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CRS Issue Brief

Tactical Aircraft Modernization: Issues for Congress

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Tactical Aircraft Modernization: Issues for Congress

SUMMARY

This Issue Brief examines DoD's four largest tactical aircraft modernization programs. The background section provides a brief description of each program, and a discussion of how tactical aircraft fit into military air operations: the missions they typically perform and how they contrast to longer-range combat aircraft.

The Analysis section examines an number of policy issues including affordability, capability required, force structure, service roles and missions, industrial base, and transformation. The paper concludes with a synopsis of recent congressional action of these programs.

The Defense Department plans to buy the F/A-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 pursue 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-term implications. The F/A-18E/F is entering production. The V-22, and the F/A-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 FY2005 defense budget included the following requests for tactical aircraft programs: F/A-22 — $4.7 billion; JSF — $4.5 billion; F/A-18E/F - $3.4 billion; EA-18G - .3 billion; V-22 — $1.7 billion.

BACKGROUND AND ANALYSIS

Background

Tactical Aircraft in the U.S. Military

Tactical or theater aircraft — fighters, fighter/attack planes, and attack planes — 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 have fueled 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 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 Clinton 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.

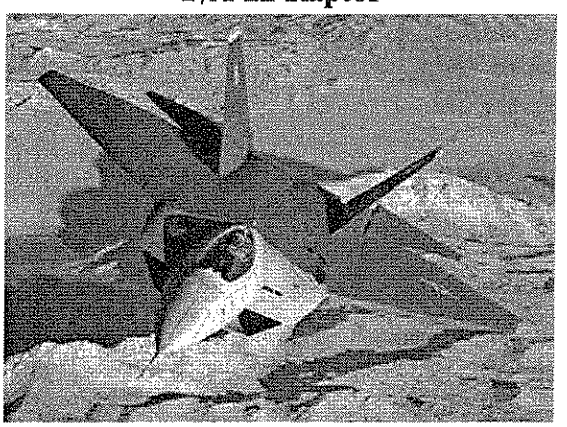
The Defense Department's Quadrennial Defense Review (QDR), released in May of 1997, recommended buying fewer tactical aircraft than was then projected, with reduced annual procurement of the F-22 and the F/A-18E/F and accelerated procurement of the V-22 tilt-rotor aircraft. Major tactical aircraft programs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

F/A-22 Raptor, built by Lockheed Martin and Boeing, features a stealthy design, 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 September 14, 2001 the Defense Acquisition Board (DAB) announced its much-awaited decision that the F/A-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 278 production F-22s was projected to cost some $72 billion current-year dollars, including actual past expenditures and projected future costs. A cost overrun of at least $800 million, announced in late 2002, 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. In early 2004 Air Force officials and DoD's Director of Operational Test and Evaluation (OT&E) debated how quickly the Raptor's operational tests should proceed. Saying that testing problems posed high schedule

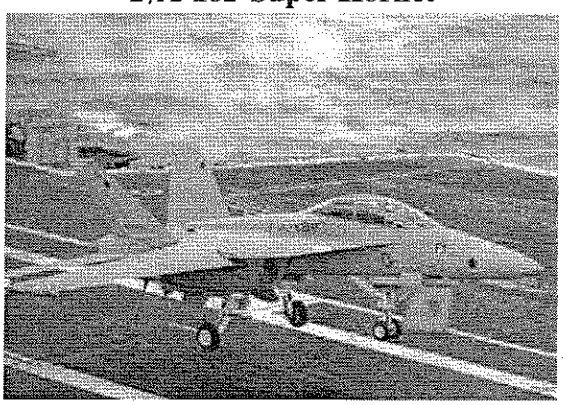
risk, the Director OT&E recommended an April 2004 start date.[1] Air Force Officials were optimistic that the tests could begin sooner, but said they were driven by events, not dates. Due to increased costs and a potentially lengthened schedule, the Air Force may only be able to afford as few as 224 aircraft. In February 2004, it was reported that the Office of Management and Budget had requested DoD to provide an independent study on the F/A-22, to include an assessment of whether the program is relevant and what alternatives to the program may exist.. Some analysts saw this request as a threat to the Raptor program.[2]

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 552 F/A-18E/Fs is currently projected, at a cost of some $50 billion current-year dollars (actual past expenditures and projected future costs) as estimated in June 30, 2002. (See CRS Report RL30624.) 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 FY2004-FY2009 budgets. An electronic attack version of the aircraft — the EA-18G is being considered as a replacement for the Navy's aging EA-6B Prowler fleet. F/A-18E/F squadrons from the aircraft carriers Abraham Lincoln and Nimitz participated in Operation Iraqi Freedom. In December 2003, the Navy awarded a five-year, $8.6 billion multi-year procurement contract for 210 F/A-18E/Fs to the Boeing Company. A separate $1 billion contract was also awarded to develop the EA-18G.

F/A-22 Raptor



F/A-18F Super Hornet



[1] Hampton Stephens. "DOT&E Report: Raptor Testing Problems Pose High Schedule Risk." *Inside the Air Force.* January 23, 2004.

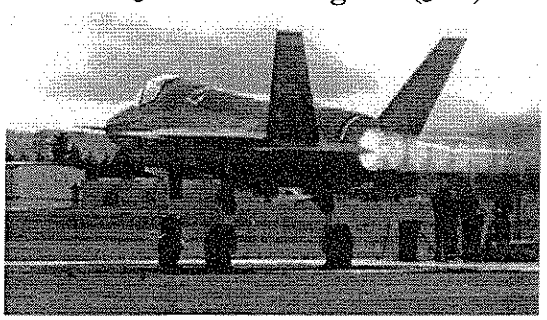
[2] Tom Bowman. "Fighter, Copter Programs in Danger, Pentagon Fears." *Baltimore Sun.* February 10, 2004.

The **F-35 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. In February 2004, Air Force leaders announced that the Air Force would also procure some number of STOVL variants to improve its ability to prosecute the close air support (CAS) mission and reduce the potential implications of uncertain access to forward bases.

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. 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 From1997-2001, 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 2,457 JSFs would be procured, with production starting around 2006 and operational service to begin around 2010. Since the JSF is a long-term program now still in development, 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 January 2004, for example, it was announced that the development program will be extended one year, and the costs of this phased increased from $33 billion to $40.5 billion, as the JSF program worked to resolve weight and other technical challenges. The JSF program is currently estimated (September 30, 2003) at $199.7 billion. As part of this restructuring, near term Air Force purchases of the F-35 will be reduced, and "re-sequencing" the order in which the three F-35 variants will be manufactured is being studied. (See CRS Report RL30563, *Joint Strike Fighter (JSF) Program: Background, Status, and Issues*; for recent legislative action on JSF, see **Congressional Action**, below.)

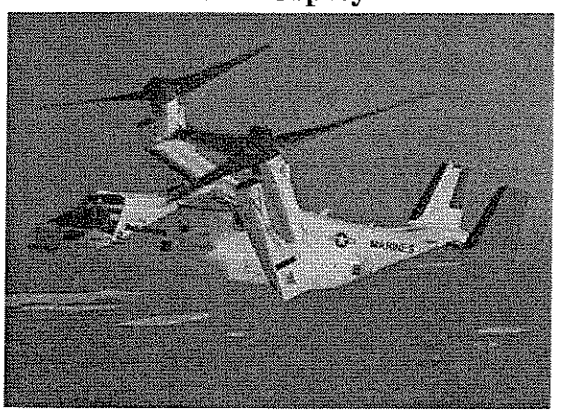
F-35 Joint Strike Fighter (JSF)



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 September 2003, the V-22 program was estimated by the Defense Department to cost some $48.2 billion current -year dollars for development and production of 458 aircraft. While proponents focus on what they believe to be 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. Opponents also challenge whether the Osprey's operational capabilities will be as big an improvement over modern helicopters as proponents claim. 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. Current plans are to procure 11 Osprey's per year (the minimum sustaining production rate) until FY2005. If the Osprey satisfactorily completes flight testing, seventeen V-22s should be procured in FY2006. Quantities should increase by about 50 percent per year for a total of 152 aircraft through FY2009.

Implications of Near-Term Decisions

Decisions in Congress and the Defense Department in regard to these aircraft programs may have important long-term 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.

Since the early 1990s, Administration officials have argued that their tactical aircraft modernization plans are designed to be affordable within the smaller procurement 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.[3]

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/A-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.)

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[3] *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.

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/A-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. Concerns about the affordability of these programs played a major role in congressional opposition to procurement funding for the F/A-22 program in the FY2000 defense budget.

In the spring of 2003 F/A-22 affordability was again at issue. During an April 11 hearing of the House Government Reform Committee's national security subcommittee, Defense Department and Air Force officials estimated that rising costs and the program's congressionally mandated $36.8 billion production cost cap could converge to reduce the total Air Force purchase to as few as 225 Raptors.[4]

Capability Required

Given the demise of the Soviet Union and the apparent dominance U.S. air forces have demonstrated in recent conflicts (Panama, Haiti, Bosnia, Kosovo, Afghanistan, Iraq) 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.

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[4] Marc Selinger. "F/A-22 Production Estimate Questioned by Lawmakers." *Aerospace Daily.* April 28, 2003.

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 stealthy F-117s used in the Gulf War constituted a tiny percentage of all tactical aircraft employed against Iraq, and only a few 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, F-22s would be procured in some smaller quantity than the 339 production planes currently projected and could be operated as special "silver bullet" forces.

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 tactical aircraft does the United States need?

The George H.W. 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/A-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 subsequently that DOD's 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 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. Recent operations, such as the 2001 war in Afghanistan, highlighted the importance of carrier-based aviation.

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.[5]

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 in1998 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 Joint Strike Fighter will be built by Lockheed Martin, with Boeing and Northrop Grumman as major subcontractors.

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.

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[5] Anthony Velocci. Industry Prognosis Flags Ominous Trends. *Aviation Week & Space Technology.* July 17, 2000.

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 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. Transformation[6]

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.[7] 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/A-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. They also maintain that today's combat aircraft are losing ground to Russian and other combat aircraft, and need to be replaced sooner rather than later.

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

[7] 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.

Congressional Action

This section presents recent legislative activity on DoD's four major tactical aircraft modernization programs. It includes the Administration's annual budget request, and annual authorization and appropriations.

The Bush Administration's FY2005 defense budget, included the following requests for tactical aircraft programs: F/A-22 — $5.1 billion; JSF — $4.3 billion; F/A-18E/F - $3.2 billion; V-22 — $1.6 billion. Details of the request are summarized in **Table 1**, below.

Table 1. FY2005 Budget Request

($ millions)

Program	USAF Procure $	USAF Procure #	USN Procure $	USN Procure #	DoD Procure	USAF RDT&E	USN RDT&E	DoD RDT&E	Total $
F/A-22	3633.8 523.2 70.1	24				210 354.5			4782.6
JSF						2307.4	2264.5		4571.9
V-22	305.6 11.0 .3	3	843.6 71.5 3.4	8	126.1	16.4	304.1	75.1	1757.1
F/A-18E/F			2907.5 *412.5	42			*134.5		3454.5
EA-18G			8.2	-			357.5		365.7

Sources: Procurement Programs (P-1). *Department of Defense Budget for Fiscal Year 2005.* February 2043. RDT&E Programs (R-1). *Department of Defense Budget for Fiscal Year 2005.* February 2004.
* Some of these requested funds would be spent on F/A-18A/C/D models as well as E/F models.

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

In their markup of the FY2004 Defense Authorization Bill (S.Rept. 108-46, S. 1050), the Senate Armed Services Committee cut the Air Force's request for F/A-22s from 22 to 20 aircraft (-$217 million). Senate authorizers matched the other tac air requests, and added $56 million to the JSF program for the interchangeable engine.[8] House authorizers (H.Rept. 108-106, H.R. 1588) provided $4.06 billion in F/A-22 procurement funding (a reduction of $161 million), and barred the Air Force from spending an additional $136 million until the Raptor's avionics software reliability is improved. The HASC also increased the F/A-18E/F

[8] "Senate Armed Services committee Completes Markup of National Defense Authorization Bill for Fiscal Year 2004. Press Release. May 9, 2003.

request by $25 million, but otherwise matched the Administration's requests for tactical aircraft funding.

Expressing their concern that "the U.S. is becoming dependent on foreign sources for many essential and critical items..." (Sec. 812, p.343) House authorizers recommend requiring DoD to buy more American-made defense products. While the JSF is not specifically mentioned in the House provisions, the "Critical Items Identification and Domestic Production Capabilities Improvement Program," if enacted, could strongly affect the program. Both White House and industry spokesmen have claimed that the legislation could force a major modification of the JSF program, or even its termination.[9]

In their report H.R. 1588 (109-354), authorization conferees followed the House recommendation to cut $161 million from the F/A-22 procurement request (22 aircraft) due to vendor cost savings. Sec. 133 of the report limited the obligation of procurement funds until a number of avionics problems are addressed, although at a low level than the House provision (5 hours of avionics stability versus 20 hours). Conferees followed the Senate recommendation to add $56 million interchangeable engine development to the Navy's JSF R&D account, and granted multi-year procurement authority (234 aircraft) for the F/A-18E/F program. Conferees matched the V-22 funding requests. House conferees receded their Sec. 812 on requiring DoD to buy more American-made defense products.

In their report (H.Rept. 108-187, H.R. 2658) House appropriators matched the Administration's request for V-22 and F/A-18E/F procurement and R&D funding. Following authorizers, appropriators cut $161 million from F/A-22 procurement request due to vendor cost savings, and matched the request for F/A-22 R&D funds. Citing "systems engineering and mission support," and "critical design review," House appropriators cut $132 million from DoD's request for JSF R&D funding.

In their report (S.Rept. 108-76, S. 1383), Senate appropriators increased the Navy's request for F/A-18E/F procurement funding by $29 million for Shared Reconnaissance Pod and ancillary equipment and matched the request for F/A-18E/F R&D funding. Appropriators matched the Navy's and the Air Force's request for V-22 procurement funding. The committee matched the Air Force's request for CV-22 R&D funding, but cut $34 million from the Navy's V-22 R&D request and transferred it to the Special Operations Command account for an additional test asset. Following the House, Senate appropriators reduced the Air Force's request for procurement funds to build 22 F/A-22 aircraft by $161 million. They matched the USAF request for F/A-22 R&D funds.

Regarding the JSF, Senate appropriators wrote that "The committee is dismayed that JSF program office was permitted to take a reduction for inflation savings disproportionately against the F136 Interchangeable Engine" which resulted in a $56 million cut in the request for FY04. So, appropriators cut $56 million from JSF R&D request (combined USN and USAF) to be taken from the R&D program with the exception of the F136 engine program. (P.157) The committee added $20 million for F136 Interchangeable Engine risk reduction.

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[9] Marc Selinger. "White House: JSF Jeopardized By House Defense Bill." *Aerospace Daily.* May 23, 2003. William Matthews. "Congress, Bush Dispute 'Buy American' Bills." *Defense News.* June 16, 2003.

In their report (H.Rept. 108-283, H.R. 2658), appropriations conferees matched all funding requests for the V-22 program, but transferred $34 million from the Navy R&D account to the Defense Wide R&D account. Conferees increased F/A-18E/F procurement by $27 million for the Shared Reconnaissance Pod and ancillary equipment and matched F/A-18E/F R&D funding request. Conferees cut the Air Force's F/A-22 procurement request by $80 million due to vendor cost savings but matched the request for R&D funding. A total of $43.2 million was cut from the JSF R&D request. Conferees cut $54 million due to excessive management support and added $14 million for risk reduction on the F-136 interchangeable engine. To reflect their concerns that the JSF Program Office had applied disproportionately to the F-136 engine inflation adjustments, conferees cut $56 million from the entire program and reinstated $52.8 million to the F-135 development