate on the balance of funding for bomber programs vs. tactical aircraft. Specific questions relating to this debate include the following:

- What is the best mix of long-range bombers and shorter range tactical combat aircraft?
- Should bombers be emphasized more in the overall structure of the Air Force?
- Is DoD shortchanging bomber modernization to finance its tactical combat aircraft programs?
- Should planned early retirements of B-1s be slowed, or even reversed?⁴
- Should the Air Force implement a proposal it is now considering to replace the engines on its B-52s?
- Should the B-2 production line be re-opened?

Inventory

How many bombers does the Air Force need? How many will it need in the future? The Air Force currently maintains 165 long-range bombers, of which 96 are combat ready. It plans to reduce the number of B-1s to 60, although some Members of Congress oppose this consolidation. Likewise, DoD has sought to cut 18 B-52s from the fleet, but has met with resistance from Congress.

Inventory, Status, and Age of Air Force Bombers

	B-1	B-2	B-52	Total
Active Inventory	60*	21	84	165
Reserve/Back-up	6*	0	9	15
Combat Ready	36	16	44	96
Average Age	15.2	8.1	40.8	–

Source: *USAF*

* These numbers may change due to a provision in the FY04 Defense Authorization Act.

⁴Many bomber supporters argue that in light of the B-1's contributions in the Iraq war and the war in Afghanistan, B-1 retirements should be truncated so as to maintain a force of about 70 B-1s.

Even prior to the recent Iraq war, bomber supporters argued that programs for modernizing the bomber force are underfunded relative to tactical aircraft programs in DoD budgets,⁵ that DoD's plan to retire certain B-1 bombers early is unwise,⁶ and that the current DoD plan for developing a next-generation bomber to replace the aging bombers in the current fleet is not sufficiently aggressive.⁷ Supporters of current DoD plans argued that the force-structure and modernization needs of the bomber force are properly reflected in DoD planning and budgeting.

Bomber advocates, including some Members of Congress, contend that more bombers are needed given the expanded roles of these aircraft in recent conflicts and the possibility that the United States will be denied access to overseas bases in the future. In particular, some in Congress have argued for re-opening production of the B-2 to augment the bomber fleet and improve long-range penetration capabilities.

The Air Force and DoD, however, remain opposed to expanding the bomber fleet and continue to press for cuts in the numbers of B-1s and B-52s. The Air Force contends that the current number of combat-ready bombers is adequate for current and projected needs and that other needs are more pressing than expanding the bomber force. Air Force Chief of Staff John Jumper, when asked if today's bomber fleet is sufficient for future challenges, replied: "There's nothing I've seen that informs me we don't have enough bombers."⁸

The Air Force contends that the current bomber force is sufficient because bombers today are vastly more capable than in the past. Where previously several bombers and scores of bombs were required to eliminate a single target, today a single bomber can reliably destroy a dozen or more targets using precision weapons. Thus the Air Force and others turn around the argument that increased capabilities have increased demand for bombers to reason that increased capabilities mean fewer bombers are needed. The Air Force is developing smaller and more precise weapons that will enable bombers and other aircraft to attack more targets with great accuracy. A 500 lb. version of the JDAM and the 250 lb. Small Diameter Bomb (SDB) are expected to greatly increase the capabilities of existing bombers in coming years, and even smaller weapons are planned. Improved accuracy, it is hoped, will give these smaller munitions the same destructive power as today's larger, less accurate weapons.

Today the B-2 carries sixteen 2,000 lb. JDAMs, but soon it will carry an estimated eighty 500 lb. JDAMs, which are scheduled to debut in 2004. General Jumper believes these new weapons will reduce the number of bombers needed: "Ten B-2 bombers with 90 weapons each will take care of

⁵For decades, DoD funding levels for tactical combat aircraft have been much greater than funding levels for bombers. In FY05, for example, DoD is requesting \$341 million in bomber procurement funding and \$100 billion in funding for tactical aviation procurement. This is approximately 276 times as much money. The request for FY04 was almost identical (U.S. Department of Defense. Comptroller. *Program Acquisition Costs by Weapon System*. [Department of Defense Budget for Fiscal Years 2004/2005, February 2003, and Department of Defense Budget for Fiscal Year 2005, February 2004.]

⁶ In 2001, the Air Force began retiring B-1 bombers, reducing the fleet from 93 aircraft to 60 aircraft.

⁷Current DoD plans don't call for a new bomber to be fielded until 2037.

⁸John Roos. "Holding the Heading: Air Force Chief Shares His View of Transformational Activities." *Armed Forces Journal International*. May 2002.

the target decks that we have prepared for conflicts in most parts of the world.”⁹ Each B-2 is anticipated to carry over 300 SDBs, which are expected in 2007.¹⁰ These projections indicate that 21 B-2s could theoretically attack over 6,000 separate targets in a single operation. Today, such an attack would require nearly 400 B-2s, assuming 16 weapons each.

Bomber supporters counter that the math doesn’t always translate to the battlefield. If the United States were to face two simultaneous conflicts, for example, the 16 combat-coded B-2s would be stretched thin regardless of how many bombs each carried. Moreover, enhanced capability has increased, not decreased, demand for bombers in recent conflicts. Lastly, bomber advocates note that neither the 500 lb. JDAM nor the SDB has been successfully fielded yet, and it may be imprudent to make decisions about the future size of the bomber inventory based on weapons that have not yet been deployed.

Projected Range and Air-to-Ground Strike Capabilities of Bombers and Select Fighters

Feature	B-1	B-2	B-52	F-35 (JSF)	F/A-22
Un-refueled Combat Radius (nautical miles)	2,200	3,000	3,826	633	540
Payload (lbs.)	55,000	40,000	50,000	14,600	4,500
2,000 lb. JDAMs	24	16	18	2	2 *
500 lb. JDAMs	n/a	80	30	2	n/a
Small Diameter Bombs **	144	320+	144	8	8

Sources: Air Combat Command Public Affairs Office, Jane’s All the World’s Aircraft (various years), USAF Fact Sheets, Air Force Almanac (various years).

Note: Stated numbers for the JSF and F/A-22 assume an air-to-ground strike configuration and that fuel and weapons are carried internally. Although both are capable of carrying external fuel tanks and weapons, doing so can compromise stealth. Data for the JSF is projected; flight testing has not been completed.

* The F/A-22 cannot carry the 2,000 lb. JDAM. It can carry two 1,000 lb. JDAMs internally for strike missions.

** Numbers for the SDB are estimates; SDB development has not been completed.

A key consideration regarding investing in a next-generation long-range bomber is when to begin a development program. A second question that may confront Congress is what the desired characteristic of a future bomber may be.

Urgency

How urgent is the need for a next generation bomber program? Current Air Force plans call for a new long-range bomber to come on line in 2037, about the time when it predicts that corrosion, fatigue, or other problems will render substantial numbers of existing bombers inoperable. The Air Force’s 1999 bomber roadmap states that 190 bombers are needed to fulfill its long-range strike mission requirements and estimates that the numbers of existing bombers will drop below that level in 2037.¹¹

The House Armed Services and Appropriations Committees, contending that a new bomber will be needed before 2037, recently added \$100 million to the Bush Administration’s FY 2004 budget

⁹*Ibid*

¹⁰John Tirpak. “Bomber Questions.” *Air Force Magazine*. September 2001.

¹¹U.S. Air Force White Paper on Long Range Bombers. March 1, 1999.

request to accelerate research and development of a next generation bomber.¹² The Armed Services Committee expressed concern that the Air Force's schedule will not ensure a sufficient bomber force for future requirements and states that it expects the Air Force to update its Future Years Defense Program to include funding to develop and procure a new bomber "well prior" to its previous plan.¹³ The arguments put forward by advocates of beginning a new bomber program earlier than the current Air Force plan include the following:

- The need for more and better long-range, high-payload strike aircraft that can penetrate advanced air defenses.
- The old age and vulnerability of the B-52. The youngest B-52 is now over 40 years old. While its remarkable durability and flexibility has sustained the B-52's relevance, at some point fatigue will catch up to it. Additionally, because the B-52 lacks sophisticated defenses and is easily detected by radar, its capabilities are limited unless enemy defenses have been suppressed.

Bomber advocates' contend that the Air Force tends to be biased toward fighter aircraft and has chronically underfunded bomber programs. One well known aviation historian argues:

They (USAF leaders) recoil at the idea of sending Air Force fighter pilots into air-to-air combat during the first decade of the 21st century in F-15C, which were first built in the 1970s, but upgraded and produced into the 1990s. Yet, they apparently have no qualms about condemning bomber pilots to fly the ancient B-52Hs, which were last produced in 1962, into combat during the first three decades of the 21st century.¹⁴

These observers argue that the Air Force gives priority to fighters because the leadership of the service tends to be tactical fighter pilots. Their bias, critics say, is indicated by what they see as the increasingly lopsided ratio of dollars invested in tactical fighters versus bombers, which increased from slightly less than 5:1 in 1999 to more than 30:1 in 2003.¹⁵ This funding imbalance is reflected in a growing imbalance between tactical fighters and bombers in the Air Force inventory: in 1950, the ratio of fighters to bombers was two to one, but by the late 1990s, the ratio had grown to 16 to one, meaning that less than five percent of the service's 4,000 aircraft were bombers.¹⁶

The Air Force has opposed accelerating development of a follow-on bomber because it believes that the current bomber force is meeting its needs, and that other priorities are more urgent. Air Force Chief of Staff General John Jumper has remarked "...there's nothing that would prompt me to begin retiring the B-52s that continue to work very well and carry large loads."¹⁷ Lieutenant General Dan

¹²House Committee on Armed Services, "National Defense Authorization Act for FY2004," Report #108-106 (H.R. 1588), p. 221. House Committee on Appropriations, "Department of Defense Appropriations Bill, 2004," Report #108-187 (H.R. 2658), p. 269.

¹³House Armed Services Committee, "National Defense Authorization Act for FY2004," Report #108-106 (H.R. 1588), p. 221.

¹⁴Williamson Murray. "U.S. Needs New Bomber, Not more Fighters." *Aviation Week & Space Technology*. March 27, 2002. p.66.

¹⁵*Ibid.*

¹⁶Laura Colarusso. "Analysts: USAF Bomber Force Dangerously Close to Serious Disconnect." *Inside the Air Force*. October 19, 2001.

¹⁷John Roos. "Holding the Heading: Air Force Chief Shares His View of Transformational Activities." (continued...)

Leaf, serving at the time as Director of Air Force Operational Requirements said that “we can’t realistically afford to modernize everything at once.” Fielding the future strike platform “is not as pressing a problem...as continued modernization of the fighters.”¹⁸ Leaf also argues that the Air Force plan favors fighter modernization not only because fighter capabilities need to be upgraded, but also because there have not been major technological leaps that apply to bombers. “The next generation bomber study...led the service to postpone development of a future strike platform because ‘there wasn’t significant technological advance anticipated in the near term to merit going forward right now,’” Leaf explained.¹⁹ Former Chief of Staff General Mike Ryan states the Air Force “wants to make a big leap in capability with its next strategic system...we need to go to the next level of strike capability, beyond the B-2.”²⁰

Desired Capabilities

What characteristics should a next-generation bomber have? Among the factors to be considered are range, payload, speed, unit cost, stealth, and whether the aircraft will be manned or unmanned. Reportedly, Air Combat Command (ACC) is examining four options:

- The B-3: an upgraded version of the B-2 that has greater payload and range along with better stealth and communications.
- Hypersonic Cruise Vehicle (HCV): An aircraft that would operate in the upper atmosphere at “hypersonic” speeds (Mach 12). It would be virtually invulnerable to enemy defenses because of its speed and altitude and could reach east Asia from the continental United States in less than two hours.²¹
- A high-altitude, low-cost unmanned combat aerial vehicle (UCAV) with a range of 17,000 nautical miles and a payload of 4,000 lbs.
- A lower-flying, stealthy UCAV.²²

Supporters of the Air Force’s leap ahead approach argue that competitors may arise to challenge U.S. air power in the future. The proliferation of advanced Russian surface-to-air missiles, for example, is just a hint of the kind of weapons that may emerge tomorrow. Potential adversaries are also developing anti-access systems and techniques like GPS jamming, “anti-stealth” radars, and terminal defenses that will require serious technological advances to defeat, they argue.

Opponents of the Air Force’s plan, on the other hand, point out that the United States has dominated the air in every conflict since Vietnam, and especially since the Persian Gulf War in 1991. They argue that while we should improve on today’s capabilities, we can strive toward cost effective

¹⁷(...continued)

Armed Forces Journal International. May 2002.

¹⁸Laura Colarusso. “Future Strike Platform Takes Back Seat to Fighter Modernization.” *Inside the Air Force*. March 1, 2002. Undersecretary of Defense Aldridge makes similar arguments in “Interim Bomber?” *Aerospace Daily*. August 12, 2002.

¹⁹ *Ibid*.

²⁰John Tirpak. “Bomber Questions.” *Air Force Magazine*. September 2001.

²¹“Hypersoar,” www.globalsecurity.com. Accessed on 7/22/2003.

²²Laura Colarusso. “Future Strike Platform Takes Back Seat to Fighter Modernization.” *Inside the Air Force*. March 1, 2002.

solutions. Developing leap ahead capabilities will be difficult and expensive—Air Force officials say that research into hypersonics has advanced little beyond the X-30 National Aerospace Plane, which was cancelled in 1995.²³ Yet it is unclear that we need such exotic capabilities in tomorrow’s long-range bombers. Retired Air Force General Richard Hawley argues, for example, that

It is not even clear that supersonic flight is a desirable, much less required attribute for a future long-range strike platform. From the standpoint of military utility, loiter capability appears more valuable than speed, given the strategic premium now being placed on dealing with mobile and other time-critical targets.²⁴

Those who wish the Air Force to accelerate its bomber plans believe tomorrow’s bomber could leverage existing platforms and technologies. Adapting technologies developed for the F/A-22, for example, or outfitting the Global Hawk UAV with more powerful engines and state-of-the-art weapons such as the Small Diameter Bomb, might be cost-effective ways to expand strike capabilities. Some even argue that commercial aircraft such as the 767 could serve as the foundation of a new bomber. Savings would be achieved by using parts and structures built in large numbers for airliners.²⁵ Because the United States can achieve air supremacy quickly and because bombs have become so accurate, some argue that bombers have essentially become “trucks” for hauling large quantities of ordnance over great distances. They argue that only a few bombers with expensive capabilities such as stealth and supersonic speed are needed. There is an important role, they say, for cheap, commercially-derived aircraft that simply carry lots of weapons and fuel.

Naval Strike Aviation

Some, including Admiral Vernon Clark, the Chief of Naval Operations, argue that the Iraq war, like the war in Afghanistan, has underscored the need for the Navy to replace its shorter-ranged F/A-18C/D strike fighters with longer-ranged F/A-18E/F strike fighters and F-35 Joint Strike Fighters. In both Afghanistan and Iraq, Clark and others have argued, Navy F/A-18C/Ds performing long-range, long-duration missions (including missions in which aircraft orbit over target areas while waiting for targets of opportunity to emerge) required multiple in-flight refuelings per sortie. Supporters assert that F/A-18E/Fs or F-35s, can perform such missions with fewer in-flight refuelings or none at all, reducing the Navy’s need for aerial refueling, which was in short supply in the Iraq war. During the Iraq war, the number of strike sorties flown from carriers was reduced in some instances due to insufficient in-flight refueling assets. Replacing F/A-18C/Ds with F/A-18E/Fs and F-35s, they now argue, will reduce the chances of such problems occurring in future operations.

In Afghanistan, Navy strike aircraft carried out the first attacks of the conflict along with long-range Air Force bombers, and Tomahawk cruise missiles. In this conflict, the Navy proved that it could sustain high sortie generation rates over long distances – each mission lasted, on average, five to seven hours, 750 miles one way. The Navy also reportedly greatly increased its use of PGMs over Operation Desert Storm, and demonstrated a greatly improved ability to attack targets of opportunity. With limited basing for Air Force theater-range aircraft and long range bombers, Naval strike aircraft

²³Nick Cook. “USAF Hones Future Bomber Requirement.” *Jane’s Defence Weekly*. January 2, 2002.

²⁴General Richard Hawley and John Backshies. “Closing the Global Strike Gap.” *Armed Forces Journal International*. September 2001.

²⁵Robert Wall. “USAF Bomber Plans Spark Renewed Debate.” *Aviation Week & Space Technology*. April 2000. p.30.

arguably were essential to the air war in Afghanistan.

Five Navy aircraft carriers and a total of 408 Navy aircraft (almost all of them operating from carriers) were involved in the Iraq war. Another 372 Marine Corps aircraft (many operating from Navy amphibious ships) were also involved. The combined naval (i.e., Navy and Marine Corps) total of 780 aircraft represented about 43% of the 1,801 aircraft (excluding Army helicopters) used in the war. Naval aircraft flew 13,893, or about 34%, of the 41,404 sorties (excluding sorties by special operations and Army helicopters, and “coalition sovereignty flights”) in the war.²⁶

Supporters of aircraft carriers and sea-based aircraft may argue that the Iraq war, like the war in Afghanistan, demonstrated the value of aircraft carriers and carrier-based aircraft for conducting U.S. military operations where access to in-theater land bases is limited. The Navy’s investment in these platforms, proponents argue, should be increased to mitigate potential forward basing access problems and ensure future U.S. long range conventional strike capabilities.

Tactical Air Integration Plan (TAI)

As part of its FY2004 budget submission, the Department of the Navy (DoN) proposed implementing a Navy-Marine Corps Tactical Air Integration (TAI) plan that would more fully integrate the Navy and Marine Corps strike fighter forces. Key elements of the plan, which would be carried out between late-FY2003 and FY2012, include the following:

- Operate a smaller total number of DoN strike fighters. The planned total number of operational DoN strike fighters would be reduced.
- Reduce planned procurement of strike fighters. Consistent with the reduction in the total number of operational strike fighters, planned purchases of F/A-18E/Fs and JSFs would be reduced: 88 E/Fs (16%) would be cut from the previously planned purchase of 548 aircraft and 409 JSFs (38%) would be cut from the previously planned purchase of 1,089 aircraft.
- Increase the readiness of Navy strike fighters. DoN would use some of the savings from reduced F/A-18E/F and JSF procurement to increase the readiness of Navy strike fighters. Navy strike fighter squadrons, whose readiness traditionally has been allowed to decline between the times that they are assigned to deploying Navy aircraft carriers, would be maintained at a more consistently high level of readiness over time (like Marine Corps strike fighters), so that they would be available in times of emergency for surge deployments aboard Navy carriers or with deploying Marine Corps units.
- Enhance funding for DoN strike fighter modernization and ancillary equipment. To further increase the capability of the smaller strike fighter force, DoN would use some of the savings from reduced F/A-18E/F and JSF procurement to enhance funding for DoN strike fighter modernization (i.e., upgrade) programs and procurement of DoN strike fighter ancillary equipment (such as targeting pods).

²⁶In the 1991 Persian Gulf war, only a small percentage of carrier-based combat aircraft were equipped to drop precision-guided munitions, and a lack of proper electronic links forced the air tasking order (ATO) to be sent each day from the land-based air operations center to the aircraft carrier in physical rather than electronic form. In the Iraq war, in contrast, all Navy and Marine Corps carrier-based strike fighters were equipped to use precision-guided weapons, and the ATO could be transmitted to the carriers electronically.

- Cross-assign Navy and Marine Corps strike fighter squadrons. On a day-to-day basis, 3 Navy strike fighter squadrons would be assigned to deploying Marine Corps units, and 6 Marine Corps strike fighter squadrons would be assigned to help fill out Navy carrier air wings. This is intended in part to familiarize pilots from each service with the operations of the other service and thereby ensure that in times of emergency, strike fighters from one service could be readily surged to meet the strike fighter needs of the other service. The cross-assignment of the 6 Marine Corps squadrons would add to the 4 Marine Corps strike fighter squadrons that, since the 1990s, have been assigned to help fill out Navy carrier air wings, bringing the total number of cross-assigned Marine Corps squadrons to 10.

The TAI plan poses potential issues for Congress in terms of its effect on total DoN strike fighter capability, and its cost effectiveness.

What effect would the TAI plan have on total DoN strike fighter capability, including the ability of the DoN strike fighter fleet to fulfill its part of the U.S. military's requirement to be able to fight distant conflicts? DoN officials argue that the TAI plan's operational strike fighter force, though numerically smaller than the previously planned force, would provide more forward-deployed DoN strike fighter capability on a day-to-day basis due to the enhanced individual capability of all DoN strike fighters. They also argue that the TAI plan would improve DoN's ability to surge additional strike fighter capability in times of emergency due to the increased surge readiness of Navy strike fighters, the improved ability to assign surged aircraft from one service to meet the needs of the other service, if need be, and the enhanced individual capability of all DoN strike fighters. Skeptics of the TAI plan may question whether the numerically smaller TAI force, even with its improvements in readiness, modernization, and ancillary equipment, would have enough aircraft to fight and win two regional conflicts at the same time.

In assessing the effects of the TAI plan on total DoN strike fighter capability, one potential issue concerns the plan's enhanced funding for DoN strike fighter modernization programs and ancillary equipment. Although "enhanced funding" might be understood to mean increased funding, DoN officials state that in the case of the TAI plan, enhanced funding refers, to a significant degree, to an *increased likelihood* that DoN in coming years would be able to afford certain strike fighter modernization programs and ancillary equipment that were included under its old strike fighter plan. For Congress, potential questions include the following: How much of the TAI plan's enhanced funding represents increased funding, and how much represents an increased likelihood of being able to afford strike fighter modernization programs and ancillary equipment included in DoN's old strike fighter plan? Has DoN quantified the increase in likelihood that these programs would be funded under the TAI plan? If the increase in funding likelihood is less than DoN believes, would the TAI force still provide more capability than the previously planned force?

Another question concerns the measurement of individual aircraft capability. Assuming the TAI plan would result in a strike fighter force reflecting greater amounts of spending for modernization and ancillary equipment, what is the resulting amount of improvement in individual aircraft capability? Has DoN quantified this improvement? If the improvement is less than DoN believes, would the TAI force still be more effective than the previously planned force?

A second potential issue for Congress is the cost effectiveness of the TAI plan. When all the cost impacts of the TAI plan are taken into account, would the net cost impact of the plan be worth the resulting change in overall DoN strike fighter capability?

Although DoN estimates that the TAI plan would reduce DoN strike fighter procurement costs by about \$35 billion through FY2021, these savings would be offset by additional expenditures in other areas. The most prominent offset would be the additional operation and maintenance spending required to increase the readiness rates of Navy strike fighters. DoN officials estimate that increased spending for strike fighter readiness through FY2021 would total about \$16.5 billion, which would offset about 47% of the avoided strike fighter procurement costs. The percentage of avoided procurement costs offset by increased readiness costs would continue to grow after FY2021, until the strike fighters in the TAI plan are replaced by a future generation of aircraft. (These figures would change if computed on a discounted basis to reflect the investment value of money over time.) It should also be noted that within the FY2004-FY2009 Future Years Defense Plan (FYDP), the TAI plan's procurement savings of about \$1 billion would be offset by about \$3.7 billion in additional aircraft readiness costs.

Annual military aircraft operation and maintenance costs have been growing in recent years, particularly for older aircraft. And new models of DoD aircraft have sometimes, if not often, proven to be more expensive to operate and maintain than planned. If the increased readiness costs of the TAI plan are underestimated, then (other things held equal) the percentage of avoided procurement costs that are offset by increased readiness costs could be higher. On the other hand, if DoN strike fighter *procurement* costs are underestimated, which would be consistent with some past DoD aircraft procurement programs, then the savings associated with not procuring the 497 aircraft would be greater than \$35 billion, and the percentage of the procurement savings offset by a given amount of increased readiness costs would be lower.

A second potential offsetting cost would be increased spending for DoN strike fighter modernization and ancillary equipment. Although, as mentioned earlier, much (perhaps most) of the enhancement of funding in these areas under the TAI plan refers to an *increased likelihood* of being able to afford modernization and ancillary equipment programs included under DoN's previous strike fighter plan, some of the enhancement would come in the form of *increased amounts* of spending in these areas.

A third potential source of offsetting costs are increased unit JSF procurement costs. The 409-aircraft reduction in DoN purchases of JSFs that would occur under the TAI plan would reduce the total planned buy of JSFs (2,912 aircraft, including 60 for the Royal Navy) by about 14%. Any Air Force or Royal Navy JSFs scheduled to be procured after the 409 DoN JSFs would now occur earlier on the production learning curve and therefore be more expensive for these services to procure (though perhaps only marginally so). In addition, if the reduction in the planned DoN JSF buy resulted in reduced *annual* JSF procurement rates in certain years compared to the old JSF procurement plan, then the JSFs produced during those years could be more expensive due to reduced spreading of manufacturer and supplier fixed overhead costs. The resulting increase in unit procurement cost would be incurred by whatever services are procuring these JSFs.

Question 3: What kind of support aircraft are required to achieve and maintain air dominance and sustain long-range conventional strikes?

The final oversight question that frames the debate on which investments to make to maintain and improve DoD's conventional long-range strike capabilities in an era of limited and uncertain access to land bases pertains to support aircraft. There are many different types of aircraft that

currently support the services' combat aircraft.²⁷ Perhaps the most prominent areas of congressional oversight pertain to investments in aerial refueling and radar jamming aircraft.

Aerial refueling

Both this sub-committee and the full committee held hearings last year on Air Force aerial refueling recapitalization. Since those hearings explored the underlying issues, and investment options for aerial refueling, this section will provide only a brief discussion.

It is currently unclear whether Congress's and the Air Force's compromise to purchase 20 KC-767s and lease 80 will come to fruition. Four other aerial refueling investment options that could be considered regardless of the lease's future include:

- Re-engining some portion of the KC-135E fleet,
- Converting some number of used commercial aircraft, such as the DC-10, into tanker aircraft,
- Increasing the use of aerial refueling contract services, especially for military exercises or the homeland defense mission, thereby freeing scarce military tanker aircraft to prosecute wartime requirements
- Purchasing or leasing some number of new, commercially derived aerial refueling aircraft other than the KC-767.

Despite considerable congressional scrutiny of this issue last year, at least five key aerial refueling issues remain unknown or unresolved. Any reasonable assessment of these four potential investment options requires that these questions be answered, or at least explored. These questions are:

- What is the total aerial refueling capability required by the services' to support current and future U.S. military operations?
- What is the required number of aerial refueling aircraft, with what mix of characteristics (e.g., range, payload, offload speed, number and type of fuel dispensers), that will best meet this requirement?
- How might requirements for aerial refueling aircraft change as a result of potential changes in the future mix of combat aircraft (long-range bombers, fighters, and unmanned air vehicles) to be supported?
- Are the current and anticipated Air Force aerial refueling aircraft modernization efforts sufficiently joint, particularly in terms of satisfying the aerial refueling needs of the Navy and Marine Corps?
- How quickly must today's aging tanker aircraft, especially the KC-135Es, be replaced?

Radar jamming

Currently, 120 Navy and Marine Corps EA-6B Prowlers are the services' only stand-off radar jamming aircraft.²⁸ These aging aircraft are in very high demand. They have been used heavily in recent conflicts, such as Bosnia, Kosovo, Operations Northern and Southern Watch, and Operation

²⁷ Other types of important support aircraft include intelligence, surveillance and reconnaissance aircraft, command and control aircraft and cargo aircraft.

²⁸ EC-130 Compass Call aircraft can provide some radar jamming capability, but these aircraft are primarily communications jammers.

Iraqi Freedom to suppress enemy air defenses, and protect strike aircraft.²⁹ While the Air Force had hoped that stealthy aircraft such as the F-117 Nighthawk and B-2 stealth bomber would be able to penetrate enemy air defenses by virtue of their stealth capabilities alone, Joint Forces Air Component commanders have found it prudent to protect these aircraft with EA-6Bs.³⁰ The downing of an F-117 in Operation Deliberate Force (the war in Bosnia), indicates that these aircraft are vulnerable to enemy air defenses if not protected adequately.

The Navy announced plans to replace its EA-6Bs with a radar jamming variant of the F/A-18F Super Hornet, the EA-18G Growler, even before the results of the December 2001 joint Electronic Attack Analysis of Alternatives, or EA-AOA, was completed. The Navy plans on developing and purchasing 90 EA-18Gs.

The Air Force appears to be planning a dual approach to creating a future stand-off radar jamming capability. Since the EA-AOA published its results, Air Force leaders have said that modifications to the B-52 are being considered to counter certain types of enemy radars, and the miniature air-launched decoy (MALD) is being considered to counter other types of radars. The FY05 budget includes a request for \$57.6 million for B-52 stand-off jamming equipment.³¹

The importance of radar jamming to aircraft survivability, the small inventory and rapid aging of EA-6Bs, and concerns about the proliferation of technologically advanced enemy air defenses, suggests that investments in future radar jamming capabilities may be a high priority for both achieving air dominance and conducting long-range strike. At least six investment questions are evident:

- Are 90 EA-18Gs enough aircraft to protect all Navy strike aircraft? Are they enough to support Marine Corps operations? Air Force operations? Today's fleet of 120 Prowlers are very busy. Furthermore, despite the pressing need to replace the Prowlers, DoD may delay the EA-18G's procurement by one year (FY2007 instead of FY2006) due to a \$150 million shortfall in the Growler's RDT&E account.
- The Marine Corps is still developing its plans for replacing its EA-6Bs. What options appear most attractive to the Marines? They currently do not fly, nor do they plan on procuring the F/A-18E/F. Much of the EA-18G's attractiveness is that it is highly common with the F/A-18F, and thus its inclusion in the fleet poses few problems for logistics and training. Therefore, purchasing the EA-18G does not offer the Marine Corps the same benefits as it does the Navy. Is the Marine Corps considering developing a radar jamming variant of the JSF? If so, would a joint program with the Air Force save money and make sense?
- Originally, the Navy and Boeing, the F/A-18's manufacturer, said that the F/A-18F could be easily converted to the G model, and that G models could be converted into F models. This adaptability would benefit the fleet by allowing air wings to tailor strike and radar jamming

²⁹ The Taliban's air defenses were limited primarily to shoulder-fired, IR-guided missiles, which reduced the requirement to employ EA-6Bs during the war in Afghanistan

³⁰ B.Gen. Robert M. Flanagan, Deputy Commander II Marine Expeditionary Force, Testimony before the House Armed Services Committee, Subcommittee on Military Readiness, on Problems Encountered, Lessons Learned and Reconstitution following Operation Allied Force. October 26, 1999.

³¹ Telephone discussion with Air Force Office of Legislative Liaison. February 26, 2004.

capabilities depending on anticipated threats. In May 2003 it was announced that the F models would still be convertible to G models, but G models would not be able to be converted to F models.³² Does this reduction in flexibility make the EA-18G less attractive, or suggest that investments in this program could be reduced?

- Some suggest that the JSF's Active Electronically Steered Array (AESA) radar already has good radar jamming capabilities in select frequencies. How much would the JSF's AESA radar contribute to the overall radar jamming mission, and what additional investments would be required to either increase the frequencies that can be jammed, or the effectiveness of the jammer? Would a second seat need to be added to the aircraft to make it an effective platform for this mission?
- One reason the Navy likes the EA-18G is because the aircraft shares many of the same flight characteristics as the aircraft it is protecting, the F/A-18E/F. Thus, it is able to escort the aircraft throughout its mission, and operational coordination is facilitated. Might this also be a consideration for the Air Force? While the EB-52 may have a long jamming range, due to its high power, it would not be able to fly closely with F/A-22s or JSF's through their mission profiles. Does this pose operational coordination problems or might it leave the strike aircraft vulnerable at critical points in the mission? What other or additional investments might be required to ensure that Air Force strike aircraft are protected throughout their entire missions?
- Is it wise for the Air Force to base its radar jamming plans on a 40 year old bomber? While the B-52 does have many years left to fly, it is projected to leave the inventory in 2037. After the EB-52 becomes operational, won't the Air Force need to begin planning for how best to replace that jamming capability once the B-52 retires?
- What is being done to develop a joint solution for the radar jamming mission as opposed to separate service solutions?

Mr. Chairman, that concludes my remarks. Thank you again for the opportunity to speak with you today. I look forward to addressing any questions you and the committee may have.

³²Stephen Trimble. "EA-18G Begins to Diverge from Super Hornet." *Aerospace Daily*. May 28, 2003.