

Issue Brief for Congress

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Tactical Aircraft Modernization: Issues for Congress

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Tactical Aircraft Modernization: Issues for Congress

SUMMARY

The Defense Department plans to buy the F-22 fighter for the Air Force, the F/A-18E/F fighter/attack plane for the Navy, and the V-22 tilt-rotor aircraft for the Marines, as well as a joint-service program to develop a multirole Joint Strike Fighter (JSF) aircraft in three variants, some of which might be operational around 2010.

Decisions in Congress and the Defense Department regarding these aircraft programs may have important long-range implications. The V-22, the F/A-18E/F, and the F-22 are now in transition from research-development (R&D) to procurement and could remain in production for decades. The next-generation combat aircraft that are expected to result from joint-service efforts now getting underway through the Joint Strike Fighter (JSF) program might be in production through the

2020s. Decisions about the funding of these programs will influence which U.S. aircraft manufacturers survive in the aviation industry and may well affect the division of combat roles and missions among the services in the next century.

Congress has questioned these tactical aircraft modernization plans on grounds of affordability and requirements. Because of the lack of consensus about future threats and defense requirements, there has been increasing skepticism about the need for some of these aircraft programs on grounds of cost and affordability, military requirements and force levels, and effects on the defense industrial base. Debate has also emerged on the need to balance modernization needs with military transformation goals.



MOST RECENT DEVELOPMENTS

The Bush Administration's FY2004 defense budget, submitted February 3, 2003, included the following requests for tactical aircraft programs: F-22 — \$5.1 billion; JSF — \$4.3 billion; F/A-18E/F - \$3.2 billion; V-22 – \$1.6 billion.

BACKGROUND AND ANALYSIS

Background

Tactical Aircraft in the U.S. Military

Tactical or theater aircraft — fighters, fighter/attack planes, attack planes, and combat support aircraft — constitute a major component of U.S. military capability. They played a prominent role in the 1991 Gulf War, and are expected to play a leading role in contemporary and future military operations, particularly in situations where U.S. leaders hope to limit or avoid the commitment of U.S. ground forces. Operation Allied Force, the 1999 war in Kosovo, may fuel these expectations. During this 78-day war, hundreds of coalition aircraft attacked Serbian targets, losing only two aircraft in the process. Navy tactical combat aircraft also played a prominent role in Operation Enduring Freedom, the war on terrorism in Afghanistan.

Tactical aviation accounts for a significant part of the defense budget, counting the costs of developing, procuring, and operating aircraft, engines, avionics, and weapon systems, and personnel, training, and administrative costs. The U.S. Air Force, Navy, and Marine Corps had a total inventory of some 2,800 fixed-wing tactical combat aircraft in 1999. Of these, the Air Force operated about 60% and the Navy and the Marine Corps about 40%. In addition to these fixed-wing combat aircraft, the Army operated about 1,500 combat helicopters. This issue brief focuses on fixed-wing aircraft programs, such as the Air Force F-22, the Navy F/A-18E/F, the Marine Corps V-22, and the Joint Strike Fighter.

These aircraft have been traditionally referred to as “tactical” aircraft to distinguish them from the Air Force's B-52, B-1, and B-2 “strategic” bombers. When applied to aircraft, “tactical” generally refers to smaller and shorter-ranged planes, while “strategic” generally refers to larger and longer-ranged aircraft. Both tactical and strategic types are operated by USAF's Air Combat Command, which in 1992 replaced Strategic Air Command (SAC) and Tactical Air Command (TAC). Reflecting the post-Cold War demise of SAC and TAC, tactical types are sometimes referred to as “theater aircraft.”

Fighter planes primarily engage in air-to-air combat, either at close/visual range or at ranges requiring radar-guided missiles and stand-off munitions (including “precision-guided munitions”/PGMs). Attack planes focus on air-to-surface combat operations such as close air support (CAS) for friendly ground forces engaged in battle, battlefield air interdiction (BAI) against enemy forces behind the lines, and deep interdiction (also known as “deep strike”) against the enemy's military, political, and industrial infrastructure. Fighter/attack planes (also known as fighter-bombers, strike fighters, or multirole fighters) perform both air-to-air and air-to-surface missions. Long-range bombers and cruise missiles can also be

used in BAI and deep strike operations. Different air-to-air and air-to-surface missions and different basing modes (sea- vs. land-based) give rise to different performance requirements for combat aircraft, making use of a common aircraft for different missions and services difficult, if not impossible, without major modifications.

Major Tactical Aircraft Programs

In response to an emerging congressional consensus and recommendations by the Defense Department's 1993 Bottom-Up Review (BUR) of force structure requirements, the Administration decided in late 1993 to continue two major aircraft programs then underway — the F-22, a low-observable-to-radar (stealthy) fighter for the Air Force; and the F/A-18E/F version of the F/A-18 fighter/attack plane for the Navy — while also pursuing new aviation technology initiatives through the Joint Advanced Strike Technology (JAST) program, which later evolved into the Joint Strike Fighter (JSF) program. The Clinton Administration also supported procurement of the Marine Corps's V-22 tilt-rotor aircraft, which had been opposed by the first Bush Administration on grounds of affordability.

The George H. Bush Administration's plan for modernizing U.S. tactical aircraft had focused on four key aircraft programs: (1) the F-22, (2) the F/A-18E/F, (3) the AFX, a stealthy attack/fighter aircraft to be developed for the Navy and Air Force, and (4) the Multi-Role Fighter (MRF), either a new aircraft or an upgraded version of the F-16 fighter/attack plane for the Air Force. Since there was no funding for the MRF and only minimal funding for the AFX, their rejection by the BUR in 1993 was more a recognition of their demise than the termination of viable programs.

The Defense Department's Quadrennial Defense Review (QDR), released in May of 1997, recommended buying fewer tactical aircraft than was then projected, with reduced annual procurements of the F-22 and the F/A-18E/F and accelerated procurement of the V-22 tilt-rotor aircraft. Major tactical aircraft programs since the early 1990s are noted below.

F-22 Raptor, built by Lockheed Martin and Boeing, features a stealthy design (difficult to detect by radar), advanced engines by Pratt and Whitney, and new avionics by Hughes and other subcontractors. It will replace the F-15 as the Air Force's air superiority fighter. The program was in competitive prototyping from 1986 to 1991 and then entered engineering and manufacturing development (EMD), with prototype flights beginning in 1997. On August 14, the Defense Acquisition Board (DAB) announced its much-awaited decision that the F-22 program had successfully completed EMD and was ready to move on to low-rate initial production. Because of uncertainties in projecting the actual production costs, the DAB also reduced the total number of Raptors produced to 295 aircraft. Like the F-15E, the F-22 will also have air-to-surface attack capabilities, although it was primarily designed for air-to-air operations. Procurement of 339 production F-22s was projected to cost some \$69 billion current-year dollars, including actual past expenditures and projected future costs. A recently announced cost overrun of at least \$700 million will likely have an impact on overall program cost and number of aircraft procured. In March 2003 the F/A-22 budget and schedule again came under fire. The GAO estimated that the Air Force budget had not accounted for up to \$1.3 billion in estimated costs. Due to these increased costs, Air Force may only be able to afford to buy as few as 224 aircraft. (See CRS Report RL31673, *F-22 Raptor*.)

The **F/A-18E/F Super Hornet**, built by Boeing (since its acquisition of McDonnell Douglas in 1997) and Northrop Grumman, is a larger and more expensive version of the current F/A-18C/D fighter/attack plane. With more range/payload than that of existing F/A-18s and more potential for future modernization, it also provides some degree of stealth (reduced radar-detection). The E/F version will replace the Navy's older F/A-18s in fighter/attack missions and will eventually assume some missions now performed by F-14 fighters and formerly by A-6 attack planes. In May 1992, the program entered engineering and manufacturing development (EMD), with prototypes beginning flight-tests in late 1995 and procurement funding beginning in FY1997. Procurement of 548 F/A-18E/Fs is currently projected, at a cost of some \$48 billion current-year dollars (actual past expenditures and projected future costs) as estimated in June 30, 2002. (See CRS Report RL30624, *F/A-18E/F Aircraft Program*). In March 2002, the Department of the Navy announced it was considering reducing its purchase of F/A-18E/F by 88 aircraft as part of a larger Navy/Marine Corps effort to more intimately integrate their tactical aircraft operations. Current plans call for the procurement of 42 Super Hornets per year through the FY '04-FY '09 budgets. F/A-18E/F squadrons from the aircraft carriers Abraham Lincoln and Nimitz are participating in Operation Iraqi Freedom.

F-22 Raptor



F/A-18F Super Hornet



The **Joint Strike Fighter (JSF)** began in FY1994 as the **Joint Advanced Strike Technology (JAST)** program, which emerged after cancellations of the AFX and MRF. The JSF program is a long-term effort to design, develop, and produce a family of affordable joint-service fighter/attack planes, with conventional take-off and landing (CTOL) aircraft for the Air Force and Navy and short take-off vertical landing (STOVL) aircraft for the U.S. Marine Corps and the U.K. Royal Navy. Participation is related to the financial contributions to the program by these governments, the British government being the major non-U.S. contributor of development funds. As of February 2003, eight foreign countries have pledged funds to the JSF program. In order of financial commitment, they are United Kingdom (\$2 billion), Italy (\$1 billion), Netherlands (\$800 million), Turkey (\$175 million), Australia (\$172 million), Canada (\$150 million), Denmark (\$125 million), and Norway (\$125 million). On February 14, 2003 Israel signed a letter of intent to contribute an estimated \$50 million to the JSF program. Singapore has officially indicated that it will join the JSF partnership and is expected to do so at the \$50 million level. A number of other countries are being considered for either JSF partnership or as purchasers From 1997-2001,

the program was in a competitive design phase involving prototypes built by Boeing and Lockheed Martin. On October 26, 2001 the DoD announced that Lockheed Martin won the competition, and would move on to the production phase. As now projected, some 2,900 JSFs would be procured for U.S. and British forces, with production starting around 2005 and operational service to begin around 2010. However, as part of their anticipated tactical aircraft integration efforts, the Department of the Navy is considering reducing its purchase of Navy and Marine Corps JSFs by 409 aircraft. (See CRS Report RS21488 *Navy-Marine Corps Tactical Air Integration Plan: Background and Issues for Congress* for more information) Since the JSF is a long-term program now in its early stages, currently projected quantities and schedules as well as the performance characteristics and acquisition costs of these aircraft are more subject to change than in the case of aircraft already in some stage of production. In March 1999, the Congressional Budget Office estimated the total acquisition cost of these aircraft over a 27-year period at some \$223 billion (FY2000\$). (See CRS Report RL30563, *Joint Strike Fighter (JSF) Program: Background, Status, and Issues*; for recent legislative action on JSF, see **Congressional Action**, below.)

Lockheed Martin JSF Prototype



The **V-22 Osprey** is a tilt-rotor aircraft built by Bell Helicopter Textron and Boeing Helicopters primarily for the U.S. Marine Corps to replace their aging helicopters that transport troops and equipment into combat zones. The Air Force also wants the V-22 for its special forces and the Navy is considering the Osprey for search and rescue missions. The V-22's distinguishing characteristic is its ability to take off, land, and hover like a helicopter, but also rotate its rotors 90 degrees and fly like a conventional airplane.

Although not part of the tactical aircraft modernization program of the early 1990s, the V-22 is in funding competition with these programs. The first production aircraft were procured in FY1997. In June 2002, the V-22 program was estimated by the Defense Department to cost some \$46.2 billion current-year dollars for development and production of 458 aircraft. While proponents focus on the Osprey's unique operational capabilities (i.e. long range, high speed, large payload coupled with vertical take off and landing capability) some opponents say that the aircraft's tilt-rotor technology is not mature and has contributed to a number of V-22 crashes over the last several years. Investigations into the V-22 program, its crashes, and allegations of malfeasance came to a head in the spring of 2001.

V-22 Osprey



On May 1, 2001, a Blue Ribbon panel formed by then-Secretary of Defense William Cohen to review all aspects of the V-22 program reported its findings and recommendations during congressional testimony. The panel recommended cutting production to the “bare minimum” while an array of tests are carried out to fix a long list of problems they identified with hardware, software and performance. On July 5, 2001, it was reported that the DoD Inspector General (IG) found evidence that the V-22 squadron at New River, NC, falsified maintenance and readiness records, and in September 2001, three Marines were disciplined. (See CRS Report RL31384, *V-22 Osprey Tilt-Rotor Aircraft*.) After a lengthy hiatus, the V-22 resumed operational flight testing June 2, 2002.

Implications of Near-Term Decisions

Decisions in Congress and the Defense Department in regard to these aircraft programs may have important long-range implications. The V-22, the F/A-18E/F, and the F-22 are now in transition from research-development (R&D) to procurement and could remain in production for decades. The next-generation combat aircraft that are expected to result from joint-service efforts now getting underway through the Joint Strike Fighter (JSF) program might be in production through the 2020s. Decisions about the funding of these programs will influence which U.S. aircraft manufacturers survive in the aviation industry and may well affect the division of combat roles and missions among the services in the next century.

Congressional debate on tactical aviation has often reflected desires by the defense committees to assess these programs from a joint and interservice perspective rather than on a program-by-program or service-by-service basis. The JSF program is a prime example of this concern for joint-service development and procurement of weapon systems and equipment. In 1994, the Senate Armed Services Committee concluded that “the only affordable long-term modernization plan must maximize commonality, where the Air Force and the Navy procure and operate the same aircraft,” adding that “both the Air Force and the Navy could face the same threats and operate side by side, necessitating a common technological approach” (S.Rept. 103-282, p. 82).

Some in Congress have expressed doubts about the affordability of tactical aircraft modernization programs as currently projected, and some question the need for as many of these aircraft as currently planned by the services. These concerns were also reflected in the

recommendations of the 1997 Quadrennial Defense Review, which resulted in reductions in the projected numbers of tactical aircraft to be procured.

Analysis: Key Issues to Consider

Affordability

Given probable constraints on defense spending in future years, can we afford tactical aircraft modernization programs as currently projected?

Tactical aviation accounts for a significant share of the U.S. defense budget, although estimates vary widely, depending on what is included and how costs are allocated. In 1996, some Defense Department analysts estimated that over 40% of the projected cost of developing and producing the 20 most expensive weapon systems during the FY1996-FY2013 period would go to three tactical aviation programs: JSF (16.5 %), F-22 (14.5%), and F/A-18E/F (11%). These analyses did not assess the relative military value of such aircraft in comparison with other weapon systems, however, nor did they compare the cost of aircraft with that of other weapon systems on an historical basis. In FY1996, tactical aircraft programs accounted for about 10% of acquisition in the FY1997-FY2001 Five Year Defense Plan (FYDP).

Since the early 1990s, Administration officials have argued that their tactical aircraft modernization plans are designed to be affordable within the smaller defense budgets projected for future years. In efforts to reduce tactical aviation costs, the Bush Administration terminated several aircraft programs in 1990-92, including continued procurement of Navy F-14D fighter/attack planes, development of a naval variant of the Air Force F-22 stealth fighter, and development of the Navy's A-12 attack plane. In a hearing on tactical aircraft before the House Armed Services Committee on April 29, 1992, Congressional Budget Office (CBO) analysts testified that the procurement costs of the four tactical aircraft then in the Administration's plan would be affordable "only under optimistic assumptions about trends in costs and available funds." CBO concluded that these aircraft would probably be procured in smaller numbers than originally planned and without some of the technological features and performance capabilities that earlier were regarded as military requirements.

In a hearing on the same subject before the House National Security Committee's R&D and Procurement Subcommittees on June 27, 1996, CBO analysts expressed similar doubts about the JSF, F-22, and F/A-18E/F programs, concluding that DOD is understating the costs of these aircraft, which "may not be affordable and will probably need to be scaled back...." General Accounting Office (GAO) analysts also testified that attempting to pay for DOD's tactical aviation programs as planned "appears to be unrealistic" in light of probable levels of defense spending in the 2000s.

On March 5, 1997, these programs were discussed in a Senate Armed Services Committee hearing and later in a joint hearing of the House National Security Committee's R&D and procurement subcommittees, where GAO and CBO analysts and DOD officials (Air Force General Joseph Ralston, Vice Chairman of the Joint Chiefs of Staff, and Dr. Paul Kaminsky, Under Secretary of Defense for Acquisition and Technology) testified. Options

noted by General Ralston ranged from canceling the F- 22, F/A-18E/F, or JSF program, or buying 25-50% fewer planes than projected, to increasing funding for these three tactical aircraft programs — which as then projected accounted for about 10% of projected spending for development and procurement of all weapons through FY2003 and would rise to 16% through FY2009 and 18% through FY2015.

Representative Weldon stated that since procurement of tactical aircraft in the Administration's FY1998 budget accounted for only about 6% of total procurement funding, the currently projected funding levels and production schedules for these three programs — estimated by CBO to cost over \$350 billion through the 2020s — were unrealistic. Several other Members also expressed doubts about the affordability of these programs, given current budgetary concerns, uncertainties about future threats, and competing funding requirements of other programs. CBO and GAO analysts expressed considerable skepticism about the affordability and schedules of these programs as currently planned. (See *Tacair Modernization on Hill: Questions, but No Decisions Yet*. Aerospace Daily, March 12, 1997: 377-378; and Capaccio, Tony. *GOP Defense Staff: Tac Air Problem 'Out Of Control.'* Defense Week, March 10, 1997: 1, 15.)

These programs were also the subject of the Senate Armed Services Committee's Air-Land Subcommittee hearing on April 16, 1997, which focused mainly on differing estimates of the F-22's production cost by Defense Department and Air Force officials. (See Foote, Sheila. *Senators Raise Questions about Affordability of TACAIR*. Defense Daily. April 17, 1997: 101-102.) On July 11, 1997, during Senate debate on the FY1998 defense authorizations bill (S. 936), an amendment by Sen. Russell Feingold requiring DOD to recommend which of three programs (JSF, F-22, or F/A- 18E/F) should be terminated if funding were available for only two programs was defeated 79-19. (Congressional Record, July 11, 1997: S7227-S7234.)

Similar concerns about the rising costs of these aircraft programs were voiced in 1999 during hearings by the House Armed Services Committee (March 3, 1999) and the Senate Armed Services Committee's Airland Subcommittee (March 10 and 17, 1999), when projected increases in the development cost of the F-22 and the JSF were discussed at length. CBO and GAO analysts expressed many of the same concerns about these programs that they have noted in recent years. (*HASC Tactical Air Hearing Raises Cost Questions Across the Board*. Aerospace Daily, March 9, 1999: 349-350; *DOD Cost Estimates for Tacair Unrealistic, CBO Says*. Aerospace Daily, March 11, 1999: 365, 368.) Concerns about the affordability of these programs played a major role in congressional opposition to procurement funding for the F-22 program in the FY2000 defense budget.

In the spring of 2000, it was reported that a joint study by Boeing and the Air Force Research Laboratory — *21st Century Affordable Aircraft Thrust* — found that fighter aircraft production costs could be cut in half by aggressively incorporating commercially proven technologies and processes throughout a fighter aircraft's development and production phase. Furthermore, operations and maintenance costs over an aircraft's 20-30 year lifetime could similarly be reduced by 50 percent.¹ In light of DoD's desire to acquire more than 3,800

¹ Dine, Philip. Talent Seeks Spending for Cheaper F-15 Test Models. *St. Louis Post-Dispatch*. May (continued...)

tactical fighter over the next 25 years, reported savings such as these may merit additional investigation.

Capability Required

Given the demise of the Soviet Union and the changed international security environment, what capabilities are required in U.S. tactical aircraft?

The F-22 program was started in the mid-1980s, when the Soviet Union was expected to continue producing high-performance aircraft and air-defense missiles that could pose serious threats in the 1990s and beyond. The F-22 was then justified as an advanced, stealthy aircraft capable of performing combat missions in a high-threat environment. With the dissolution of the Soviet Union and a much changed international environment, some question the need to procure large quantities of such expensive, high-capability aircraft. Alternatives would be to produce only limited numbers of these aircraft, while upgrading and extending the service lives of existing aircraft such as Air Force F-15Es and F-16Cs and Navy F-14Ds and F/A-18C/Ds.

Others argue that large numbers of high-capability aircraft are still necessary because Russian aircraft and surface-to-air missiles (SAMs) are available to potential adversaries of the United States and its allies, and some European and Asian companies may soon be able to market advanced aircraft and missiles to potential enemies. In this view, the demise of the Soviet Union does not mean the end of potential high-threat areas requiring advanced aircraft. For example, Iraq's Air Force included some advanced, Soviet-designed fighters that are aerodynamically equivalent to the F-15, and its air-defense system included advanced equipment of both Soviet and European design. Against this force, the F-117 stealth attack plane played a crucial role in destroying targets in high-threat areas. Having large numbers of such advanced aircraft, it is argued, will help ensure operational success in future conflicts with well-armed adversaries.

Most of those questioning the modernization plan acknowledge that proliferation of advanced aircraft and air-defense equipment in the Third World will require the United States to field some new-generation high-capability aircraft. They argue, however, that the Gulf War showed the United States has a formidable advantage in air-to-air combat, which can be maintained by procuring a limited number of F-22s for use against those adversaries who may be able to make effective use of modern Soviet or European aircraft. They note that the F-117s used in the Gulf War constituted a tiny percentage of all tactical aircraft employed against Iraq, and yet only a few of the non-stealthy planes were shot down, even in the early days of the war. Moreover, they argue that cruise missiles and stealthy B-2 bombers and non-stealthy B-1s equipped with adequate standoff munitions could be used against heavily defended targets. In this view, the F-22 would be procured in some smaller quantity than the 339 production planes as currently projected and could be operated as special "silver bullet" forces.

¹ (...continued)

9, 2000. And Rep. James Talent. Building the Affordable Fighter. *Defense News*. July 24, 2000:37-38.

Others take issue with the need for any F-22s, arguing that the Air Force and Navy will face generally the same adversary aircraft in the future, and these services now have roughly equal capability in air-to-air combat as well as considerable air-to-surface attack capabilities with F-15Es and F-14Ds. Others point out that the Navy will eventually conduct its air-to-air combat mission primarily with the F/A-18E/F — a major modification of a 1970s-era strike-fighter. If the Navy does not need a new-generation stealth fighter for the post-Cold War era, they ask, why is such an aircraft required for the Air Force? Some also argue that the improved attack capability of the F/A-18E/F will be sufficient for carrier-based attack missions against the most likely adversaries in regional conflicts. Furthermore, it can be argued that the successful development of longer-range and more accurate and lethal standoff munitions would significantly increase the combat effectiveness of current-generation tactical aircraft. (See CRS Report RL30552, *Missiles for Standoff Attack: Air-Launched Air-to-Surface Munition Programs*, by Christopher Bolkcom and Bert Cooper, May 9, 2000.)

The need for the V-22's capabilities are also debated. Those in favor of the program say the V-22 is needed to replace aging military helicopters in all the services, which are costly to maintain and operate safely and effectively. This tilt-rotor aircraft will provide the operational flexibility of a helicopter without the helicopter's inherent limitations of speed, range, and altitude. When landing on hostile shores in a third-world conflict, the V-22 would be critical for the transport of Marines from ship to shore. In sum, it is the Marine Corps' most important program and a key pillar supporting emerging Marine Corps warfighting concepts such as *Operational Maneuver from the Sea*. Those who question the need for the V-22's capabilities say that ship-to-shore logistical operations can be performed by less expensive helicopters for the kinds of landing operations in which the Marines are likely to be involved, where the V-22's greater speed and range would not be needed. Moreover, Marine assault missions in an opposed landing would involve ship-to-shore movement of troops and equipment, which would require coordination with aircraft having less speed and range than the V-22.

Force Structure

How many wings of tactical aircraft does the United States need?

The Bush Administration's proposed base force for the mid-1990s and beyond reduced force structure to 26.5 Air Force fighter and attack wings, 13 Navy carrier air wings, and four Marine Corps air wings (compared to 35, 15, and four air wings respectively in FY1990). Budgetary considerations and radically altered international conditions led to these reductions, which some argued were appropriate for the post-Cold War era, while others viewed this force structure as excessive. Secretary of Defense Les Aspin announced in September 1993 that the Clinton Administration projected a base force of 20 Air Force fighter/attack wings (13 active, 7 reserve), 11 Navy carrier air wings, and four Marine Corps air wings. The Quadrennial Defense Review released by Defense Secretary William Cohen in May 1997 recommended no major changes in this force structure, although the 20 Air Force tactical wings would comprise 12 active and 8 reserve wings.

The question of how many wings of tactical aircraft the United States needs for the post-Cold War era, and how this number should be determined, is part of an on-going debate in the Defense Department and Congress over the proper overall size of U.S. military forces for the early 2000s and beyond. Decisions on this issue can affect views on the affordability

and focus of plans for modernizing tactical aircraft. A reduction in the number of air wings would lead to a corresponding reduction in the number of aircraft to be procured. On the other hand, a reduction in the number of air wings may lead to a decision to increase the proportions of F-22s and F/A-18E/Fs in the force, on grounds that reduced forces need more capable equipment.

Service Roles and Missions

How should views on service roles and missions be factored into decisions on tactical aircraft modernization?

The high cost of tactical aircraft programs has renewed interest in the division of tactical aviation roles and missions among the services. The apparent redundancy in tactical aviation among the services — the Air Force plus air components of the Navy, Marine Corps, and Army — has often been criticized as a duplication of efforts. In May 1995, the Commission on Roles and Missions advocated the continuation of air components in every service, but suggested that the overall force structure as well as the mix of capabilities and support infrastructure should be reviewed. GAO analysts concluded in 1996 that DOD's current plans for tactical aviation have not taken adequate account of overall capabilities and requirements from a joint-service perspective.

The main roles-and-missions issue affecting current modernization plans concerns the respective roles of the Air Force and Navy/Marine Corps in projecting U.S. air power overseas. Most defense analysts view this as not an either-or question but a question of the appropriate balance between these services in a shared and joint mission. Some would give the Air Force primary responsibility for power projection overseas; others argue that geo-political factors would require naval assets for sustained air operations in many situations. Canceling the AFX in 1993 and relying mainly on the attack capabilities of the F/A-18E/F has been viewed by some as reducing the Navy's role in overseas projection of air power, which to some would call into question the value of aircraft carriers. Others would argue that carrier-based aircraft are needed for missions other than deep-strike operations, such as shorter-range land attack, air superiority, airborne early warning, reconnaissance, electronic warfare, and anti-submarine warfare.

Industrial Base

How should industrial-base considerations be factored into decisions on tactical aircraft modernization?

The health of the U.S. industrial base has been an issue of growing concern. A report by the Defense Science Board published in the Spring of 2000 noted that the defense industry is in the midst of a painful transition that is complicated by the "new economy," which is draining human and financial resources. Unless steps are taken now, the study concluded, the U.S. defense industry will likely be less competitive and financially viable in five to 10 years than it is today. A July 2000 study by Booz-Allen Hamilton reported that the U.S. defense

industrial base is in a state of decline and national security will be affected if current trends go unchecked.²

Congressional decisions on tactical aviation programs have serious implications for the aerospace sector of the U.S. industrial base, which is a major source of technological innovations as well as export earnings. Aerospace is the nation's leading net exporter of manufactured goods, with exports exceeding imports in 1998 by \$41 billion (including \$12 billion in military exports), according to the Aerospace Industries Association. There is general agreement that there were more aircraft manufacturers and subcontractors than recent levels of defense spending could sustain. Consequently, the aerospace industry, like other industries heavily dependent on Pentagon spending, has been undergoing a shakeout, with some companies leaving the military aircraft business and others merging with financially stronger competitors and downsizing production lines.

During 1994, Lockheed bought General Dynamics' aircraft production facilities in Ft. Worth, Texas; Grumman merged with Northrop; and Martin Marietta merged with Lockheed. Similar buy-outs and mergers have continued, with Boeing buying McDonnell Douglas in December 1996, and Lockheed Martin seeking to acquire Northrop Grumman in 1998. Thus, the F-22 will be built by Lockheed Martin with Boeing as a major partner; the F/A-18E/F is now built by Boeing (as owner of McDonnell Douglas) with Northrop Grumman as the major airframe subcontractor; and the proposed Joint Strike Fighter would be built by Boeing or Lockheed Martin in a competition to be decided in 2001, as currently planned.

Congressional decisions on which military aircraft programs to support may influence which aircraft manufacturers and subcontractors remain in business. While the U.S. economy as a whole regularly absorbs declines equal in magnitude to that projected for defense aerospace, in the short- and medium-term, thousands of skilled engineering and manufacturing jobs as well the health of local and regional economies are at stake. Some argue that preservation of critical components of U.S. defense industry is now as important as military requirements, which have always been matters of judgment based on threat assumptions that are subject to change. There is no apparent consensus, however, about what is most critical to future U.S. military requirements or how excess military industrial capabilities can be converted to civilian production that might enhance international competitiveness in export trade.

Several questions arise out of the industrial base issue: How many aircraft manufacturers are needed to support U.S. military needs? To what extent should the survivability of these firms be taken into account in deciding which aircraft programs to pursue? Which aspects of the aerospace industry are really unique and vital to production of tactical aircraft? How can competitiveness among U.S. defense contractors be maintained with fewer firms, particularly regarding different design concepts and cost-reduction innovations in the development and production of planes? Should foreign sales of U.S. military aircraft be factored into decisions on which tactical aircraft programs to pursue? How might decisions on tactical aircraft programs affect U.S. export earnings and

² Velocci, Anthony. Industry Prognosis Flags Ominous Trends. *Aviation Week & Space Technology*. July 17, 2000:28

international competitiveness of the U.S. aerospace industry? There are no easy answers to such questions and no consensus on these industrial base issues, which confront all industrial nations in the early 2000s.

Modernization vs. Transformation³

How can tactical aircraft modernization needs be balanced with transformation goals?

Over the past several years, defense analysts and decision makers have increasingly discussed the need for the Department of Defense (DoD) to transform itself in light of rapidly changing geo-military circumstances.⁴ Unlike modernization, transformation is generally viewed as discontinuous change, or a “leap ahead” in capabilities. Transformation is thought to be fueled by a combination of new technologies, innovative operational concepts, and codified by new organizational schema. Modernization and transformation objectives may not be compatible. This potential incompatibility raises several questions: What emphasis should DoD place on tactical aviation modernization vs. transformation goals? To what degree do DoD’s current tactical aviation modernization programs facilitate transformation? To what degree do they conflict with transformation?

Many proponents of transformation argue that instead of pursuing the tactical aviation programs described in this report, DoD should upgrade the F-16, F-15 and F/A-18C/Ds. Then, DoD would have sufficient resources to pursue more aggressive aviation technologies such as unmanned combat aerial vehicles (UCAVs) and next generation bombers, which, transformation advocates argue, would more likely generate a “leap ahead” in aviation capabilities. Advocates of the F-22, JSF and Super Hornet argue that these aircraft have capabilities that could contribute to transformation. Furthermore, they argue, DoD has already skipped a generation of tactical aircraft modernization and can’t wait for more aggressive technologies that may or may not emerge in the distant future. Today’s combat aircraft are losing ground to Russian and other combat aircraft, and need to be replaced sooner rather than later.

Congressional Action

The Bush Administration’s FY2004 defense budget, submitted February 3, 2003, included the following requests for tactical aircraft programs: F-22 — \$5.1 billion; JSF — \$4.3 billion; F/A-18E/F - \$3.2 billion; V-22 – \$1.6 billion. Details of the FY2003 request are summarized in **Table 1**, below.

³ For a more detailed discussion of transformation, see CRS Report RS20859, *Air Force Transformation: Background and Issues for Congress*.

⁴ For instance: The 1997 Quadrennial Defense Review; The National Security Strategy of the United States; The Secretary of Defense’s Annual Report to the President and Congress; The 1998 National Defense Panel; P.L. 105-261, Title IX, Subtitle A, Sec. 903.

Table 1. FY2004 Budget Request

(\$ millions)

Program	USAF Procure		USN Procure		USAF RDT&E	USN RDT&E	SOCOM RDT&E	Total \$
	\$	#	\$	#				
F-22	4,233.7	22	-	-	936.5			5,170.2
JSF	-	-	-	-	2,194.1	2,171.7		4,365.8
V-22	233.1	2	877.0	9	65.7	441.1	36.5	1,654.0
F/A-18E/F	-	-	3,031.2	42	-	179.0		3,210.2

Note: Program Acquisition Costs by Weapon System. *Department of Defense Budget for Fiscal Year 2004/2005*. February 2003. Procurement Programs (P-1). *Department of Defense Budget for Fiscal Year 2004/2005*. February 2003. RDT&E Programs (R-1). *Department of Defense Budget for Fiscal Year 2004/2005*. February 2003. Telephone conversation with USMC Office of Legislative Liaison. February 5, 2003.

The Bush Administration's amended FY2003 defense budget, submitted February 4, 2002, included the following requests for tactical aircraft programs: F-22 — \$5.2 billion; JSF — \$3.4 billion; F/A-18E/F - \$3.2 billion; V-22 – \$1.9 billion.⁵ In their markup of the FY2003 defense authorization bill (H.R. 4546), House authorizers fully supported the Administration's request for F-22, JSF, F/A-18E/F and V-22 funding.⁶ Senate authorizers (S.Rept. 107-151, S. 2514) also matched the request for F-22 and JSF funds. However, the Senate Armed Services Committee added \$240 million to the request for F/A-18E/F procurement funding to increase the 2003 purchase of 44 Super Hornets to 48.⁷ Also, Senate authorizers reduced the Administration's request for V-22 funding by \$9.2 million.⁸

In their report (H.Rept. 107-772, H.R. 4546), authorization conferees matched the Administration's request for F/A-22 and JSF funding. Conferees followed Senate authorization by increasing F/A-18E/F funding by \$240 million to procure and additional four Super Hornets in FY2003, for a total buy of 48 aircraft. Conferees cut \$20 million from the Navy's V-22 procurement request (advanced procurement, current year).

House appropriators (H.Rept. 107-532, H.R. 5010) provided \$4.1 billion for 23 F-22s, \$1 billion for 11 V-22s, \$3 billion for 44 F/A-18E/Fs, and full funding for the JSF.⁹ Senate appropriators (S.Rept. 107-213, H.R. 5010), followed authorization by increasing F/A-18E/F

⁵ "Department of Defense FY2003 Budget Program Acquisition Costs." *Aerospace Daily*. February 5, 2002. P.6.

⁶ *House Armed Services Committee Reports Fiscal Year 2003 Defense Authorization Legislation*. Press Release. U.S. House of Representatives. Committee on Armed Services. May 1, 2002.

⁷ *Senate Armed Services Committee Completes Markup of National Defense Authorization Bill for Fiscal Year 2003*. Press Release. U.S. Senate. Committee on Armed Services. May 10, 2002.

⁸ Ron Laurenzo. "Senate Defense Panel Cuts Missile Defense, Adds Ships." *Defense Week*. May 13, 2002.

⁹ "House Passes FY03 Defense Appropriations Bill." Press Release. United States House of Representatives. Committee on Appropriations. June 28, 2002.

funding by \$240 million. Recommendations on FY0003 V-22 funding matched the Administration's request, but Senate appropriators reduced MV-22 advance procurement (-\$9.2 million) and zeroed out CV-22 advance procurement (-\$10 million). Senate appropriators reduced F-22 procurement funds by \$28.5 million, and citing excessive increases for inflation estimates and overhead management costs, the committee recommended cutting \$10 million from both Navy and Air Force RDT&E. \$35 million was added to the Navy's JSF RDT&E account for the F136 Interchangeable Engine.

In H.Rept. 107-732 (H.R. 5010), Appropriations Conferees followed the Senate by cutting \$28.5 million from FY2003 F-22 procurement due to cost growth, but otherwise supported the Air Force's procurement request: \$4.06 billion for procurement, \$530.6 million in advanced procurement (current year), \$11.2 million for modification of in service aircraft. Conferees also included House language requiring DoD certify the proposed F-22 production rate is the lowest risk and lowest cost solution (p. 206). Conferees matched the Administration's request for F-22 RDT&E funding: \$627 million for EMD, and \$181.2 for operational systems development. Appropriations conferees increased the Navy's procurement request for F/A-18E/F aircraft for FY2003 by \$92 million, paving the way for two additional aircraft. The Navy's request for \$107.8 million in RDT&E for the Super Hornet was also met.

Conferees reduced the Navy's FY2003 V-22 procurement request by \$10 million for unjustified cost resolutions, and cut the Navy's \$1.1 billion procurement request for spares and repair parts by \$25 million. Conferees also reduced advanced procurement (current year) by \$18.4 million. Conferees matched the Air Force's \$101 million request for FY2003 and advanced procurement (current year) funds and the Special Operations Command's procurement request. Conferees matched both the Navy's (\$420 million) and the Air Force's (\$11 million) RDT&E requests. Conferees cut \$10 million from both the Air Force and the Navy requests for JSF RDT&E funding, citing excessive growth in inflation and overhead estimates. However, Conferees also added \$29.7 million to the Navy's account to promote development and testing of two interchangeable engines for the JSF.

In July 2001, the Bush Administration submitted its amended budget request for FY2002 (in millions): F-22 - \$3,918.8, JSF - \$1,536.7, V-22 - \$1,615.0, F/A-18E/F - \$3,409.6. In H.Rept. 107-194 (H.R. 2586), the HASC matched the Administrations's request for FY2002 F-22 procurement and EMD funding, but reduced operational system development funding by \$15 million. Similarly, it matched F/A-18E/F procurement funding, but cut systems development funding by \$39 million. The HASC also matched the request for JSF funding, and added \$10 million for the Alternative Engine Program. House authorizers also matched the request for MV-22 procurement funding and CV-22 R&D. It eliminated all CV-22 procurement funding except for \$295 million for spare and repair parts, and cut \$100 million from the MV-22 RDT&E request.

In S.Rept. 107-62 (S. 1416), the SASC also matched the Administration's request for all F-22 funding. It also increased F/A-18E/F procurement funding by \$15 million to accelerate IDECM procurement, and also increased systems development funding by \$27 million to support the Joint Helmet Mounted Cueing System. The SASC reduced JSF EMD funding by \$307 million, expressing their expectation that DoD would not be prepared for EMD down select this October. Senate authorizers increased the DemVal account by \$60 million. SASC oversight of the V-22 program was very similar to that of the HASC, except

for MV-22 procurement funding, which the HASC cut to \$783 million to procure nine aircraft, in line with the Blue Ribbon Panel's recommendation for maintaining the minimum sustainable procurement rate.

In their report S. 1438 (H.Rept. 107-333), FY2002 authorization conferees cut \$50 million from the Navy's MV-22 procurement request, providing enough funding for 11 airframes vs the 12 requested. Conferees rejected the Administration's request for Air Force CV-22 procurement funding, reduced the Navy's request for R&D funding by \$100 million, and matched the Air Force's request for \$10 million in R&D funding. Authorization conferees also required DoD (Sec. 124, p.514) to provide a report 30 days prior to any resumption of V-22 flight testing. Authorization conferees supported the Administration's request for F-22 funding, and adopted a Senate provision to remove the \$20.4 billion legislative cost cap on F-22 Engineering, Manufacturing and Development. Authorization conferees increased the F/A-18EF procurement request by \$13 million to accelerate IDECM purchases. Conferees authorized the Administration's request for JSF funding, but expressed concern regarding industrial base issues and directed DoD to provide a report on the subject.

The House Appropriations Committee took the following action on the Administration's FY2002 budget request: MV-22 - reduced purchase by three aircraft, and funding by \$226 million; CV-22 - increased funding by \$85 million to facilitate procurement of two airframes; F-22: approved Administrations's plan to purchase 13 aircraft, but reduced funding by \$2.5 million due to delayed procurement plan; JSF - matched the Administration's request; F/A-18E/F - matched the Administration's request.

In their report H.R. 3338 (S.Rept. 107-109), Senate appropriators matched the Air Force's procurement request for current and advance year procurement to build 13 F-22 Raptors, and the Air Force's request for RDT&E funding. The Senate Appropriations Committee cut \$226.7 million and three aircraft from the Navy's FY02 procurement request and zeroed-out the Air Force's procurement request of \$95.1 million. Senate appropriators matched the Navy's RDT&E request, but denied the Air Force's \$10 million R&D request. Similar to Senate authorizers, Senate appropriators reduced JSF EMD and increased JSF concept development funds in anticipation of a delay in the down select. The net reduction was \$247 million divided equally between the Navy and Air force. Senate appropriators supported the Navy's request to procure 48F/A-18E/F aircraft, but cut \$35 million.

In their report H.R. 3338 (H.Rept. 107-350) appropriations conferees matched the Administration's request for JSF R&D funding and modestly reduced (-\$30 million) the Navy's request for F/A-18E/F procurement funds; citing excess growth in ancillary support equipment. Appropriations conferees matched the Air Force's request for procurement and R&D funding. Conferees transferred \$111 million from the F-22's Advanced Procurement (Current Year) account to FY2002 procurement. Conferees also transferred \$16 million from the F-22 Operational Systems Development account to the EMD account. Conferees cut the Navy's procurement request by \$226 million, a reduction of three airframes. Like authorizers, appropriators rejected the Administration's request for Air Force procurement funding. However, appropriators increased Air Force R&D funding by \$180 million to produce 2 CV-22 EMD articles. \$100 million was cut from the Navy's R&D request.